



**University of
New Hampshire**

GRADUATE ACADEMIC CATALOG

2018–2019

General Information

Academic Regulations and Degree Requirements

Programs of Study

Course Descriptions

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GRADUATE

Introduction

The University of New Hampshire enrolls 12,000 undergraduate students and 2,400 graduate students in Durham and has a full-time faculty of more than 600. A comprehensive research university, it retains the look and feel of a New England liberal arts college with a faculty dedicated to teaching. The University is ideally located within easy driving distance to the White Mountains, the Seacoast area of New Hampshire, and Boston.

UNH is a land-, sea-, and space-grant research university. It comprises the following academic units: the College of Engineering and Physical Sciences; College of Liberal Arts; College of Life Sciences and Agriculture, which includes the Thompson School of Applied Science; College of Health and Human Services; Peter T. Paul College of Business and Economics; University of New Hampshire at Manchester; University of New Hampshire School of Law in Concord; and the Graduate School.

The University System of New Hampshire, of which UNH is a member, also includes Keene State College, Plymouth State University, and Granite State College.

The University awarded its first Ph.D. in 1896, placing it among the earliest American universities to award that degree. Doctoral programs in their present form began in the 1950s.

Academic Regulations and Degree Requirements

It is the student's responsibility to become familiar with the academic regulations and degree requirements of the Graduate School as well as the special requirements of their own academic program. The general requirements of the Graduate School are found in the catalog. Individual program requirements may be found in the catalog or obtained from the respective department.

<http://www.gradschool.unh.edu/>

Academic Honesty

Academic honesty is a core value at the University of New Hampshire. The members of its academic community both require and expect one another to conduct themselves with integrity. This means that each member will adhere to the principles and rules of the University and pursue academic work in a straightforward and truthful manner, free from deception or fraud. The academic honesty policy can be found in the Student Rights, Rules, and Responsibilities (<https://www.unh.edu/student-life>) handbook.

Academic Standards

Academic Standards

Graduate students receiving grades below "B-" in 9 or more credits, including undergraduate courses taken while a graduate student, will be dismissed from the Graduate School.¹

Graduate students enrolled under the accelerated master's program receiving any grade below "B-" in a graduate course while in dual status may be dismissed and have their admission to the Graduate School withdrawn.

Graduate students will have a maximum of two opportunities to successfully complete final examinations for the master's or Ed.S. degree.

Doctoral students will have a maximum of two opportunities to successfully complete qualifying or final examinations for the Ph.D. degree.

Graduate students admitted on a conditional or provisional basis must meet the conditions or provisions as stated in the letter of admission in order to remain in the Graduate School.

Graduate students **MUST** have a cumulative GPA of 3.0 or higher in order to graduate.

- Each individual program may set and announce standards for coursework, examinations, and/or research achievement that are more rigorous than the Graduate School standard. Thus, students may be dismissed if they accumulate fewer than 9 credits below the "B-" level, and/or fail to make adequate progress in other aspects of their graduate program.

Appeals Procedure

Policy and Appeals Procedure for Graduate Students Dismissed for Failure to Make Satisfactory Academic Progress or Professional, Ethical, or Behavioral Misconduct

The process by which a student can be dismissed for violations of academic standards or violations of professional, ethical, and/or behavioral expectations of the program is outlined below along with the process by which such decisions can be appealed.

Dismissal for Failure to Make Satisfactory Academic Progress

(Note: This procedure is not available to graduate students who have received failing grades in 9 or more credits.)

A department chairperson or a graduate program coordinator, upon the recommendation of the appropriate faculty committee, may recommend dismissal for a student who is failing to make satisfactory academic progress in their program. This recommendation shall be forwarded in writing to the associate dean of the Graduate School with a copy to the affected student. The associate dean of the Graduate School will act on the faculty recommendation and inform the student and the graduate program coordinator or department chair of the action taken. A student disagreeing with the action taken should make every effort to resolve the situation through informal discussions with the individuals involved in the decision. If the recommendation to dismiss is changed at this point, the associate dean will be notified and after review will notify the student of the decision. If the decision to dismiss stands, a student wishing to enter a formal appeal shall follow the procedure outlined below. A student who has been dismissed for failure to make satisfactory academic progress may, with the permission of the dean of the Graduate School, enroll as a special student in courses in his/her program pending a final decision on the appeal.

Dismissal for Professional, Ethical, or Behavioral Misconduct

Graduate students shall conduct themselves in a manner consistent with the norms and practices of their program and/or discipline.

A department chairperson or graduate program coordinator, upon the recommendation of the appropriate faculty committee at the department/program level, may recommend dismissal for a student who

is failing to meet the professional, ethical, and behavioral expectations of the program or otherwise fails to act in ways that are consistent with the norms and standards of the profession or discipline. This recommendation shall be forwarded in writing to the associate dean of the Graduate School with a copy to the affected student. The associate dean of the Graduate School shall act on the faculty recommendation and inform the student and the graduate program coordinator or department chair of the action taken. A student disagreeing with the action taken should make every effort to resolve the situation through informal discussions with the individuals involved in the decision. If the recommendation to dismiss is changed at this point, the associate dean will be notified and after review will notify the student of the decision. If the decision to dismiss stands, a student wishing to enter a formal appeal shall follow the procedure outlined below. A student who has been dismissed for professional, ethical, or behavioral misconduct may, with the permission of the dean of the Graduate School, enroll as a special student in courses in his/her program pending a final decision on the appeal.

Appeals Process for Graduate Students Dismissed for Failure to Make Satisfactory Academic Progress or Professional, Ethical, or Behavioral Misconduct

Step 1: The student shall request that the faculty member or committee making the original recommendation reconsider their decision, generally within 10 working days after the receipt of the official decision from the Graduate School. The student's request shall be written and shall contain any information which the student feels warrants a reconsideration of the decision. A copy of the request shall be sent to the dean of the Graduate School. As soon as possible after receiving this request, the faculty member or committee group will reconsider their decision and notify the student and the dean of the Graduate School of the result of their deliberations in writing. If the original recommendation is reversed at Step 1, the associate dean will review the new material and act on the recommendation and inform all parties involved.

Step 2: If the student is not satisfied with the decision reached in Step 1, they may request that the chairperson of the appropriate department or program convene a meeting of all graduate faculty members in the department or program to review the decision, generally within 10 working days after the receipt of the official decision reached in Step 1. The student's request shall be in writing, and a copy shall be sent to the dean of the Graduate School. After the meeting, the chairperson will provide the student and the dean of the Graduate School with written notification of the decision of the faculty. If the recommendation to dismiss is reversed by the graduate faculty, the associate dean will again review the case, act on the recommendation and inform all parties involved.

Step 3: If the student is dissatisfied with the decision reached in Step 2, they may request that the dean of the Graduate School review the decision, generally within 10 working days after the receipt of the official decision reached in Step 2. The student must request such a review in writing and stipulate the reasons for dissatisfaction with the decisions reached in the earlier steps in the review procedure. Within a reasonable period of time, the dean of the Graduate School will hold separate meetings with the student and the appropriate faculty and the associate dean to discuss the case. After these meetings and after reviewing any other information deemed appropriate, the dean of the Graduate School will inform the college dean about the appeal process to date. In consultation with the Graduate Council, the dean of the Graduate School

will then arrive at a final decision, which will be communicated in writing to the student, the department or program faculty, and the college dean.

In Steps 1 and 2, the student may, at the discretion of the faculty body involved in hearing the appeal, be present to state their case during the review of the appeal. A member of the University community may appear with the student, as an adviser, before the dean of the Graduate School and before any faculty meeting, which the student is permitted to attend. An adviser may be present, but may not directly participate, in any of these proceedings. Students shall not be present during deliberations.

Approved by the Graduate Council, April 6th, 2010.

Amended with approval by the Graduate Council November 3rd, 2017.

Credit Transfer

A maximum of 12 credits taken by a student prior to matriculation (internal and external combined) can be applied to a degree program.

External to UNH

Students may request that a maximum of two courses, for up to 8 semester credit hours of graduate level coursework from an accredited institution authorized to grant graduate degrees, be transferred to count toward their graduate program. Courses must be at the graduate level and cannot have been used or be in the process of being used in earning another graduate degree or have been taken while completing a bachelor's degree. A grade of **B** or better must have been earned.

Transfer of credits must be recommended by the program faculty and approved by the dean of the Graduate School. Students taking courses at another university for transfer after enrolling at UNH should obtain approval of their adviser and the graduate dean prior to enrolling in the course.

Internal to UNH

A maximum of 12 credits completed by a nondegree student in UNH graduate courses (800 or 900 level) at UNH or UNHM may, upon approval of the dean of the Graduate School, be applied to a student's degree program. Each program's faculty retain discretion regarding the maximum number of graduate credits that will be recommended for approval (not exceeding 12).

Continuing Education Units

The Continuing Education Unit (CEU) is a nationally recognized method of quantifying the time spent in the classroom during professional development and training activities. Ten hours of instruction = 1.0 CEU. One hour of instruction = 0.1 CEU. CEUs are not transferable as graduate credit.

Degree Requirements

Doctoral Degree Requirements

The degree of **doctor of philosophy** is conferred on qualified candidates who have passed an oral or written examination(s) on the subject matter of their field of study, who have completed an original investigation in this field and have embodied the results in an acceptable dissertation, and who have passed an oral examination in defense of the dissertation. The degree of doctor of philosophy is essentially a research degree.

The degree of **doctor of nursing practice** is a practice based doctorate that prepares nurses for the highest level of specialized nursing practice. DNP graduates are prepared to translate evidence into practice, improve systems of care, and measure health outcomes in diverse settings. Graduates of the DNP program are prepared for culturally competent, evidence-based, system-based care, interprofessional collaboration and leadership. DNP graduates are distinguished by their abilities to:

- Affect practice
- Design and implement programs that improve health and healthcare delivery
- Apply data management and informatics skills to evaluate programs, outcomes, and care systems
- Influence health policy

Responsible Conduct of Research

As a land-grant institution, the University of New Hampshire (UNH) is accountable to New Hampshire residents and to the University community to ensure the ethical and safe conduct of research and scholarly activity. As an institution of higher education that prides itself on extensive research endeavors and the involvement of undergraduates and graduate students in research projects, UNH has an obligation to teach and actively promote integrity in research and scholarship.

To fulfill its obligations, UNH has embarked on a program on the responsible conduct of research and scholarly activity (RCR) to:

- Raise the consciousness of faculty, staff, and students regarding the ethical and responsible conduct of research and scholarly activity#
- Establish a knowledge base that defines normative and/or professional behavior to assist faculty, staff, and students in making ethical and responsible decisions in the conduct of research and scholarly activity# and
- Foster an institutional culture of integrity in research and scholarly activity.

To support these efforts, the Graduate Council has mandated that all incoming Ph.D. students complete RCR training approved by the Graduate School by the end of their first semester. For more information, visit the RCR website (<http://www.unh.edu/research/responsible-conduct-research-scholarly-activity>).

Guidance Committee

A guidance committee is appointed by the dean of the Graduate School upon the recommendation of the program faculty as soon as possible after a student has begun study for the Ph.D. degree. The committee assists the student in outlining a program and preparing for the qualifying examination, and administers the examination.

Residency

A minimum of three academic years of graduate study is required for the Ph.D. degree. Resident graduate work done at other universities may be counted toward the minimum requirement upon approval of the guidance committee and the dean of the Graduate School, but one full academic year must be in residence at the University of New Hampshire. In individual cases, the major department and the dean of the Graduate School may grant permission to pursue the research for the dissertation at another institution where access to special facilities would be advantageous.

Credits

Each program specifies the number of courses required for the Ph.D. degree.

The DNP program requires 21-33 credit hours.

Doctoral Research (999)

A minimum of two semesters of registration in Doctoral Research is required for Ph.D. students. However, Ph.D. students at candidacy must register for 999 each semester during the academic year, even if the minimum requirement has been met. Although Doctoral Research (999) is 0 credits, it grants full time student status.

Degree Candidacy

A Ph.D. student is advanced to candidacy for the degree by the dean of the Graduate School upon recommendation of the graduate program coordinator after the student has passed the qualifying examination, met the language or proficiency requirements as are deemed desirable by the student's program, and declared a topic for dissertation research.

Students are expected to file an Advancement to Candidacy form with the Graduate School once all of the requirements for candidacy have been met. Ph.D. students at candidacy must register for Doctoral Research (999) each semester during the academic year until the degree is awarded.

Note: If doctoral candidacy is reached before the final day to register for the current semester, then candidacy shall be effective immediately. If doctoral candidacy is reached after the final day to register for the current semester then candidacy shall be effective at the start of the following semester.

Qualifying Examination

The qualifying examination, which must be taken at UNH, is required and may be written, oral, or both. This examination will test

1. the student's general knowledge in the student's major and minor work and
2. the student's fitness for engaging in research, particularly in the subject proposed for the dissertation.

The chairperson of the student's program will communicate the examination results to the Graduate School dean. (See academic standards for details.)

Language/Research Proficiency

Each doctoral program has its own language and/or research proficiency requirements. These requirements can be found in the individual program descriptions.

Doctoral Committee

After a Ph.D. student has been advanced to candidacy, a doctoral committee will be appointed to supervise and pass on the dissertation and administer the final examination. This committee will be nominated by the department of major concentration and appointed by the dean of the Graduate School. It shall consist of a minimum of five members, usually three from the major department and two from related departments. The dean of the Graduate School is an ex officio member of all doctoral committees.

Dissertation

The dissertation must be a significant contribution to scholarship in the student's discipline, demonstrating the student's ability to conduct independent and original research and to communicate the results of the research through a coherent, integrated, and mature piece of writing.

Final Defense

A copy of the completed dissertation must be made available to the members of the examining committee two weeks before the final examination date.

The final oral examination is conducted by the doctoral committee and is intended to give the candidate an opportunity to defend the dissertation. While it is desirable for all committee members to participate in dissertation defenses, whether in person or through virtual means such as conference calls or video conferencing, outside scholars are not required to be present at the defense. Departments will determine how to obtain meaningful and substantive evaluations from external members in consultation with the Graduate School. A written final examination, on subject matter not covered in the qualifying examination, may also be required. This written examination is conducted by the major department. These final examinations must be completed by the date listed in the Graduate School calendar. After consultation with the major program, the dean of the Graduate School may appoint, for participation in the final oral examination, additional members of the faculty under whom the student has worked. The doctoral committee alone shall decide on the merits of the candidate's performance by a majority vote.

Submission of Dissertation

The final approved dissertation must be submitted for publication by ProQuest via the UNH ETD Administrator website by the appropriate deadline as published in the Graduate School calendar. Bound copies are available for purchase through ProQuest at the time of submission. Students should check with their department to determine if a bound copy is required. Students may choose to copyright their thesis at the time of publication. All fees are to be paid by the student at the time of submission. If the dissertation material is further published, it should be designated as having been accepted as a doctoral dissertation by the University of New Hampshire.

Doctoral Time Limit

All graduate work for the doctorate must be completed within eight years of matriculation (enrollment after admission) or within seven years if the student entered with a master's degree in the same field. A Ph.D. student must be advanced to candidacy within five years after matriculation or within four years if the student entered with a master's in the same field.

Master's Degree Requirements Credits

A minimum of 30 graduate credits is required for all master's degrees. Many programs require substantially more than the minimum 30 credits. Individual program requirements are outlined in the program descriptions of this catalog. Graduate credits are normally earned in courses numbered 800-999. Up to 12 credits earned in courses numbered 700-799 may be taken for graduate credit by master's degree students provided the courses are approved by the dean of the Graduate School and given in a department other than the one in which the degree is sought.

Residency

A student will normally spend at least one calendar year, or the equivalent, in satisfying the requirements for the degree.

Capstone Experience

The most appropriate capstone experience(s) for each program is determined by the faculty of each program. Such experiences may include a single integrative course, a performance, an internship or praxis, a portfolio, a scholarly paper or essay, an examination, a research problem, a research project, or a research thesis, and are subject to approval of the dean of the Graduate School. All master's degrees at UNH must include a capstone experience.

Capstone – Non--thesis Option

Requirements for non-thesis capstone experiences must be clearly articulated by each program. Capstone experiences, with the exception of capstone courses, must be approved by a committee of at least two faculty members in the student's program and approved by the graduate program coordinator. All capstone experiences must be completed by the end of the final examination period of the graduation date for which the degree is to be conferred.

Capstone--Thesis Option

Students who are in a thesis program are required to conduct research and prepare a scholarly paper under the guidance of a faculty committee for submission to the Graduate School. Guidelines on the purpose, framework, and process for the thesis should be clearly articulated by each program. Students writing a thesis should obtain a copy of the *Thesis and Dissertation Manual* from the Graduate School website at www.gradschool.unh.edu. Students in thesis programs may also be required to pass a final examination. The regulations concerning this exam are the same as those in the non-thesis option. The thesis committee will normally also serve as the examining committee.

Thesis

Thesis Credit

During their degree program, a student completing a thesis must enroll in 6–10 thesis credits. Students are not eligible to receive credit for any more than 10 thesis credits. The exact number of thesis credits that are required for each degree will be determined by the faculty of the individual programs. No thesis credit shall be given until the completed thesis has been approved by the thesis committee and accepted by the Graduate School. Satisfactory acceptance of the thesis will be recorded as a credit (CR).

Thesis Committee

A master's thesis must be approved by a committee composed of a regular member of the graduate faculty under whose direction it was written and two other members of the graduate faculty nominated by the department chairperson or graduate program coordinator and appointed by the dean of the Graduate School.

Submission of Thesis

The final approved thesis must be submitted for publication by ProQuest via the UNH ETD Administrator website by the appropriate deadline as published in the Graduate School calendar. Bound copies are available for purchase through ProQuest at the time of submission. Students should check with their department to determine if a bound copy is required.

Students may choose to copyright their thesis at the time of publication. All fees are to be paid by the student at the time of submission.

Master's Time Limit

All graduate work for any master's degree must be completed within six years from the date of matriculation (enrollment following admission) in the program. Progress toward the degree will be carefully monitored by the adviser and the Graduate School to ensure that adequate advancement is made toward the completion of the program and that any deficiencies noted at the time of admission are removed.

Dual Degrees

The Graduate School allows UNH students to pursue two degrees at UNH and count credits toward both degrees under the circumstances detailed below. Such credit will be granted only for graded coursework completed with a grade of "B–" or higher. Application of such credit toward a student's program for a second degree is subject to departmental recommendation and approval by the Graduate School. Dual degrees should be interpreted to include separate majors within the same degree, or a combination of two different degrees. Students will receive separate diplomas for each degree program. **Note: Dual degrees will NOT be awarded retroactively.**

1. **Accelerated Master's.** Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures# they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.20 cumulative grade point average is normally required to be considered for early admission. Students are normally admitted prior to the start of their last undergraduate semester. Students who have been admitted under early admission may register for a maximum of 12 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may, upon recommendation of the department and approval of the Graduate School, count toward both a bachelor's and master's degree.
2. **Consecutive Master's Degrees.** Enrollment in consecutive master's degrees refers to admission and matriculation in a second master's degree program at the University of New Hampshire after the completion of the requirements for a first master's degree earned at the University of New Hampshire. A student may apply up to 12 credits earned in the first master's degree awarded at the University of New Hampshire toward a second master's degree with approval of the student's graduate advisory committee and/or graduate program coordinator in the second master's program. Thesis or research credits from the first program may not be counted toward the requirements of the second program.
3. **Concurrent Dual Degrees.** Enrollment in concurrent dual degrees occurs when a student is admitted to and matriculated in two graduate degree programs at the University of New Hampshire simultaneously. A student may pursue concurrent degrees only with approval of the appropriate graduate program coordinator(s) and the dean of the Graduate School. With approval of the student's graduate advisory committee(s) and/or the graduate program coordinator(s), a student may apply up to 12 University of New Hampshire credits earned in one master's degree toward the requirements for a second master's degree. A student must complete the capstone requirements for both programs. Completion of degree requirements for the two programs need not be at the same time.
4. **Integrated Dual Degrees.** Integrated dual degrees occurs when two graduate programs have formalized a program of study which creates an integrated program linking the two disciplines, while

continuing to award separate degrees. Students must be admitted to both programs and complete the requirements for both degrees. Integrated dual degree programs may include a single admissions process, submission of a single thesis or capstone experience, and a single advisory committee composed of members from both programs. The number of required credit hours for integrated dual degrees must not be less than 80 percent of the total minimum hours required to complete each degree separately. Integrated dual degree programs must be approved by the Graduate Council and the dean of the Graduate School.

All standard policies relating to time to degree, residency requirements, academic standards, and minimum GPA required to graduate apply to any dual-degree arrangement.

If the student withdraws from one of the participating programs, the dual-degree arrangement is automatically nullified.

If a student's tuition is funded by one or more units, it is up to the funding unit to decide if tuition may cover courses taken solely for completion of the second program.

Educational Specialist Degree

Requirements for completion of the educational specialist degree (Ed.S.) are found under the program descriptions of the Department of Education. A student can petition to count a maximum of 12 credits, not previously applied to a degree program and taken prior to admission to the Ed.S., toward a Ed.S. program.

All graduate work for the Ed.S. must be completed within six years from the date of matriculation (enrollment after admission) in the program.

Certificate Programs

Graduate certificate programs require a minimum of 4 graduate courses and a minimum of 12 credits of graduate course work (800- or 900-level courses) organized in a coherent and logical manner to provide knowledge and expertise relevant to a specific aspect of professional and/or personal development. All coursework in a certificate program must be taken at UNH.

Only courses completed with a grade of B- or higher may be used to fulfill certificate requirements. A student who receives more than one grade below B- will be required to withdraw from the certificate program.

CERTIFICATE TIME LIMIT

All course work for a certificate must be completed within 3 years from the date of matriculation (enrollment) in the program after admission

Credit Transfer

A maximum of one full UNH course (3 or 4 credits) or two 1 or 2-credit UNH courses taken prior to matriculation (enrollment in the program after admission) in a certificate program may be applied to fulfill the certificate requirements. Courses may be applied to only one certificate program but may be applied to a master's or doctoral degree program at UNH. There are no upper limits to the number of credits that maybe applied to a degree program provided the courses fulfill a degree requirement.

Registration

Students enrolled only in certificate programs are exempt from the Graduate School's continuous enrollment policy.

Tuition

Tuition for NH residents in certificate programs will be equal to the rates for NH resident graduate degree students. Tuition for out-of-state students will be 10% above the resident rate, unless the student is also enrolled in a degree program, in which case the nonresident or New England Regional rate will apply. Students enrolled only in certificate programs are not eligible for graduate assistantships or scholarships unless specifically awarded by the sponsoring program, but may be eligible for need-based aid through the UNH Financial Aid Office. Students enrolled in degree programs as well as certificate programs are eligible for all forms of graduate financial support.

Graduation

Graduation occurs three times a year in September, December, and May. All students **MUST** file an intent-to-graduate form by the appropriate deadline specified on the Graduate School calendar (<http://gradschool.unh.edu/dates.php>). Students must file this form online through the MyUNH website. More information on this process is available on the Graduate School's website at <http://www.gradschool.unh.edu/graduation.php>. (<http://www.gradschool.unh.edu/graduation.html>)

All coursework completed prior to the official conferral of the degree will be applied only to that degree program. Graduate students **MUST** have a cumulative GPA of 3.0 or higher in order to graduate.

Commencement

The annual commencement ceremony is held in May.

Doctoral, Master's and Ed.S. students who earned their degrees in the preceding September and December are invited to participate in commencement ceremonies in May.

Master's and Ed.S. students who expect to complete their degree program in May, as well as those who expect to complete their programs at the end of the summer term following the commencement ceremony (September), are eligible to participate in the May commencement ceremony. Students who file their intent-to-graduate online for either May or September by the last deadline to file for May will be listed in the commencement book.

Doctoral students must have completed all requirements for the degree by the published deadlines for May in order to participate in the May ceremony. Only those candidates who have completed their program are listed in the commencement book.

Master's and Ed.S. students who intend to participate in the May ceremony must register to attend through the Commencement Office. Doctoral students should register to attend through the Graduate School.

For more information on how to register for commencement please visit the UNH Commencement Website www.unh.edu/presidentialevents/commencement (<http://www.unh.edu/presidentialevents/commencement>).

Graduate Courses

Graduate credits may be earned in courses numbered from 800 through 999, or under limited circumstances in courses numbered at the 700 level.

The faculty of each graduate program prescribes the courses that make up the degree program. In addition, the Graduate School has general requirements for master's and doctoral degree programs.

800- and 900--Level Courses

800- and 900- level courses are offered for graduate credit only and therefore are open only to admitted graduate students or non-degree students with a minimum of a bachelor's degree.

700-Level Courses

700-level courses are advanced undergraduate courses. Up to 12 credits earned in 700-level courses may be petitioned for graduate credit by a graduate degree student, provided the credits are taken in a program other than the one in which the student is seeking the degree and provided such courses are approved by the student's adviser, graduate program coordinator, and the dean of the Graduate School. Such courses must be taken for a letter grade. Petitions must include what additional requirements or expectations will be required of the student to make the course a graduate level experience. Petition forms are available at <http://www.gradschool.unh.edu/fp.php>

Simultaneous 700/800 Courses

800-level courses may be cross-listed with 700-level courses and taught simultaneously to both graduate and undergraduate students. While the content of the course is the same, the requirements and expectations of the students differ substantially with assignments, examinations, projects and analyses demonstrating a broader depth of understanding, sophistication and skills for students enrolled at the 800-level.

Graduate credit will not be given for any courses (700-level or simultaneous 700/800 level) that have freshmen or sophomores enrolled. The Graduate School monitors those advanced-level undergraduate courses that are co-listed and co-taught with 800-level graduate courses to ensure that only advanced-level undergraduates are enrolled.

Graduate Grading

Letter grades: The following grades are used at the University: A (4.0), A- (3.67), B+ (3.33), B (3.0), B- (2.67), C+ (2.33), C (2.0), C- (1.67), D+ (1.33), D (1.0), D- (.67), F (0). Graduate credit is only granted for courses completed with a grade of B- or higher. Individual programs may have stricter requirements, and those are published with their degree program requirements.

AF Grades: An "AF" grade, Administrative F, is assigned for failure to either drop or complete a course. An "AF" is considered the same as an "F"

Credit/Fail Grades: A "CR" grade is assigned for complete, approved theses and dissertations, as well as other approved courses and seminars.

Pass/Fail Grades: Graduate courses cannot be taken pass/fail. A graduate student may petition to take undergraduate courses on a pass/fail basis. Such a petition must be approved by the end of the add period for the term the course is taken. A grade of "C" is the minimum grade in order to receive a "P." Courses at the 700-level approved for graduate credit cannot be taken for pass/fail.

Audit Grades: An "AU" grade is assigned for completion of courses for which an audit was granted. No credit is earned.

Incomplete Grades: An "IC" grade is assigned with the approval of the instructor for excused unfinished work only. The work must be completed and submitted to the instructor by the date agreed upon with the instructor, but not later than the last day of classes of the semester immediately following the one in which the incomplete was granted (800- and 900-level courses only# midsemester deadline for 400-, 500-, 600-, and 700-level courses). If extraordinary circumstances arise, a petition requesting additional time may be submitted. The petition, listing a specific deadline for completion, must be approved by the instructor, the student's adviser, and graduate program coordinator before being submitted to the Graduate School. An extension will be granted by the dean only under unusual circumstances and will usually not exceed one calendar year from the end of the semester in which the course was originally taken. An incomplete grade becomes an "F" if not resolved or if a petition for an extension is not approved within the allotted time period. This policy also applies to students who withdraw from the University or who are on an approved leave of absence.

IA Grades: An "IA" grade is assigned for approved continuing courses such as thesis or doctoral research and remains on the record until the course requirements are completed. In the case of doctoral research, the "IA" grades remain on the official transcript for all semesters prior to the completion of the degree. The "IA" grade for the final term of enrollment will be changed to "CR" to signify successful completion of the dissertation.

W Grades: If a student withdraws from school or drops a course prior to the fifth Friday of the semester, the course(s) will not appear on the student's permanent record. If a student withdraws from school or, for compelling nonacademic reasons, submits an approved petition to drop a course after the fifth Friday of the semester, a notation of "W" will be shown on the student's academic record. If the withdrawal or drop is after the midpoint in the class, a grade of "WP" or "WF" is shown on the record. A "WF" is considered a failing grade and will calculate into the GPA as such. Deadlines for courses scheduled for any time period other than a full semester are apportioned at the same rate as semester courses. The actual dates are determined on a term-by-term basis.

Appeals: Every instructor must be prepared to discuss and explain the basis for her or his evaluation of students. If, after consulting the instructor, a student still believes that he or she was treated unfairly, he or she has the right to seek redress from the chairperson of the department or program in which the course is offered. Under exceptional circumstances, a final appeal may be made to the dean of the college or school in which the program is offered.

Repeated courses: Repeating a course does not remove the original course or grade from the record. If the course numbers and/or titles do not match exactly, graduate students must obtain written permission of their adviser, graduate program coordinator, and the endorsement of the Graduate School dean before the adjustment will be made. Only the most recent grade is included in the cumulative grade-point average# only the most recent credit, if any, is included in the cumulative credits earned. A course may only be repeated once. Only repeated courses taken at UNH will alter the cumulative grade-point average.

UNH Credit Hour Policy

The University of New Hampshire is in compliance with the federal definition of credit hour. For each credit hour, the University requires, at a minimum, the equivalent of three hours of student academic work each week. Academic work includes, but is not limited to, direct faculty instruction, e-learning, recitation, laboratory work, studio work, fieldwork,

performance, internships, and practica. Additional academic activities include, but are not limited to, readings, reflections, essays, reports, inquiry, problem solving, rehearsal, collaborations, theses, and electronic interactions. Student work reflects intended learning outcomes and is verified through evidence of student achievement.

Information and Policy

Graduate Education

The mission of the Graduate School is to provide innovative, responsive, and accessible master's and doctoral degree programs of the highest quality to graduate students. Our programs foster a close interdependence between research and classroom teaching. The 600 graduate faculty members and more than 2,200 graduate students at UNH work together to develop new theoretical and empirical knowledge, design innovative methods and technologies to discover and disseminate that knowledge, and engage in undergraduate and graduate state-of-the-art teaching. The Graduate School is a source of intellectual capital for the University, the region, and the nation.

UNH is the primary institution within the University System of New Hampshire responsible for providing graduate programs that meet state, regional, and national needs and the only one at which doctoral programs are offered. Other units of the University System do offer some master's degree programs.

The Graduate School is led by the dean, who implements the policies of the graduate faculty. The dean is advised by the Graduate Council, which is composed of elected faculty members and graduate student representatives.

Graduate School

www.gradschool.unh.edu (<http://www.gradschool.unh.edu>)

The Graduate School provides assistance to prospective and current students from the time of their first inquiry about graduate study until completion of their graduate programs. Students are encouraged to contact the Graduate School staff with questions regarding academic policy, financial assistance (scholarships, fellowships, and travel grants), and availability of University services.

Graduate Council

The Graduate Council is comprised of 12 graduate faculty members and four graduate students. The council advises the dean of the Graduate School on policies concerning graduate education and is responsible to the graduate faculty for recommendations concerning new graduate programs. Standing committees of the council include the doctoral program committee, the master's program committee, the student affairs committee, and program review committee.

Certificate Programs

The purpose of graduate certificate programs is to serve the needs of both matriculated and non-degree students interested in developing specific skills and knowledge for personal and/or professional development. Graduate certificate programs are credit-based, taught by regular or associate members of the graduate faculty, and normally aligned with existing graduate education curricula.

Master's Programs

The University offers master's degree programs in a wide variety of disciplines, which can serve either as professional terminal degrees or as intermediate degrees for those intending to pursue further graduate study. In many programs, students can elect options that will permit them to study one aspect of a discipline in depth by preparing a thesis or to gain a broader mastery of a discipline by electing to take coursework in lieu of a thesis.

Doctoral Programs

The University offers doctoral programs in those disciplines that have both the faculty and facilities to support high-quality advanced graduate education. Care has also been taken to ensure that the programs will make a significant contribution to the opportunities for doctoral education in the New England region. Doctoral education properly focuses on preparing the student to contribute to the growth of knowledge through research. Most doctoral programs also provide opportunities for students to work as teaching assistants and to participate in seminars on teaching led by experienced faculty members. After receiving a dual grounding in the development and communication of knowledge, graduates from UNH doctoral programs have gone on to find excellent teaching and research positions.

Interdisciplinary Programs

The Graduate School encourages and supports interdisciplinary study within existing programs and in the form of new and innovative graduate curricula. While self-designed courses of study are not available at the University, many of our programs offer a range of electives, cross-disciplinary study, and independent projects that allow students to tailor their work to reflect individual interests. This is especially true at the doctoral level. In addition, the Graduate School oversees intercollegiate programs that involve faculty and coursework from more than one school or college. Intercollegiate programs offer students the opportunity to pursue new and emerging fields of study that draw upon multiple disciplines, leading to solid disciplinary foundations as well as cross-disciplinary skills useful for solving new social and scientific problems. Opportunities for interdisciplinary research are also available in the institutes and centers at the University.

UNH Graduate School Manchester Office

www.gradschool.unh.edu/manchester (<http://www.gradschool.unh.edu/manchester>)

The University of New Hampshire Graduate School Manchester Office offers post baccalaureate programs in applied professional fields. Centrally located in Manchester's historic Millyard in the heart of the I-93 corridor, the Graduate School offers the expertise of University of New Hampshire faculty, contemporary curricula, modern educational facilities, convenient access, flexible schedules, and most important, a graduate degree from the University of New Hampshire, the state's flagship public university.

UNH Online

<https://online.unh.edu/>

UNH Online students receive the same high quality education and University of New Hampshire diploma as students studying on campus. Online programs & courses offer flexibility, intimate class sizes, and high quality technology solutions to enhance the learning experience.

McNair Graduate Opportunity Program

www.unh.edu/mcnair (<http://www.unh.edu/mcnair>)

The McNair Graduate Opportunity Program provides eligible undergraduate students with ongoing consultation and support from faculty mentors and staff to help ensure their success in making the transition from undergraduate to graduate education. There is both an academic year and a summer component to the program. An application is required.

Graduate Student Senate

The Graduate Student Senate (GSS) provides a collective voice for the more than 2,000 graduate students who form an integral part of the University community. The representative structure of the GSS comprises representatives from each college and on-campus housing unit. GSS representatives advocate for graduate students at the USNH Board of Trustees and on various University boards and committees. The GSS also promotes the graduate student community by sponsoring professional development opportunities and social events.

Communication to Students

University communications are sent to students through the following channels:

WEBCAT

Students receive billing statements, register, and view grades, student accounts, and financial aid awards through Webcat, a part of MyUNH.

UNIVERSITY E-MAIL

Important notifications are sent to students by many departments and offices via a UNH e-mail address that is assigned by the University. Students are responsible for checking this e-mail address on a regular basis.

MYUNH

Course material and University announcements are available through MyUNH, a student portal system.

MAIL TO PERMANENT ADDRESS

Some notifications are sent in the student's name to the permanent mailing address.

About the Catalog

The University provides information pertaining to the Family Educational Rights and Privacy Act of 1974 (the "Buckley Amendment") in the annual student handbook. Information is also available from the office of the Senior Vice Provost for Student Life and Dean of Students. The annual student handbook publication, Student Rights, Rules, and Responsibilities (<https://www.unh.edu/student-life>), also contains University regulations and policies regarding student conduct.

The University will supply information about the employment of its graduates who have graduated from our degree and/or certificate programs. This information may be obtained upon request from the University's Advising and Career Center and is available by university, college, or school to current and prospective students. Information on employment outcomes depends on student self-reporting. The University does not guarantee employment to its graduates. Chances for employment are enhanced if students have begun career planning early in their degree programs.

Program descriptions may vary from the actual content or requirements because of advancements in the discipline or the active nature of academic planning and decision making. Accordingly, the University reserves the right to make whatever changes are deemed necessary in schedules, course content, requirements, academic programs (including their termination), calendar, tuition and fees, services, or any other aspect of the University's operations, giving whatever notice thereof is reasonable under the circumstances. Therefore, the provisions of this catalog are not an irrevocable contract between the students

and the University. The University is also not responsible for failure to provide or for delay in providing expected services and/or facilities when such failure arises from causes beyond the reasonable control of the University.

All aforementioned publications are available in alternate formats upon request.

Admissions

In this section, you'll find details regarding the University's admission and course registration process. Please contact us at the Graduate School or at the Registrar's Office if you need further clarification. We will be happy to answer your questions regarding University procedures and policy.

Applying for Admission

Persons holding a baccalaureate degree from an accredited college or university may apply for admission to the Graduate School. Admission is both limited and competitive and is based solely upon academic qualifications and potential of the individual.

All application materials become part of the permanent records of the University of New Hampshire and will not be returned. Access to this material is limited under the Family Rights and Privacy Act of 1974. Applicants who are not admitted, or who are admitted and do not register in the Graduate School, do not have access to their application files. Materials received as part of the application process will not be duplicated for personal use by the applicant or forwarded to a third party. Materials received from applicants who do not complete their application, who are not admitted, or who are admitted and do not register are held for two years before being destroyed.

Application procedures, including deadlines and program-specific requirements, are available at the Graduate School website, <http://www.gradschool.unh.edu>.

Applicants from Foreign Countries

All applicants from non-English-speaking countries must, in addition to all of the above, provide Test of English as a Foreign Language (TOEFL) scores. A minimum TOEFL score of 80 on the Internet-Based test is required for admission. TOEFL scores are valid for only two years. The International English Language Testing System (IELTS) is also accepted with a minimum score of 6.5. A financial declaration on official University forms is also required should you be admitted. A four-year baccalaureate degree, or equivalent, is normally the minimum academic certification required for admission.

Applications from residents of foreign countries will be considered only for regular full-time admission.

Application Deadlines

Application deadlines for admission and financial aid vary by program. These are updated on an annual basis and may be found on the Graduate School website.

International applicants are advised to have their applications completed at least four months prior to the session for which they are applying.

Incomplete Applications

Applications that remain incomplete after the first day of classes of the term for which admission was desired will be placed in an inactive status. A written request is required to reactivate an application.

Application Review

Once an application is complete, it is reviewed by an admissions committee of graduate faculty members, which makes recommendations to the Graduate School. The Graduate School will review these recommendations and make the final decision. While applicants with bachelor's degrees may apply directly to certain doctoral programs, the Graduate School also reserves the right to offer applicants admission at the master's degree level in its place.

Admission Categories

Official offers of admission from the Graduate School are made for a specific term and year in one of the following categories: regular, provisional, or conditional. Applicants who are in the final year of an undergraduate or, in some cases, a graduate degree program are contingent upon the successful completion of that degree program. An official final transcript showing grades and the awarding of the degree must be received by the Graduate School before the student may enroll for the graduate program.

Regular Admission

Regular admission may be offered to applicants whose academic records and supporting documents indicate that they are fully qualified to undertake graduate study in their chosen fields.

Provisional Admission

Provisional admission may be offered to applicants whose academic records and supporting documents indicate that they are qualified to undertake graduate study, but whose undergraduate preparation was not in the intended field of graduate study. Applicants offered provisional admission must meet the specific criteria, usually undergraduate coursework, stated at the time of their admission, before being changed to regular graduate student status.

Conditional Admission

Conditional admission may be offered to applicants whose academic records indicate deficiencies but suggest some promise of success in graduate study. Students offered conditional admission must meet the specific requirements stated at the time of their admission in order to remain in the Graduate School. Conditionally admitted students are not eligible for assistantships and scholarships offered through the Graduate School until the conditional status is removed.

Deferred Admission

Applicants who cannot enroll in the term for which admission was offered may request to have their admission deferred for up to one year. Such requests must be in writing and will be considered only once. Because enrollments are limited and competition for admission may vary from year to year, such requests may not be granted. Applicants who have received approved deferment of their admission cannot register for graduate coursework at the University during the period of deferment.

APPLICANTS NOT ADMITTED

Applicants who are denied admission may have their applications reconsidered only if they furnish significant additional material that was not available at the time of the original decision, such as evidence of further academic achievement or more recent and significantly improved GRE or GMAT scores. Reapplication is not encouraged.

Accelerated Master's Program

(University of New Hampshire Seniors)

Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit (the first semester of their senior year.) A 3.20 cumulative grade-point average is normally required to be considered for admission to the accelerated master's program.

Seniors who have been admitted under the accelerated master's program may register for a maximum of 12 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may upon recommendation of the department and approval of the Graduate School count toward both a bachelor's and master's degree.

Not all graduate programs participate. Each program's faculty retain discretion regarding whether their program admits students under the accelerated master's program, as well as the maximum number of graduate credits permitted (e.g., some programs will allow for a maximum of 8 credits). Applicants are strongly encouraged to meet with the graduate coordinator in the program's faculty to discuss the specifics of applying and enrollment.

Students admitted to the accelerated master's program must maintain a grade-point average of 3.20 throughout their senior year, complete their undergraduate degree as planned, and pass graduate courses taken for credit with a grade of B- or better. If these conditions are not met, admission may be withdrawn.

Dual-credit forms must be completed and approved by the dean of the Graduate School at the beginning of the semester for which dual credit is sought.

Non-Degree Students

Individuals holding baccalaureate degrees may register for graduate courses through Continuing Education, or through the UNH Graduate School's Manchester office. These individuals are designated as "non degree students." Non degree students are not required to file an application for admission to the Graduate School and are not candidates for a graduate degree. Non degree students are not normally permitted to register as full-time students (i.e., 9 or more credits). Please note the policy on transfer of credits (internal and external) in academic regulations and degree requirements.

<https://www.gradschool.unh.edu>

Academic and Support Services

Community, Equity and Diversity

For information and resources on ways that UNH invites a diversity of experiences to its learning community, visit: <https://www.unh.edu/inclusive/> as well as the four President's Commissions websites as described below. Faculty, staff, and student volunteer commission members are appointed each year by the president to advocate for improvement of UNH policies and practices that create inclusive curricula and welcoming classroom, living, and work environments for all.

In addition, each year, one graduate student is selected to serve on the Community, Equity and Diversity Advisory Council to monitor and assess the progress of the commissions.

INCLUSIVE EXCELLENCE INITIATIVES

Through educational programming, staff training opportunities, and academic research, our goal is to make the University of New Hampshire a more diverse, respectful community, one that communicates to all of its members that they are respected and that their contributions are valued.

COMMITMENT TO DIVERSITY AND INCLUSIVE EXCELLENCE

Diversity is a community value at the University of New Hampshire. We are committed to supporting and sustaining an educational community that is inclusive, diverse, and equitable. The values of diversity, inclusion, and equity are inextricably linked to our mission of teaching and research excellence, and we embrace these values as being critical to development, learning, and success. We expect nothing less than an accessible, multicultural community in which civility and respect are fostered, and discrimination and harassment are not tolerated. We will ensure that underrepresented groups and those who experience systemic inequity will have equal opportunities and feel welcome on our campus. We accept the responsibility of teaching and learning in a diverse democracy where social justice serves as a bridge between a quality liberal education and civic engagement.

President's Commissions

<https://www.unh.edu/inclusive/presidents-commissions>

The commissions work with other organizations, individuals, offices/depts., and administrative groups at UNH to recommend policies and programs that promote diversity of culture, curriculum and ideas among students, staff and administration at UNH. The commissions provide a forum for discussion and assessment of diversity and inclusion related issues and opportunities that are relevant to the campus community. Each commission is comprised of staff, students, faculty and community member volunteers who meet monthly.

PRESIDENT'S COMMISSION ON THE STATUS OF LESBIAN, GAY, BISEXUAL, AND TRANSGENDER PEOPLE (LGBTQ+)

The UNH President's Commission on the Status of **Lesbian, Gay, Bisexual, and Transgender People (LGBTQ+)** facilitates the development of a University community that is equitable and inclusive of all sexual orientations, gender identities, and gender expressions.

PRESIDENT'S COMMISSION ON THE STATUS OF PEOPLE OF COLOR

The UNH President's Commission on the Status of People of Color proposes, recommends, and evaluates programs, policies, and services aimed at fostering diversity on campus and ensuring a campus climate in support of people from under represented groups.

PRESIDENT'S COMMISSION ON THE STATUS OF PEOPLE WITH DISABILITIES

The President's Commission on the Status of People with Disabilities is to promote empowerment and inclusion of students, faculty, staff, and guests with disabilities and to develop universal access for a diverse group that includes individuals with visible and nonvisible disabilities.

The commission provides a forum for discussion of disability-related issues relevant for the campus and larger community.

PRESIDENT'S COMMISSION ON THE STATUS OF WOMEN

The UNH President's Commission on the Status of Women creates equal employment and educational opportunities, through policy, advocacy, and education, in its promotion of an environment free of sexism and discrimination.

Commuter and Non Traditional Student Services

Commuter & Non-Traditional Student Services at the University of New Hampshire is here to help you get the most out of your college experience. Whether you are a commuter, non-traditional, military-connected, or graduate student, our primary goals include helping you stay informed, connecting you to valuable resources, and supporting you through targeted programming.

For more information call (603) 862-0303 or visit <https://www.unh.edu/mub/commuter-services>.

Health and Wellness

The University has a nationally accredited health and wellness program. <https://www.unh.edu/health/>

MEDICAL SERVICES

Health Services provides comprehensive, student-focused, primary medical care through a team approach. The clinical staff consists of board-certified physicians, physician assistant, nurse practitioners, nurses, and medical assistants who are committed to prevention and holistic care. Primary medical care is provided for a large variety of common concerns. <https://www.unh.edu/health-services/services>

OFFICE OF HEALTH EDUCATION AND PROMOTION

The Office of Health Education and Promotion coordinates health promotion activities on campus. Services provided include educational programs/workshops, individual and group health counseling, and support to promote healthy lifestyle choices. <https://www.unh.edu/health-services/ohep>

STUDENT HEALTH BENEFITS PLAN

Health insurance is required as a condition of enrollment for full-time degree students at the University of New Hampshire. Some students have the option of waiving this requirement if they present proof of adequate coverage; alternatively, students can acquire an affordable health benefits plan sponsored by the University. For more information about the University's Student Health Benefits Plan, visit <https://www.unh.edu/health/shbp>.

IMMUNIZATION REQUIREMENT

Health Services requires proof of two Measles, Mumps and Rubella (MMR) vaccinations prior to attendance. Any student failing to complete this requirement may not be cleared to register for future classes. For more information on the requirement and completion of the on line health form, visit <https://www.unh.edu/health-services/incomingstudents>

Information Technology (IT)

UNH Information Technology delivers network and communications infrastructure, as well as provides IT services that support students, faculty & staff with learning & research. For a complete list of services

and to learn more visit the UNH IT Service Catalog (<https://www.unh.edu/it/services>). For information on how to use the services, visit the Self-Help Knowledge Base (<http://unh.edu/it/kb>). For more information call (603)862-4242 or visit <https://www.unh.edu/it>.

International Students and Scholars

The Office of International Students and Scholars (OISS) provides services to international students, faculty, staff and exchange scholars covering a broad spectrum, which begin before the international visitor arrives on campus and often continue past the completion of their program. These include: Preparation of eligibility documents for visa issuance along with pre-arrival instructions and information; Preparation of applications to U.S. immigration offices to secure appropriate work authorization for international faculty and staff; In-depth orientation programs for new students and scholars, covering a variety of issues such as immigration rights and responsibilities, adjusting to life in another culture, working in the U.S., adapting to the U.S. educational system, area attractions and services and much more; A variety of workshops and seminars such as immigration and employment workshops and career orientation seminars.

All international students are encouraged to maintain contact with the OISS and are required by law to report changes of address, academic program, or source of educational funds.

OISS also serves as a liaison between international students, faculty and staff and various other UNH offices and departments. For more information visit <https://www.unh.edu/global/international-students> or call (603) 862-1288.

Center for International Education and Global Engagement

<https://www.unh.edu/global/about>

The Center for International Education's mission is to promote and facilitate global learning and responsible world citizenship. The center helps UNH students, faculty, and New Hampshire citizens gain international knowledge and experience in order to better understand the complexities of world affairs and effectively respond to the global issues affecting their lives and livelihood. International knowledge, intercultural competence, and global preparedness are at the core of CIE's mission. CIE achieves its mission through its support of the *Report of the President's Panel on Internationalizing UNH* and through the following programmatic activities:

International Affairs Dual Major

To help students of every major develop critical global understanding, foreign language competency, and international experience

Study Abroad

For a new perspective and valuable first-hand experience in countries around the world

Scholarship Opportunities

To make direct international learning available to students with financial need

N.H. International Seminars

By eminent UNH and visiting scholars to engage the community on important international issue

Faculty Development

To support faculty to explore research and collaborations abroad to enrich classroom teaching and the UNH community

Library

The UNH Library consists of the main Dimond Library and three branch libraries specializing in chemistry (Parsons Hall), physics (DeMeritt Hall), and computer science, mathematics, and engineering (Kingsbury Hall) and a natural science resource center located on Level Two in Dimond. All science libraries have reserve materials, reference and circulating collections, periodicals, and electronic resources specific to their fields.

The Dimond Library offers seating for 1,200, three grand (quiet study) reading rooms, The Connors Writing center, Zeke's Café, and the Dimond Academic Commons (DAC) which is a "one-stop shop" for information needs including reference assistance, IT help, rich media equipment (with video and audio equipment to borrow), collaborative work spaces, computers, workstations, and laptops that can be borrowed for use in the Library. High-speed Wi-Fi is available throughout the building. Group study rooms can be reserved for groups of four to thirty.

In addition to more than a million volumes and access to 50,000 periodical subscriptions, the library has extensive collections of government documents, maps, sound recordings, CDs, videos, DVDs, and a Special Collections and Archives section with rare books, manuscripts, and University publications and papers. The UNH Library offers extensive electronic resources including Refworks, e-books, digital collections, indexes in many subject areas, statistical data sets, and databases supplying full-text periodical and newspaper articles. Library faculty and staff provide expert service to people seeking information or research assistance. Graduate students have additional privileges including access to recently renovated graduate carrels in room 441 on Level Four (please visit the Circulation Desk for the code) and extended borrowing. Graduate carrels have soft seating, individual study carrels, lockers, and Wi-Fi.

Through the UNH Library's membership in the Boston Library Consortium (BLC), UNH community members are entitled to visit any of the other 17 research institutions (including MIT, Tufts, Williams, and Wellesley) or request material through a virtual catalog from a combined collection totaling more than 34 million volumes. Requestors will be notified by e-mail when the material arrives. In addition, journal articles and books not available on site or through the BLC can be delivered from libraries worldwide through interlibrary loan. Most journal articles are received within 24 hours. The UNH Library is a member of the Boston Museum of Fine Arts; free passes are available at the Circulation Desk.

For more information on Dimond and the science libraries, visit www.library.unh.edu (<https://www.library.unh.edu>).

Military & Veteran Services

The mission of Military & Veteran Services is to provide the highest quality service and support to Student Veterans, Active Duty, National Guard and Reserve Members, and their families who may attend UNH as their dependents, as outlined in the Principles of Excellence (http://www.benefits.va.gov/gibill/principles_of_excellence.asp) and The 8 Keys of Success (<https://www.va.gov/opa/pressrel/pressrelease.cfm?id=2470>).

Military and Veteran Services (MVS) is the primary support (benefit, academic, personal or social) office for any military connected student. We are also the first line resource within the university community for information about educational benefits offered to support all military

connected students. We also play a central role on campus in educating and raising awareness within the university community and beyond with all issues related to the success of each of the military connected students at UNH.

For more information call (603) 862-0643, visit www.unh.edu/veterans (<http://www.unh.edu/veterans>) or e-mail UNH.Veterans@unh.edu.

Office of Multicultural Student Affairs (OMSA)

OMSA creates opportunities for people to participate in an inclusive community and to explore and understand diversity, social justice, inclusion, and equity via educational presentations, workshops, professional development and leadership opportunities, retreats, brown-bag discussions, etc. We serve all members of the UNH community through these various opportunities and beyond.

Our work is grounded in an understanding of diversity that includes people of all abilities, ages, ethnicities, genders, nationalities, races, religions, spiritual traditions, socio-economic classes, and sexual orientations.

Providing support, advising, advocacy, and student development for African American/Black/African/Caribbean, Hispanic/Latino/a, Asian/Asian American/Pacific Islanders, Native American/Indigenous/First Nations, Arab/Middle Eastern/Middle Eastern American, Biracial/Multiracial students, and Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning students, and First Generation College Students, as well as Ally students is at the heart of our work. For more information, please visit: www.unh.edu/omsa (<https://www.unh.edu/omsa>).

Office of Student Involvement and Leadership (OSIL)

The Office of Student Involvement & Leadership (OSIL) is the nucleus for student involvement at UNH. Working collaboratively with the MUB, the Office of Student Involvement & Leadership provides programs, resources and opportunities that promote student involvement in ways that positively affect the learning, growth and development of each student, while enhancing the quality of life at UNH and the greater community.

Primarily comprised of Commuter & Non-Traditional Student Services, Fraternity & Sorority Life, Leadership Programs, Student Activity Fee Office, and Student Organizations. For more information, please visit: <https://www.unh.edu/mub/involvement-leadership>.

Psychological and Counseling Services

Psychological and Counseling Services is the primary mental health facility on campus. We offer a variety of services that are designed to enhance students' ability to fully benefit from the University environment and academic experience. This includes providing counseling and therapy for students who may be experiencing situational or ongoing psychological difficulties, providing programming to meet the developmental needs of the student population, and encouraging a University atmosphere conducive to personal and intellectual growth as well as psychological well-being. We are fully funded by student fees. An intake appointment is available to all students who have paid the js/cc fee. Ongoing services are a clinical decision.

The staff at the University of New Hampshire Psychological and Counseling Services believes that our role in a university setting is multifaceted. We see ourselves as specialists in developmental, clinical/

remedial and preventative interventions with young adults and non-traditional age college students. As counselors, we facilitate student's further development of their strengths so that they can overcome their challenges.

We also aim to serve the community while being part of the community. As community members with specialized training in work with the university population, we are knowledgeable about the special needs of students, faculty, staff, and the systems of which we are a part. A large part of our community work focuses on prevention; we believe that increased awareness of healthy ways to cope with stress can help the UNH community and its individual members achieve their professional and personal goals.

All information about a student's visits to the Counseling Center is confidential and cannot be released without the written permission of the student. The University of New Hampshire Psychological and Counseling Services has been accredited by the International Association of Counseling Services since 1978.

For more information, call (603) 862-2090 or visit <http://www.unh.edu/pacs>.

Sexual Harassment and Rape Prevention Program (SHARPP)

The Sexual Harassment and Rape Prevention Program (SHARPP) is a crisis intervention center dedicated to providing free and confidential services for all members of the University community. SHARPP operates a 24-hour support line as well as in-person and online advocacy services to respond to the needs of survivors of sexual assault, sexual harassment, childhood sexual abuse, relationship abuse, and stalking. SHARPP also provides support and crisis services for those who are impacted by abuse experienced by someone they are close to. Additionally, SHARPP presents a wide range of educational programs to the University community and serves as a campuswide resource on issues relating to sexual and relationship violence. For more information about SHARPP, please visit www.unh.edu/sharpp (<https://www.unh.edu/sharpp>).

Student Accessibility Services

Student Accessibility Services (SAS) (*formerly Disability Services for Students*) is committed to establishing a community that ensures full participation for students, and providing assistance that will facilitate independence and academic progress. The office is responsible for determining and ensuring academic and housing accommodations. In addition, we are a source of information and referral; a resource and collaborative partner for the campus community; and a point of support and advocacy regarding access issues in general.

Self-identifying with SAS is the first step in both gathering useful information—what SAS offers and what other resources exist—and establishing accommodations. You will need to provide documentation, make an appointment to review/discuss it, and identify appropriate accommodations. Creating a faculty accommodation letter is part of that process. Please see the Documentation Guidelines for direction on what to provide. If you are unsure, submit/bring whatever you may have so we can review and evaluate it.

There is no deadline to make contact, complete an intake, or provide documentation. The process of identifying and determining accommodations is an ongoing conversation. Students should provide

additional documentation and/or talk with SAS as concerns and needs arise, or as the condition of the disability changes.

For more information call (603) 862-2607 (voice), 711 (TTY) or 800-735-2964 (Relay NH); (603) 862-4043 (fax); e-mail SAS.office@unh.edu ([SAS.office@unh.edu?subject=SAS webpage inquiry](mailto:SAS.office@unh.edu?subject=SAS%20webpage%20inquiry)); or visit <http://www.unh.edu/studentaccessibility>. Student Accessibility Services is located in Smith Hall, Room 201.

<https://www.gradschool.unh.edu/>

Campus Life

Campus Recreation

Campus Recreation provides a variety of opportunities for you to maintain your active, healthy lifestyle. Programs and facilities are available for full-time matriculating students. Memberships are available for non-students.

Programs include group exercise classes such as cycling, yoga, and Zumba; intramural sports with co-rec, men's and women's teams; sport clubs; outdoor adventures; instructional classes; ice skating; and aquatics.

Campus Recreation manages 11 facilities including the new Hamel Recreation Center (HRC) with cardio and weight equipment, multipurpose courts, bouldering wall, saunas, locker rooms, and much more; Swasey Indoor Pool (located at the Field House); Whittemore Center Arena for ice sports and major events; outdoor fields; Outdoor Pool; and a large outdoor recreation facility on Mendum's Pond in Barrington. For a full list of offerings, please visit <http://campusrec.unh.edu>.

Dining Services

UNH Dining Services is committed to providing the highest level of quality food and service at a great value. Offering fresh and healthy food options at three dining halls and multiple retail locations, UNH Dining Services can meet the needs of busy graduate students. UNH Dining hall choices include all-day breakfast, sushi, rotisserie selections, brick oven specialties, and afternoon tapas along with local, sustainable, vegan, vegetarian, and gluten-free items. UNH Dining retail locations offer everything from Starbucks® Coffee to inspired salads made with the freshest local greens grown right on campus. Flexible meal plans and payment options make UNH Dining Services a convenient way to eat while you are here. For menus, locations, and other info, please visit: www.unh.edu/dining (<http://www.unh.edu/dining>).

Graduate Student Housing

UNH Housing provides two on-campus options for graduate students: Babcock Hall, a traditional residence hall for graduate or non-traditional students, and Forest Park, our family housing complex on campus for those who are arriving with families (married, civil unions, or those with dependent children). For more information, visit www.unh.edu/housing (<http://www.unh.edu/housing>).

BABCOCK HALL AND FOREST PARK APARTMENTS

Babcock Hall is a vibrant community of individuals 21 and older, with a mix of international, graduate, and non-traditional/undergraduate students. This group of people makes for an incredible community of mature individuals who enjoy their quiet and social time equally. The gorgeous new kitchen on the ground floor is always in use by our residents cooking up incredible meals from all over the world, and our

entire ground floor is dedicated social space with the kitchen and several lounges, making it easy to meet and connect with other people! Want to compete in a ping pong or pool tournament, enjoy a quiet study space, or cook up a delicious meal? You can do it all on the ground floor! Then when you're ready to take a break from socializing, all you have to do is head upstairs to our residential floors. All of our rooms are singles, which means you have your own private space to relax and unwind.

Forest Park is our family housing complex for undergraduate and graduate students and scholars. Married students, scholars and those with dependent children are given higher priority than individuals.

Our current population hails from more than 18 different countries. Residents of Forest Park live within walking distance of all UNH academic and administrative buildings. This 97-unit complex is within walking distance of downtown businesses, banks and a supermarket.

Following acceptance to the Graduate School, any student interested in on-campus housing should contact the University's Department of Housing at (603) 862-2120.

SUMMER HOUSING

Rooms in Babcock Hall are available to graduate students taking courses during the summer. Students interested in summer accommodations should contact the Department of Housing. Off-campus housing is listed on the Web at www.unhmub.com/housinglist (<http://www.unhmub.com/housinglist>).

Graduate Student Senate

The Graduate Student Senate (GSS) is the official voice of UNH's graduate student body. We work hard to advocate for graduate students, representing their interests across UNH and the university system. We also work to engage the state legislature and foster a sense of community and social engagement among graduate students on campus. For more information, please visit: <https://www.unh.edu/gss>.

Memorial Union Building

The Memorial Union and Student Activities fosters a sense of community and inclusion at the University of New Hampshire. We provide services and facilities that enhance the quality of campus life, support the academic mission of the University, and create opportunities for student development and engagement. For more information, please visit: www.unhmub.com (<http://www.unhmub.com>).

UNH Transportation Services

UNH Transportation Services administers visitor parking; parking for faculty, staff, and students; and University mass transit, including Wildcat Transit, Campus Connector, and Wildcat Access. Other services offered by Transportation Services are Cat Courier, Guaranteed Ride Home, Safe Rides, and the Bike Program. For more information, please visit: www.unh.edu/transportation (<https://www.unh.edu/transportation>).

University Police

The nationally accredited University Police Department's mission is to support the University community in creating a safe environment that is conducive to higher education by protecting life and property while supporting the rights and dignity of all persons. Specific educational programs, including drug and alcohol abuse prevention, are provided by professionally trained police officers. Rape Aggression Defense (RAD) is taught to female students, staff, faculty, or community members, and a walking patrol provides escort services for students, faculty, and

staff. For more information, please visit: www.unh.edu/upd (<https://www.unh.edu/upd>).

Fees and Financial Support

New Hampshire Residency

Each graduate student is classified as a resident or nonresident for tuition purposes at the time of admission to the University. The decision, made by the Graduate School, is based upon information furnished by the student's application and any other relevant information. Nonresident undergraduates continuing directly to the Graduate School will be classified as nonresidents.

All applicants claiming New Hampshire residency are required to have been legally domiciled in New Hampshire continuously for at least twelve months immediately prior to registering for the term for which in-state status is claimed.

Students admitted from states other than New Hampshire or from foreign countries are considered nonresident throughout their entire attendance at the University unless they shall have acquired bona fide domicile in New Hampshire. Changes in residency for enrolled students as well as appeals are reviewed by the Registrar's Office and will only occur if the student can clearly establish that his or her residence in New Hampshire is for some purpose other than the temporary one of obtaining an education at the University.

The burden of proof in all cases is upon the applicant. In all cases, the University reserves the right to make the final decision as to resident status for tuition purposes. The University rules governing tuition rates are fully set forth in the application for admission package; all students are bound by them.

New England Regional Student Program

The University of New Hampshire participates in the New England Regional Student Program administered by the New England Board of Higher Education (NEBHE). Under this program, admitted graduate students from New England may qualify for regional tuition rates (New Hampshire resident tuition, plus 50 percent).

To qualify, the program to which they are admitted must be one that is not available at any of their home state/public institutions. Inquiries about the NER program may be directed to the Graduate School or the New England Board of Higher Education: <http://www.nebhe.org>. This tuition rate does not apply to students who are eligible for New Hampshire resident tuition rates.

Tuition and Fees

Tuition and fees are established by a vote of the Board of Trustees. Approval normally occurs between April and July. The current academic year tuition rates are published annually on the University's website (<https://www.unh.edu/business-services/tuitfees>). Graduate tuition rates are based on full-time registration (9-16 credits). Graduate students who register for fewer than 9 credits will be charged per credit hour. Graduate certificate program tuition rates are charged per credit hour.

Graduate tuition and fees apply to admitted graduate students enrolling for courses, graduate or undergraduate, at the University during the academic year. Admitted graduate students planning to enroll for UNH courses through weekend or executive programs during the summer session, or through the Graduate School Manchester campus should

consult the relevant publications for information regarding tuition and fees.

Mandatory Fees

The University of New Hampshire assesses mandatory fees to support expenses associated with the participation in an academic community. Mandatory fees are defined as fees that all students are assessed as a prerequisite for registration unless specifically exempt. The services and facilities supported by mandatory fees are available to all students. They are not charged based on the extent of students' usage of the facilities or services supported by the fees. It is recognized that not all students will use the benefits and privileges made available by fee-supported activities to an equal extent. Mandatory fee charges are based on registration status: full-/part-time, depending on number of credit hours registered. Students enrolled in predesignated evening-only programs do not pay the health and counseling fee. Students enrolled in 4 credits or less pay the technology fee only. For a listing of current academic fee rates please visit the mandatory fee section of the Business Services (<https://www.unh.edu/business-services/feeinfo>) website.

Fee Structure

Full mandatory fees are assessed to graduate students (registered for 9 or more credits), national student exchange students, doctoral research (999), and master's continuing research (GRAD 900) students. Graduate students registered for 5 to 8 credits are assessed half of the full time mandatory fee rate. Students registered for 1 to 4 credits are assessed only the technology fee. Students enrolled in Manchester campus programs pay Manchester mandatory fees. Students enrolled in the UNH School of Law pay the fees associated with that campus. Students enrolled as non-degree full-time special students (12 or more undergraduate credits or 9 or more graduate credits) pay full mandatory fees.

The graduate--student mandatory fees include:

- Memorial Union fee for the use and administration of the student union
- Student Recreation fee for support of recreational facilities
- Health & Wellness and Counseling fee to provide general health care through University Health Services
- Technology fee to provide electronic tools to students both on and off campus
- Transportation fee to provide student transportation services, including select infrastructure improvements, transit service, pedestrian and bicycle facilities, and ride services

Students who withdraw or drop to part-time status after classes begin are eligible for a partial refund of fees. (One hundred percent will be refunded until the 2nd Friday of the semester, 50 percent after that date and within 30 days, and none thereafter.)

BILLING AND PAYMENT

Billing for graduate and law students begins approximately one month before the start of classes. Bills are no longer sent through the mail. They are posted to students' individual Webcat accounts, and emails are sent notifying students when new bills have been posted. All bills are due upon receipt except where noted. Non-payment can result in late fees and may result in students being disenrolled from classes. Late fees

are based on the amount of the outstanding balance - 5% of the billed amount or \$250 (whichever is lower).

Exceptions

Students enrolled as majors in the Graduate School Manchester campus are assessed the Manchester mandatory fees.

Students participating in a UNH Study Abroad Program or internship outside the immediate geographic area (50-mile radius) for a semester may petition for a waiver of mandatory fees, with the exception of the technology fee. Students taking online courses only and who reside outside the immediate geographic area (50-mile radius) may petition for a waiver of mandatory fees, with the exception of the technology fee. All graduate students are exempt from the student activity fee and athletic fee. Graduate students enrolled in weekend/executive programs on the Durham campus are exempt from mandatory fees except the technology fee.

Graduate students enrolled in predesignated evening-only programs, as approved by the provost and vice president for academic affairs or his/her designee, are exempt from the health services and counseling fees.

Graduate students holding paid full-time academic year graduate assistantships, research assistantships, and graduate fellowships who register for 9 or more credits are charged ½ the full mandatory fee rate. Students appointed as assistants, fellows and lecturers receive a fee waiver for the technology fee during the period of their appointment.

Doctoral students who have achieved candidacy may petition for a waiver of the mandatory student fees. A waiver will be granted under the following circumstances:

- The student must be advanced to candidacy and enrolled only in 999 prior to the beginning of classes.
- The student cannot be on an assistantship or fellowship, unless such support covers research that is being conducted out of the geographic area (50 miles).
- The student has recently relocated and/or permanently resides out of the immediate geographic area (50 miles) prior to the beginning of classes. The 50-mile radius may be waived if the student is not receiving University support, has met the one-year residency requirement, is working full time and will only be on campus sporadically to meet with his or her adviser, or if the student has completed all requirements for the degree prior to the end of the drop/add period (end of the second week).
- The student is temporarily out of the region (50 miles) for at least one semester, conducting research related to his or her dissertation.
- The student has a family emergency, illness, or has provided the dean of the Graduate School other information to warrant an exception. (Information will be provided with the petition as appropriate.)
- Students who meet the above conditions and are within the immediate geographic area must confirm in writing that they will not be using the campus services covered by mandatory fees.
- Students must submit petitions each semester to waive fees.

Authority

Any conflicts resulting from this procedure will be adjudicated by the provost and vice president for academic affairs and the vice president for finance and administration or his/her designee.

Special Fees

Differential Tuition

Students in CEPS Engineering & Computer Science or the Paul College of Business and Economics will be charged a tuition differential. Students in these programs who are registered for Doctoral Research (999) or Masters-Continuing Research (GRAD 900) are considered full time and pay the full tuition differential. The current academic year rates are published annually. Music majors are charged an applied music fee each semester. Please visit the Business Services (<https://www.unh.edu/business-services/tuitgrad/#add>) website for more information.

Continuing Enrollment Fee

Students registered for Continuing Enrollment (GRAD 800) will pay a continuing enrollment fee.

Master's Continuing Research Fee

Master's students registered for Master's Continuing Research (GRAD 900) will pay a continuing research fee plus full mandatory fees.

Doctoral Research Fee

Doctoral students in residence and registered for Doctoral Research (999) will pay a doctoral research fee plus full mandatory fees. Students who register for coursework in addition to Doctoral Research will pay the appropriate additional tuition charges up to the appropriate maximum tuition rate for full-time students. Doctoral candidates not in residence who are conducting their research away from the Durham campus may petition for a waiver of the mandatory fees.

Other Charges and Fees

Overload

Graduate students are charged full tuition plus the appropriate course charge for each credit beyond 16, if registered for more than 16 credits thirty days after the semester has begun. (No refund will be made if a student subsequently drops a course, reducing his or her course load to 16 or fewer credits.) Tuition waivers awarded with assistantships and scholarships do not cover charges for overload.

Zero-Credit Seminars

Seminars for 0 credit are billed as if they were for 1 credit.

Audit

Charges for auditing a course are the same as those for taking it for credit.

Late Fees

A \$25 late registration fee is charged to students who register after the last day scheduled for graduate registration. Late fees are also charged on accounts remaining unpaid by published due dates.

Reinstatement Fee

A reinstatement fee is charged to any student who has his or her degree status discontinued and subsequently petitions to be reinstated during

the same semester when the action to discontinue the degree status was taken. This fee will not be waived.

Registration Fee

Part-time students (i.e., those registering for 1 to 8 credits) pay a nonrefundable registration fee.

Student Health Benefits Plan

Health insurance is required as a condition of enrollment for full-time degree students at the University of New Hampshire. Students will have the option of waiving this requirement if they present proof of adequate coverage; alternatively, students can acquire an affordable health benefits plan sponsored by the University. The Health Services website has information about the University's Student Health Benefits Plan <http://www.unh.edu/healthservices/shbp>. Students with F-1 or J-1 visas are required to enroll in the UNH Student Health Benefits plan. They are not eligible to waive coverage.

Refunds

Tuition and mandatory fees are refundable during the academic year in accordance with the calendar published by the Registrar's Office (UNH Academic Calendar). Students receiving federal financial aid will have their refund calculated in accordance with the U.S. Department of Education regulations in effect at the time of their withdrawal. Specific details regarding the regulations are available in the UNH Financial Aid Office.

Scholarships and Fellowships

Financial Assistance

Several forms of financial assistance are available to graduate students through the Graduate School and individual departments, most of which are awarded for an academic year commencing in the fall. To be eligible for any assistance, the student must first be admitted to the Graduate School. In most cases, the application for admission with supporting documents serves as the application for new graduate students for the scholarship and assistantship programs available to them. In other cases, individual departments have their own application forms. Students are advised to contact individual programs for more information about assistantships and scholarships, and any departmental application forms.

Graduate Scholarships for Merit

The Graduate School awards six scholarships annually to recognize the outstanding contributions of both master's and doctoral students for their teaching and scholarship. Availability and criteria for award of these scholarships are announced annually by the Graduate School.

Scholarships for Full-Time Students

Students who are full-time may be granted full- or half-tuition scholarships for the academic year or semester. These awards provide for waiver of tuition and are subject to the maintenance of a high scholastic record in the Graduate School. Application is made to the student's department or program.

Graduate Fellowships

The Graduate School offers a number of fellowships to entering students to assist programs in recruiting a high-quality and diverse student body. Availability and criteria for these fellowships are announced annually by the Graduate School. Students are nominated by their respective program coordinators.

Dissertation Fellowships

Dissertation fellowships for a maximum tenure of one academic year are available on a competitive basis to doctoral students who have been advanced to candidacy. These awards include a stipend and a waiver of the doctoral research and mandatory fees for the period of the award. Application is made to the dean of the Graduate School.

Summer Fellowships for Teaching Assistants

A limited number of summer fellowships are awarded to students who have held graduate assistantships involving teaching during a previous academic year. Application is made to the dean of the Graduate School.

Graduate Appointments 2018-19

The university offers a variety of forms of financial assistance to graduate students in support of their efforts to obtain a graduate degree. Graduate appointments are made to post-baccalaureate students who have been regularly or provisionally admitted to the Graduate School and who have been recommended by the appropriate department or program and approved for appointment by the Graduate School. Appointments are normally for one academic year and may be renewed provided that funds are available and that the student's academic performance, as well as performance in carrying out the responsibilities of the appointment, is satisfactory.

Graduate Assistants: Graduate assistants are students who provide instructional or administrative support as specified by the appointing department and are normally supported by university funds.

Graduate Part-time Lecturers: Graduate part-time lecturers are students who because of their specific expertise are appointed to teach one or two courses per semester and are normally supported by university funds.

Graduate Interns/Trainees: Graduate interns/trainees are students who are assigned to a specific project or subject area to acquire additional learning experiences and are normally supported by external funds.

Graduate Fellows: Graduate fellows including dissertation fellowship recipients are students who have been awarded a fellowship normally through an external grant to the University of New Hampshire or directly to the student. Appointment will normally not exceed one fiscal year and may be renewed in accordance with the terms of the fellowship program.

Graduate Research Assistants: Graduate research assistants are students who are appointed to conduct research on grants supported by the Agricultural Experiment Station, or external grants and contracts.

Graduate Supplemental Appointments: U.S. and permanent resident graduate students on appointment in one of the above categories may petition¹ to supplement their regular appointment for up to an average of 10 hours per week when school is in session unless precluded from doing so by the terms of their appointment. **F-1 and J-1 students on full assistantships may not accept additional appointments while school is in session.** All students, including F-1 and J-1, may supplement their regular appointments for up to 20 hours per week when school is not in session (December-January Semester Break and March Spring Break). Such appointments may be processed as stipends or hourly. Assistants who serve as TA's during the J-term receive a supplemental appointment if the workload exceeds the 20 hours they are normally expected to work.

¹ **Petition process:** All petitions are reviewed by the Dean of the Graduate School. Petitions must provide an explanation of the work associated with the supplemental appointment and a rationale that explains how the additional work will have a positive impact on the student's graduate program and will not negatively impact time to degree. The petition requires input from the student's advisor and Graduate Program Coordinator.

Graduate Stipend Only Appointments: Graduate stipend only appointments may be made to students during the academic year under one of the above categories. Students on such appointments have responsibilities of less than those of students on regular graduate appointments; have a workload of less than those of students on regular graduate appointments, and receive a lower stipend than students on regular graduate appointments.

Graduate Hourly Appointments: Graduate hourly appointments are appointments made to students in support of the instructional, administrative or research activities of the university. Students on such appointments have responsibilities of less than those of students on regular graduate appointments.

Graduate Summer Appointments: Graduate summer appointments are appointments made to students during the summer in one of the above categories. Students on summer appointments may work for up to forty hours per week. Graduate students working full time on research or combined teaching and research for the entire summer earn 2/3 of their prior academic year stipend. Appointments for less than the maximum time are prorated.

International students (F-1 and J-1) must consult the Office of International Students & Scholars to confirm employment eligibility.

Stipends:

- **Level 1 - \$18,640** all masters' students and PhD students with a bachelor's degree who have less than 2 years' experience as a GA or RA at UNH.
- **Level 2 - \$19,760** PhD students with a master's degree or PhD students with a bachelor's degree who have 2 years' experience as a GA or RA at UNH.
- **Level 3 - \$21,060** PhD students @ candidacy.

Note: Departments may pay a higher base stipend for assistants to meet the recruitment needs of the program. Graduate assistants on a semester appointment receive 1/2 of the AY year rate. Graduate part-time lecturers receive a stipend of no less than the adjunct rate appropriate to their program. Graduate fellows, trainees and interns receive a stipend in accordance with the terms of their award.

Academic Year Dates: The academic year payment dates for 2018-19 are **August 20, 2018 to May 17, 2019**. The corresponding semester dates are **August 20, 2018 to January 2, 2019**; and **January 3, 2019 to May 17, 2019**. Assistants who are appointed for the full academic year should check with their hiring unit to determine the expectations for working during the semester break.

Workload: Students on full assistantships are involved in assistantship activities for **20 hours a week** during the academic year. The workload for students on stipend only and hourly appointments is specified at the time of appointment. The workload for students in both of these categories is less than 20 hours per week.

Registration: All graduate students holding appointments must be enrolled as students in order to hold an appointment during the academic year. Assistants, fellows or graduate part-time lecturers must register for a **minimum of 6 course/thesis credits, Master's Continuing Research (GRAD 900) or Doctoral Research (999)** during each semester in which they hold their appointments. Interns/trainees must register according to terms specified in their contracts. Students holding a stipend only or hourly appointment must register for course/thesis credits (no minimum), Master's Continuing Research, or Doctoral Research. Students registered for GRAD 800 Continuing Enrollment are **not eligible** to hold an appointment. Students holding summer appointments have no required enrollment unless specified by their appointment.

Tuition Waivers: Students appointed as assistants, fellows and graduate part-time lecturers receive tuition waivers in addition to their stipends during the period of their appointment. Waivers will be prorated for students who hold less than a full appointment. Assistants and fellows on AY or spring only appointments receive tuition waivers for the January term. Graduate part-time lecturers receive tuition waivers for the January term only if they are teaching during that term. Students on stipend only and hourly appointments do not receive a waiver. Such students may be eligible for tuition scholarships. Graduate assistants, research assistants and fellows receive tuition waivers for summer courses offered through the Graduate School (GRAD) related to academic programs in College Teaching, Research Ethics and Grant Writing. Summer waivers are prorated for students who had less than a full academic year appointment. Such waivers are provided through the Graduate School. Graduate assistants, research assistants and fellows may receive tuition waivers for summer courses offered outside of the Graduate School if approved by their funding source. Such waivers are provided by the hiring unit. **Waivers cover only course work that is directly related to a student's academic program.**

Student Health Benefits Plan (SHBP): Students appointed as assistants, fellows and graduate part-time lecturers for the full academic year receive a waiver for the university's Student Health Benefits Plan (SHBP) during the period of their appointment. Students on a fall only appointment and continuing in the graduate school for the spring semester full time receive a waiver for the SHBP for the fall and will be responsible for the spring portion of the plan costs. Students on a fall only appointment and continuing in the graduate school for the spring semester on a part time basis receive a waiver for the SHBP for the fall, have the option of continuing on the plan for the spring, and will be responsible for the spring portion of the plan costs. Students on a spring only appointment will receive a waiver for the SHBP for the spring.

Mandatory Fees: Students holding paid full-time academic year graduate assistantships, research assistantships, and graduate fellowships who register for 9 or more credits are charged ½ the full mandatory fee rate. Students appointed as assistants, fellows and lecturers receive a fee waiver for the technology fee during the period of their appointment.

Course fees are also covered by the waiver. The Health Services and Counseling fee, the Memorial Union fee, the Student Recreation fee and the Transportation fee **are not** covered by waivers, although scholarships maybe awarded to individual students to cover these fees.

FICA taxes will generally be withheld from wages paid to any graduate student registered for less than 1/2 time (less than 5 credits per semester during the academic year; or less than 3 credits per session in the summer). Note: Students registered for Doctoral Research (999) or Master's Continuing Research (GRAD 900) are full-time and will not have FICA taxes withheld. In summer students enrolled for 3 or more

credits of "899" or "independent study" will generally not have FICA withheld.

Federal income taxes will be withheld from wages paid to graduate students based on information supplied to USNH Payroll on IRS Form W-4. The value of the SHBP waiver is considered a scholarship and may be reportable to the IRS and subject to tax withholding for foreign students. Both wages and scholarships may be exempt from withholding if the student is from a foreign country with tax treaty provisions that exempt these payments. The appropriate IRS Form 8233 or W-8BEN must be on file in USNH Payroll in order for a foreign student to claim these exemptions.

Criminal background checks are conducted for all graduate students appointed as a teaching assistant (TA), research assistant (RA), graduate assistant (GA) or graduate part time lecturer, graduate fellow or graduate intern/trainee. Graduate students on stipend only or hourly appointments may also be required to undergo a background check depending on the nature of their appointment. These investigations are mandated by University policy requiring a preemployment background review for all appointees who commence their duties after July 1, 2008. A standard background review consists of a criminal history review, sex and violent offender registry review, social security trace and verification; and, if required by the nature of the appointment, a Department of Motor Vehicle record search. International students whose visas and/or authorization to work in the United States were obtained after the Patriot Act was implemented on October 12, 2001, are exempt from a criminal history check.

Reappointment, Non-Reappointment and Termination

Reappointment: A graduate student who holds a working appointment directly connected with his/her graduate studies may be reappointed for an additional period, provided that funds are available and that the student's academic performance, as well as performance in carrying out the responsibilities of the appointment is satisfactory, and the student's status as a graduate student is maintained.

Non-reappointment: The University, for any reason, may elect not to renew a graduate student's working appointment at the end of the appointment period. No advance notice nor any reason need be given to the graduate student in the case of non-reappointment, and the appeal procedure is not available.

Termination: A hiring unit may recommend to the Graduate School that a graduate student be terminated from a working appointment prior to the end of the appointment. The Associate Dean of the Graduate School will act on this recommendation. A student who is terminated is entitled to a written statement of the reasons for the termination from the hiring unit. A student who is terminated may initiate an appeal except when the termination is due to the loss of funding for the position; or the termination is due to either a voluntary or involuntary loss of graduate student status. If the graduate student is eligible, and does initiate an appeal using the following procedure, s/he may be placed on leave of absence without pay during the period of time involved in processing the appeal. If the case is found in favor of the student, "back pay" will be awarded.

Step 1: The student should request that the hiring unit making the original recommendation reconsider the decision. The student's request should be written and should contain any information that the student feels warrants a reconsideration of the decision. A copy of the request should be sent to the Graduate Dean. As soon as possible after receiving this request, the hiring unit will reconsider

the decision and notify the student and the Graduate Dean of the results of the deliberations in writing.

Step 2: If the student is not satisfied with the decision reached in Step 1, s/he may request that the Graduate Dean review the decision. The student's request should be in writing and must stipulate the reasons for his/her dissatisfaction with the decision reached in Step 1. The Step 2 appeal will be heard by the Student Affairs Committee of the Graduate Council, unless the student requests that the Dean or the Dean's designee hear the appeal. When the appeal is heard by the Dean's designee or the Student Affairs Committee, a recommendation is made to the Dean, who will render a decision. The Dean's decision will be communicated in writing to the student, the hiring unit and the hiring unit's College Dean, Director or Vice-President.

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Federal Financial Aid

Graduate students who are enrolled in a degree program at least half time (6 or more credits per semester) and are a U.S citizen or an eligible non-citizen may be considered for federal financial aid. Graduate students are reviewed for loans and work study. There are no federal or University grants or scholarships awarded to graduate students by the UNH Financial Aid Office.

To apply for federal financial aid you must complete the Free Application for Federal Student Aid (FAFSA). You can complete the application online at <https://www.fafsa.gov> (<https://www.fafsa.gov>). The UNH priority deadline for applying for financial aid is March 1. This is the date by which the FAFSA must be received by the federal processor. However, students applying after March 1 will still be considered for the Federal Direct Loan, which is not subject to the priority deadline.

Be aware that the Financial Aid Office will make their offer of aid based on your full-time enrollment. If you will be enrolled for less than 9 credits or pay reduced tuition in either semester, your aid package may be adjusted. If you are not planning to be full time, you should notify the Financial Aid Office as soon as you can. Any time you change your enrollment status, receive a scholarship, tuition waiver or other resource, or correct and/or change the information on the FAFSA, an aid adjustment may result.

Types of aid available:

Federal College Work Study utilizes federal funds to provide employment opportunities to graduate students who file on time and demonstrate financial need.

The **Federal Unsubsidized Direct Loan** is available to graduate students regardless of financial need.

Federal Direct Graduate PLUS Loan is a loan in the student's name for graduate and professional studies. In order for a graduate or professional student to receive a Federal Direct PLUS Loan they must first file the Free Application for Federal Student Aid (FAFSA). Students apply for the Federal Direct PLUS Loan at <https://www.studentloans.gov/>. Approval for the Direct PLUS Loan is based on good credit and the student being enrolled at least half-time in a graduate or professional degree program.

Please feel free to visit the UNH Financial Aid website (<http://www.unh.edu/financialaid/>) for further information.

SATISFACTORY ACADEMIC PROGRESS

Satisfactory progress in a course of study must be maintained by all students who receive federal financial aid. The current standards for satisfactory academic progress are available upon request from the UNH Financial Aid Office (<http://financialaid.unh.edu>).

Veterans Benefits

Military servicepersons, veterans, and their dependents should investigate their eligibility for veteran's benefit payments. Questions may be addressed to any local Veterans Administration office; the VA Education Benefits toll-free number, 888-4424551 (888-GIBILL1); the VA website at www.gibill.va.gov (<http://www.gibill.va.gov>); or the UNH veterans coordinator, Registrar's Office at (603) 862-1595, or via email UNH.Veterans@unh.edu. (UNH.Veterans@unh.edu)

Registration

Registration information and the Time and Room Schedule are available at <https://courses.unh.edu/>

Continuous Registration Policy

Unless a leave of absence is granted, graduate students are required to maintain continuous enrollment each semester of the academic year until their degree is formally awarded by registering for course credits, research, or continuing enrollment.

- Master's students must enroll, as appropriate, for course credits, thesis credits, Master's Continuing Research (GRAD 900 Master's Continuing Research), or Continuing Enrollment (GRAD 800 Continuing Enrollment).
- Ed.S. students must enroll, as appropriate, for course credits or Continuing Enrollment (GRAD 800 Continuing Enrollment).
- Pre-candidacy doctoral students must enroll, as appropriate, for course credits, Doctoral Research (999), or Continuing Enrollment (GRAD 800 Continuing Enrollment).
- All doctoral candidates must register for Doctoral Research (999) each semester after advancement to candidacy until their degree is conferred, even if the minimum requirement (two semesters) has been met.

Students enrolled in summer-only programs (currently, Math M.S.T., English M.S.T., and College Teaching M.S.T.) are required to enroll, as appropriate, in course credit or Continuing Enrollment (GRAD 800 Continuing Enrollment) each summer until their degree is formally awarded. Students who do not maintain continuous enrollment will have their degree status discontinued and will need to petition for reinstatement or readmission in order to return to their program.

Master's Continuing Research (Grad 900--Full-time Status, 0 credits)

Master's students who have completed all course requirements and have previously registered for the maximum number of thesis or project credits and are in residence completing their master's program must register for Master's Continuing Research (GRAD 900 Master's Continuing Research).

Continuing Enrollment (GRAD 800)

All continuing graduate students who are not enrolled for course credits, thesis credits, Doctoral Research (999), or GRAD 900 Master's Continuing Research, and are not in residence, are required to register for GRAD 800 Continuing Enrollment each semester of the academic year (or each

summer for students in Math M.S.T, English M.S.T programs, and College Teaching M.S.T.). Students registered for GRAD 800 are considered part-time, 0 credits. New students are not eligible to enroll in GRAD 800.

Degree Status Discontinued

Students who do not formally withdraw and do not register and pay for course credits, research, or continuing enrollment by the appropriate registration deadline, or do not return from an approved leave of absence, will have their degree status discontinued. Students are notified by the Graduate School when this administrative action is taken and are required to apply for readmission or reinstatement if they subsequently desire to resume their academic program.

Reinstatement

Students who have their degree status discontinued for failing to maintain continuous enrollment may petition the Graduate School for reinstatement as long as the term that the degree status was discontinued has not ended. Such a petition requires a reinstatement fee, plus payment of current semester charges and any late fees that may have accrued. If the term in which the student's degree status was discontinued has ended, the student must then petition the Graduate School for readmission. Both forms can be found on the Graduate School's forms page (<http://www.gradschool.unh.edu/fp.php>).

Full--Time Students

Graduate students registered for 9 or more credits, GRAD 900 Master's Continuing Research, or Doctoral Research (999) are classified as full-time students. Students holding assistantship appointments are also considered full time and must register for a minimum of 6 credits, GRAD 900 Master's Continuing Research, or Doctoral Research (999) each semester.

Three-Quarter-Time Students

Graduate students not on an assistantship and registered for 7 or 8 credits are classified as three-quarter-time students.

Half--Time Students

Graduate students not on an assistantship and registered for 5 or 6 credits are classified as half-time students.

Maximum Load

The maximum graduate load allowed is 16 credits (12 credits for a student on a full assistantship). Only under unusual circumstances will a student be allowed to exceed these limits, and then only with the recommendation of the student's adviser and graduate program coordinator and the approval of the dean of the Graduate School.

Dropping and Adding Courses

Graduate students may add or drop courses in accordance with the procedures and deadlines published by the Registrar's Office at www.unh.edu/registrar (<http://www.unh.edu/registrar>).

Auditing Courses

A graduate student may, with the approval of his or her adviser and the faculty member concerned, audit courses. The deadline for requesting an audit is listed on the Registrar's calendar. Subsequent requests for change to audit require a petition form and must be approved by the course faculty member, the student's adviser, graduate program coordinator, and the dean of the Graduate School. Courses taken by

graduate students for audit are charged at the same rate as for-credit courses.

Summer Session

Although many graduatelevel courses are offered during the summer session, the University does not guarantee that any particular course will be offered. The availability of individual faculty members to supervise research or to participate in qualifying examinations and final examinations or defenses during the summer session varies from year to year.

Course information and registration materials may be obtained at unh.edu/summersession (<https://unh.edu/summersession>).

Maximum Load

The maximum graduate load allowed is 12 credits for the entire summer session. A student will be allowed to exceed this limit only by petition with the recommendation of the student's adviser, graduate program coordinator, and the approval of the dean of the Graduate School.

Student Load for Veterans Benefits

Graduate students eligible for VA benefits during the summer receive benefits according to the following schedule of average credit registrations:

- 1/2 credit/week or more = full time
- 3/8 credit/week or more = 3/4 time
- 1/4 credit/week or more = 1/2 time
- less than 1/4 credit/week = tuition and fees only

Nonregistration

Leave of Absence

Students who, because of extenuating circumstances, are unable to pursue their graduate program may request a leave of absence for a maximum of one calendar year. Such circumstances may include medical reasons, military obligation, family emergencies, or hardship. The procedure for an approved leave of absence requires that students submit a request, available at the Graduate School's website, along with appropriate documentation, **prior** to the term for which the leave is requested. The dean of the Graduate School, upon recommendation of the student's adviser and graduate program coordinator, will review the request. If the request for a leave is granted, the time limit for completion of the student's program will be extended appropriately. Students on an approved leave of absence are exempt from paying the continuing enrollment fee. Graduate students who do not return from a leave of absence in the allotted time frame will have their degree status discontinued.

Withdrawal

A student may withdraw from the Graduate School during any semester by obtaining a withdrawal form from the Graduate School. This form should be signed by the student's adviser and the dean of the Graduate School. Students who formally withdraw are required to apply for readmission if they subsequently desire to resume their academic program. Students who are applying for readmission are required to pay an application fee plus, if readmitted, any accumulated continuing enrollment fees for the period during which they have been inactive. Students are not guaranteed readmission and may be evaluated in competition with current applicants to the program.

Administrative Separation for Reasons of Health--Related Behaviors

The dean of students, or the associate dean of the Graduate School, or designee, in consultation with Health Services, and/or Counseling Center, Disability Student Services, Behavioral Intervention Team, and Affirmative Action and Equity Office (ADA Compliance) may temporarily separate a student for reasons relating to seriously impaired mental/physical health when such student's health-related behaviors:

1. pose a significant risk of substantial harm to health, safety, or property of him or herself or other members of the University community,
2. and/or when the student's health-related behaviors significantly disrupt the ability of other University community members to fulfill the University's mission.

Examples of such behaviors include but are not limited to:

1. continuing disruptive behaviors after being told by a University official to stop,
2. behaviors that indicate the student may be out of touch with reality or unaware of the consequences or effects of his or her behaviors, and
3. threat of or harm to self or others.

Administrative withdrawal is not intended to be a substitute for other procedures as found in the Code of Conduct or Academic Policies. Such action may not be used as a means of excluding qualified students with disabilities. The dean of students or associate dean of the Graduate School or designee shall provide the student with a written statement of reasons for the temporary separation and invite the student to meet.

The purpose of this meeting shall be to provide the student with an opportunity to challenge the separation and request reconsideration. The dean of students or associate dean of the Graduate School or designee may require documentation of readiness to return from a licensed attending medical authority and/or licensed psychologist, and consult with the appropriate University official(s) before lifting the separation. The student may be accompanied at the meeting by a member of the University community.

The student must schedule a meeting within ten (10) calendar days of receiving the written statement. If the student fails to request a meeting with the dean of students or associate dean of the Graduate School within ten (10) calendar days of beginning the temporary separation, or if the temporary separation is upheld either at the meeting and the student fails to appeal, or upheld upon appeal, the temporary separation shall be changed to an administrative withdrawal.

Within three (3) calendar days of the conclusion of this meeting the dean of students or associate dean of the Graduate School shall send a letter to the student, informing him/her of the outcome. The student may appeal the determination to the vice president for student and academic services, the dean of the Graduate School, or his/her designee. The appeal request must be received by the vice president for student and academic services by no later than five (5) calendar days after the student receives the letter from the dean of students or associate dean of the Graduate School.

Students who withdraw for health reasons, whether voluntarily or are separated by administrative action, must apply for readmission through the Office of Undergraduate Admissions or the Graduate School. Readmission shall be contingent upon receipt by the appropriate director(s) or their agents, of documentation regarding readiness to

return from a licensed attending medical authority, and/or licensed psychologist; to the extent the withdrawal was for a condition that requires ongoing treatment, readmission may also be contingent upon documentation of the prescribed treatment course and the plan for implementation thereof. Readmission may also include a personal interview with either the vice president or dean of the Graduate School or his/her designee.

For graduate students, the dean of the Graduate School will make the final decision based on the information received, in consultation with the appropriate University official(s). (University Senate, April 26, 1976, updated by the dean of students, June 2009.)

Readmission

Students who withdraw, who have their degree status discontinued, or whose time limit has expired and subsequently desire to resume their academic program, are required to apply for readmission. Readmission forms are available at the Graduate School's website. Students who are applying for readmission are required to pay an application fee plus, if readmitted, any accumulated continuing enrollment fees for the period during which they have been inactive. Students are not guaranteed readmission and may be evaluated in competition with current applicants to the program.

Change in Degree

Students who wish to pursue a degree program other than the one for which admission was originally granted must complete the appropriate application for a change in degree. This includes students enrolled in UNH master's programs who intend to pursue the Ph.D. in the same department in which they were admitted for the master's degree. These forms are available at the Graduate School's website. The dean of the Graduate School will notify the student of the decision after consulting with the appropriate departments.

CHANGE OF NAME OR ADDRESS

It is the responsibility of the student to complete a change of name or address form whenever a change is made. Change of name/address forms can be found at <http://www.unh.edu/registrar/regforms/registrarforms.html>. Students are also advised that their UNH e-mail address is the official means of electronic communication with UNH. Billing, registration notices, reminders, as well as the majority of correspondence from the Graduate School will be communicated through the UNH email account.

Research and Scholarship

The University is a land-, sea-, and space-grant institution and is ranked among the top 125 research universities. In recent years, graduate students at the University have been awarded a number of highly competitive fellowships from EPA, Ford, Fulbright, Merck, NASA, NIH, NOAA, and NSF.

The University's research and scholarly activities range from highly specialized investigations in the physical and biological sciences to broad interdisciplinary studies.

Graduate students are intimately involved in these activities and are expected to be familiar with the policies and procedures that govern their research activities at the University. For more information, visit the Compliance and Safety pages (<http://www.unh.edu/research/compliance-safety>) of the Research Office website.

Research at UNH

www.unh.edu/research (<http://www.unh.edu/research>)

Research at the University of New Hampshire seeks to understand and improve the world around us, with high-impact results that transform lives, solve global challenges and drive economic growth. Our research excellence reaches from the depths of our oceans to the edge of our solar system and the Earth and environment in which we all thrive. For an overview of all research news and activities at the University, including resources for graduate students, visit the UNH Research website.

Office of the Senior Vice Provost for Research

The Office of the Senior Vice Provost for Research (Research Office) provides leadership and services to support UNH faculty, students, and staff in their research, scholarship, and creative activities; facilitates cooperation between UNH and the business community; and communicates and promotes the breadth and depth of UNH research and discovery and its resulting impacts both within and beyond the University. Research is conducted according to ethical principles provided by professional associations and by federal regulations and guidelines. Accordingly, UNH has institutional policies governing the conduct of research and scholarly activities, including but not limited to, the use of animal subjects, human subjects, hazardous materials, misconduct, and financial conflict of interest.

The University prides itself on extensive research endeavors and the involvement of graduate students in research projects. The University, therefore, has an obligation to teach and actively promote integrity in research and scholarship. As a graduate student here, it is your responsibility to be familiar with University policies that govern your research activities at the University and to comply with all requirements. For more information, visit the Compliance and Safety pages (<http://www.unh.edu/research/compliance-safety>) of the Research Office website.

Office for Research and Partnerships and Commercialization

<https://innovation.unh.edu/>

UNHInnovation advocates for, manages, and promotes UNH's intellectual property# promotes partnerships between UNH and the business community; and is responsible for licensing UNH technologies and creating startup companies based on innovations created at UNH. UNHInnovation also hosts the Interoperability Laboratory and the NH Innovation Research Center.

<https://www.gradschool.unh.edu/>

Trustees and Administrative Officers University System of New Hampshire Trustees

<https://www.usnh.edu/trustees>

The University System of New Hampshire is governed by a 29-member Board of Trustees comprising the Governor of the State, the President of the Senate, the Speaker of the House, 10 members appointed by the Governor and Executive Council, 7 alumni-elected members, 2 student-

elected members, the Commissioner of Education, the Commissioner of Agriculture, the presidents of the University System's four colleges and universities, and the Chancellor. The Chancellor is the chief executive officer of the University System.

UNH Affirmative Action and Equity Statement

UNH Affirmative Action and Equity Statement

The University of New Hampshire (UNH) is a public institution with a long-standing commitment to equal opportunity for all. It does not discriminate on the basis of race, color, religion, sex, national origin, age, veteran's status, gender identity or expression, sexual orientation, marital status, or disability in admission or access to, or treatment or employment in, its programs, services, or activities. Sexual harassment and sexual violence are types of sex discrimination. Inquiries regarding discriminatory harassment (including sexual harassment or violence) should be directed to Donna Marie Sorrentino, dms@unh.edu, Director & Title IX Coordinator, Affirmative Action and Equity, Room 305, Thompson Hall, 105 Main Street, Durham, N.H. 03824, phone (603) 862-2930 (voice), (603) 862-1527 (TTY), 7-1-1 (Relay NH), (603) 862-2936 (fax); or to the Office for Civil Rights, U.S. Department of Education, 8th Floor, 5 Post Office Square, Boston, MA 02109-3921, phone (617) 289-0111, fax (617) 289-0150, e-mail OCR.Boston@ed.gov.

There are various grievance procedures to provide for the resolution of complaints under this policy. See the UNH Discrimination and Discriminatory Harassment Policy (<http://www.usnh.edu/olpm/UNH/V.Pers/B.htm>) and Grievance and Complaint Procedures (<http://www.unh.edu/vpsas/handbook/grievance-and-complaint-procedures>) in *UNH Student Rights, Rules, and Responsibilities*. Further information may be obtained at the Affirmative Action and Equity Office or via e-mail affirmaction.equity@unh.edu.

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Accounting (ACFI)

Degree Offered: M.S.

This program is offered in Durham.

The master of science in accounting, offered by the Peter T. Paul College of Business and Economics, develops students' competencies to become innovative problem solvers in public accounting firms as well as small businesses, non-profit organizations, and major corporations. Designed for students with undergraduate degrees in accounting, the graduate program can be completed in one year. Applicants without an undergraduate degree in accounting can still apply but will need to take additional undergraduate business and accounting courses prior to beginning the graduate program.

The program satisfies the 150-hour course load required by most U.S. state licensing boards, including the state of New Hampshire. The Paul College is AACSB accredited. The master of science in accounting program strives to ensure that students have range and depth in the field, emphasizing strong analytical and communication skills as well as fostering awareness of ethical issues.

Admission Requirements

The primary admission period for the program is the fall. Admission requirements include a personal history that demonstrates high academic achievement, as well as the applicant's potential and desire for graduate study in accounting. Applicants are required to submit copies of prior academic records, current GMAT scores, three references, and a complete Graduate School online application. A baccalaureate degree program must be completed prior to beginning the M.S. program.

GMAT Waiver

Current UNH undergraduate accounting option students or undergraduate accounting students from other AACSB accredited business schools may request a GMAT waiver from the Graduate School if they meet one of the follow conditions:

- Cumulative GPA of 3.2 or higher or
- Accounting Option/Major GPA of 3.5 or higher

Admission to the program is highly selective and limited. Interested applicants are advised to apply as early as possible.

<https://paulcollege.unh.edu/academics/graduate-programs/ms-accounting>

Programs

- Accounting (M.S.) (p. 29)

Faculty

See <https://paulcollege.unh.edu/directory/all> for faculty.

Accounting (M.S.)

<https://paulcollege.unh.edu/business-administration/program/ms/accounting>

Description

The master of science in accounting, offered by the Peter T. Paul College of Business and Economics, develops students' competencies to become innovative problem solvers in public accounting firms as well as small businesses, non-profit organizations, and major corporations. Designed for students with undergraduate degrees in accounting, the graduate program can be completed in one year. Applicants without an undergraduate degree in accounting can still apply but will need to take additional undergraduate business and accounting courses prior to beginning the graduate program.

The program satisfies the 150-hour course load required by most U.S. state licensing boards, including the state of New Hampshire. The Paul College is AACSB accredited. The master of science in accounting program strives to ensure that students have range and depth in the field, and emphasizes strong analytical and communication skills as well as fosters awareness of ethical issues.

Requirements

Upon admission to the program, applicants are required to complete seven required courses and three track courses. ACFI 850 Accounting Theory and Research is the capstone course.

All admitted candidates are expected to have completed a series of prerequisite courses. If an applicant has not completed all of the prerequisite courses, the admissions committee may offer provisional admission and require that the applicant take the prerequisite courses prior to beginning the standard course of study. Refer to the list of prerequisites below labeled "For Students with Non-Accounting Business Degrees".

Code	Title	Credits
ACFI 820	Corporate Taxation	3
ACFI 844	Topics in Advanced Accounting	3
ACFI 860	Advanced Business Law	3
ACFI 890	Accounting Information Systems	3
ACFI 895	Governmental and Non-Profit Accounting	3
ACFI 897	Ethics and Professional Practices	3
Capstone		
ACFI 850	Accounting Theory and Research	3
Select a track below		9
Total Credits		30

Auditing and Assurance Track

Code	Title	Credits
ACFI 830	Advanced Auditing	3
ACFI 896	Topics (International Accounting)	3
ACFI 840	Forensic Acctg & Fraud Exam	3
Total Credits		9

Tax Track

Code	Title	Credits
ACFI 896	Topics (Applied Tax Research and Planning)	3
ACFI 896	Topics (Advanced Topics in Tax)	3
ACFI 896	Topics (Advanced Business Taxation)	3
Total Credits		9

Integrated Audit and Tax Track

Code	Title	Credits
Select three of the six track courses above		9
Total Credits		9

For Students with Non--Accounting Business Degrees

Prerequisites that must be completed at the undergraduate level are:

Code	Title	Credits
ACFI 621	Intermediate Financial Accounting I	4
ACFI 622	Intermediate Financial Accounting II	4
MGT 647	Business Law I	4
ACFI 723	Advanced Managerial Accounting Concepts and Applications	4
ACFI 724	Auditing	4
ACFI 726	Introduction to Federal Income Tax	4
Total Credits		24

Students who do not possess an undergraduate degree in business must also complete:

Code	Title	Credits
ADMN 502	Financial Accounting	4
ADMN 503	Managerial Accounting	4
ECON 401	Principles of Economics (Macro)	4
ADMN 420	Business Statistics	4
ADMN 570	Introduction to Financial Management	4
ADMN 970	Economics of Competition	3
In addition, students must choose two of the following:		8
ADMN 575	Behavior in Organizations	
ADMN 585	Marketing	
ADMN 580	Quantitative Decision Making	
Total Credits		31

Agricultural Sciences (ANFS)

<https://colsa.unh.edu/agriculture-nutrition-food-systems>

Overview

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Agricultural Sciences graduate programs (M.S. and Ph.D.) offered by the Department of Agriculture, Nutrition, and Food Systems (ANFS) are intended for students interested in careers in plant and animal

agriculture, aquaculture, food production and distribution systems, and/or related fields.

Programs

- Agricultural Sciences (M.S.) (p. 30)
- Agricultural Sciences (Ph.D.) (p. 30)

Faculty

<https://colsa.unh.edu/agriculture-nutrition-food-systems/faculty-staff-directory>

Agricultural Sciences (M.S.)

<https://colsa.unh.edu/agriculture-nutrition-food-systems/program/ms/agricultural-sciences>

Description

The M.S. Agricultural Sciences graduate program offered by the Department of Agriculture, Nutrition, and Food Systems (ANFS) is intended for students interested in careers in plant and animal agriculture, aquaculture, food production and distribution systems, and/or related fields.

Emphasis is placed on acquiring basic and practical knowledge in one or more of the diverse components of agricultural systems, including breeding and genetics, physiology, environmental interactions, organismal health, cultural and post-harvest practices, and others. The agricultural sciences graduate programs prepare students to become highly knowledgeable and competent in professional fields related to agriculture, and leaders in collaborative and interdisciplinary efforts to address local, regional, national and/or global agricultural issues.

Graduates may pursue careers in teaching, public service, research in federal, state, and private organizations, commercial plant and/or animal production for food, fiber, fuel, recreation, and many other areas.

Requirements

REQUIREMENTS

Students plan a program of study in conjunction with their advisor and Master's Thesis Committee, including the required courses and competencies. Completion of at least **30 credits**, including research credits, is required. A thesis proposal is developed within the first year. Students complete thesis research for 6 -10 credits# the degree is completed when results are acceptable, a formal thesis presentation and defense has occurred, and the thesis is approved by the Master's Thesis Committee and accepted by the Graduate School.

Number of Credits Required

The M.S. degree requires completion of a minimum of **30 credits**, 6-10 of which may be earned for thesis research (ANFS 899 Master's Thesis).

Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer

credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

Required Courses, Competencies, and Electives

Students in the Agricultural Sciences Graduate Programs are required to take two core courses: ANFS 895 Special Topics Introduction to Agriculture, Nutrition and Food System Graduate Studies (to be taken at the earliest opportunity, typically in the initial fall semester of the graduate program); and ANFS 997 Agriculture, Nutrition, and Food Systems Seminar (1 cr per semester, to be taken at least twice by MS students). In addition, students will be expected to fulfill competency requirements in experimental design and analysis and in scientific writing and communication. For this purpose, relevant courses include Applied Biostatistics II (BIOL 811), Design, Analysis, and Interpretation of Experiments (BIOL 933), and Scientific Writing (e.g., Writing and Publishing Science (BIOL 902). Depending on the prior background of incoming students, one or both of these competency requirements may have been fulfilled through previous graduate or other course work or professional experience. Each student, in consultation with their graduate committee, will define one or more areas of informal specialization, and will take additional courses appropriate for their area(s) of specialization.

Additional Information/Requirements

All students in the Agricultural Sciences Graduate Programs are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

Agricultural Sciences (Ph.D.)

<https://colsa.unh.edu/agriculture-nutrition-food-systems/program/phd/agricultural-sciences>

Description

The Ph.D. Agricultural Sciences graduate program offered by the Department of Agriculture, Nutrition, and Food Systems (ANFS) is intended for students interested in careers in plant and animal agriculture, aquaculture, food production and distribution systems, and/or related fields.

Emphasis is placed on acquiring advanced expertise in one or more of the diverse components of agricultural systems, including breeding and genetics, physiology, environmental interactions, organismal health, cultural and post-harvest practices, and others. The agricultural sciences graduate programs prepare students to become highly knowledgeable and competent in professional fields related to agriculture, and leaders in collaborative and interdisciplinary efforts to address local, regional, national and/or global agricultural issues.

Graduates may pursue careers in teaching, public service, research in federal, state, and private organizations, commercial plant and/or animal production for food, fiber, fuel, recreation, and many other areas.

The Ph.D. program is thesis-based, with the expectation of generating and publishing substantial new knowledge in the field of interest.

Requirements

REQUIREMENTS

Students work with their advisor and their Doctoral Guidance Committee to plan a program of study including the required core courses and competencies, and develop a viable research proposal. The Guidance Committee is normally established by the end of the first semester, and should meet by the end of the second semester. The student presents to the Guidance Committee a preliminary research proposal in which the soundness, originality, and feasibility of the planned research are clearly described. The Guidance Committee is responsible for approving the proposal, and also oversees the qualifying examination through which the student is admitted to doctoral candidacy. The Doctoral Dissertation Committee is established at this point. To earn the Ph.D. degree, students must complete an original dissertation project, present the results at a public seminar, pass an oral dissertation defense consisting of questions from members of the Dissertation Committee, and have the dissertation approved by the Dissertation Committee and accepted by the Graduate School.

Number of Credits Required

There is no specific credit requirement for the Ph.D., though students must take the required core courses and fulfill the competences stated in the following section. Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

Required Courses, Competencies, and Electives

Students in the Agricultural Sciences Graduate Programs are required to take two core courses: ANFS 895 Special Topics Introduction to Agriculture, Nutrition and Food System Graduate Studies (to be taken at the earliest opportunity: typically in the initial fall semester of the graduate program); and ANFS 997 Agriculture, Nutrition, and Food Systems Seminar (1 cr per semester, to be taken at least three times by Ph.D. students). In addition, students will be expected to fulfill competency requirements in experimental design and analysis and in scientific writing and communication. For this purpose, relevant courses include Applied Biostatistics II (BIOL 811), Design, Analysis, and Interpretation of Experiments (BIOL 933), and Scientific Writing (e.g., Writing and Publishing Science (BIOL 902)). Depending on the prior background of incoming students, one or both of these competency requirements may have been fulfilled through previous graduate or other course work or professional experience. Each student, in consultation with their graduate committee, will define one or more areas of informal specialization, and will take additional courses appropriate for their area(s) of specialization.

Additional Information/Requirements

All students in the Agricultural Sciences Graduate Programs are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

Analytics (DATA)

Degrees Offered: M.S., Graduate Certificate

This program is offered in Durham.

The full-time, 11-month Master of Science in Analytics program immerses students in the skills necessary to become effective analytics professionals, including: quantitative tools, applications and reasoning, critical thinking and presentation/communication skills. This program places heavy emphasis on student application of knowledge and skills through a two-semester practicum where students work in teams to complete an industry or government sponsored real-world analytic problem. In addition, the program emphasizes student professional development with respect to written and oral communication, leadership, and career development. Students specialize in a domain of interest by choosing a "cluster" made up of two courses in a specific area of study. Currently the program offers business, health, and sports clusters. For more information, view the MS Analytics program flyer.

Admission Requirements

Applicants are expected to hold a Bachelor's degree as verified by official transcripts with a minimum GPA of 3.0 from an accredited undergraduate/graduate degree institution(s), at least one statistics course, three letters of recommendations, current CV, Completion of the four essay questions, and an interview with an Analytics Program faculty.

<https://www.unh.edu/analytics/>

Programs

- Analytics (M.S.) (p. 31)
- Public Policy and Analytics Dual Degree (M.P.P./M.S.) (p. 32)
- Analytics (Graduate Certificate) (p. 33)
- Data Science (Graduate Certificate) (p. 33)

Faculty

See <https://www.unh.edu/analytics/faculty-staff> for faculty.

Analytics (M.S.)

<https://www.unh.edu/analytics/master-science-analytics>

Description

These days, big data is a big deal, and it is everywhere - from professional sports to healthcare, and from e-commerce to government sectors. As the use of analytics grows, so does the demand for people who know how to skillfully extract value from massive amounts of data. The University of New Hampshire's Master of Science in Analytics degree prepares graduates to fill the current gap in the marketplace. Analytics experts are needed - and in just 11 months, you can become one of them.

The **Master of Science in Analytics** full-time, three-semester program (summer, fall, spring) at UNH is an applied, interdisciplinary graduate program that offers students in-depth training in quantitative analysis, applications and reasoning, critical thinking and analytics. It has a

cohort design and is a full-time program intended to engage students in real-world projects with external partnerships that provide them with unique opportunities to apply their skills, solve real-world analytics problems, and develop connections for employment. Students are able to specialize in areas of health, business, or self-designed focus areas. Professional development, critical thinking, presentation/communication, and leadership skills are integrated into the analytics program—one of the fastest growing fields in the world. Upon completion of the program, students will be prepared to sit for a number of SAS certifications.

- Intensive, full-time, on-campus program provides a specialized set of skills in just 11 months.
- Complete analytic projects with industry partners, gaining real-world experience while networking.
- Work in analytics teams on projects sponsored by industry partners.
- Gain expertise in advanced predictive modeling, market segmentation and text analysis.
- Professional development through teamwork, communication, critical thinking and project work

Please visit the program website (<http://www.unh.edu/analytics>) for program or Analytics & Data Science information.

Requirements

Degree Requirements

- 36 credits completed with a cumulative grade point (GPA) average of 3.0 or higher and grades higher than B-.
- Passing grade on Practicum Project – Student demonstrates synthesized learning from the curriculum into the analysis of a team project which includes applied skills in data cleaning, data mining, and analysis, professionalization, including presentation skills, conceptual mapping of questions, conveying of data and analytic limitations, and project scoping, as well as communication, messaging, and professional development skills.
- Satisfactory attendance
- Acceptable Student Professional Code of Conduct

Code	Title	Credits
Required Courses		
DATA 800	Introduction to Applied Analytic Statistics	3
DATA 801	Foundations of Data Analytics	3
DATA 802	Analytical Tools and Foundations	3
DATA 803	Introduction to Analytics Applications	3
DATA 900	Data Architecture	3
DATA 901	Analytics Applications I	3
DATA 911	Analytics Practicum I	3
Cluster Elective I		3
DATA 902	Analytics Methods	3
DATA 903	Analytics Applications II	3
DATA 912	Analytics Practicum II	3
Cluster Elective II		3
Total Credits		36

Public Policy and Analytics Dual Degree (M.P.P./M.S.)

<https://www.unh.edu/analytics/master-public-policy-analytics>

Description

The Public Policy and Analytics Dual Degree equips you with the skills and knowledge required to analyze critical societal issues, develop effective policy solutions, and translate analysis into action.

You can choose to start the program with either the Master in Public Policy (fall term) or the MS in Analytics (summer term) and study a mix of content from both programs each year. Your capstone experience during the second year for both paths will demonstrate your command of skills from each program. In just two years, you will graduate with two highly marketable and sought-after degrees: Master in Public Policy and MS in Analytics.

Program Delivery & Location: Academic courses for both programs are offered in person on the UNH Durham campus with a portion of the MPP experiential learning taking place offsite: Washington, DC, for the Colloquium and at the Internship site location during the internship experience.

Requirements

Students enrolled in the Public Policy and Analytics Dual Degree program are required to earn a minimum of thirty-one (31) credits in the Master in Public Policy program (MPP) and thirty (30) credits in the MS in Analytics program, resulting in a minimum of 61 credits in total. Students completing their dual degree will graduate with two master's degrees: Master in Public Policy and Master of Science in Analytics.

Students can choose to start the dual degree in the fall term with MPP coursework or in the summer term with MS in Analytics coursework. It is highly recommended that students meet with their Academic Advisors for both programs prior to starting the Dual Degree to insure they have a clear understanding of the dual degree program requirements and course schedule.

Below are the courses required for the Public Policy (MPP) and Analytics (MS) programs to successfully complete this Dual Degree curriculum:

Public Policy M.P.P. - Dual Degree Curriculum - Required Courses

Code	Title	Credits
MPP CORE Curriculum Courses (4 Courses):		
PPOL 902	Strategy and Practice of Public Policy	3
PPOL 904	Economics for Public Policy	3
PPOL 906	Fundamentals of Policy Analysis	3
PPOL 910	Policy Across Borders	3
MPP EXPERIENTIAL LEARNING Activities (4 Courses):		
PPOL 950	Washington DC Colloquium	3
PPOL 990A	Policy Capstone Planning ¹	1
PPOL 990	Policy Capstone ¹	3
PPOL 998	Policy Internship ²	3

MPP ELECTIVE Courses: Choose 3 MPP-Approved Elective Courses 9
1,3

Total Credits 31

¹ With your MPP Academic Advisor's approval, DATA 911 Analytics Practicum I and DATA 912 Analytics Practicum II courses can fulfill the PPOL 990 Policy Capstone requirements if there is a policy-relevant component to the Practicum. If this is the case, an additional MPP-approved elective course is required. All students are required to take PPOL 990A Policy Capstone Planning.

² The Policy Internship is supervised by a faculty member who will provide the academic structure to parallel the applied experience.

³ Electives are available in many substantive areas with topics and courses added on a continuing basis. Students may also propose additional electives if they make sense in terms of the student's interests and academic plan. Discussion with an advisor should inform this choice.

Analytics M.S. - Dual Degree Curriculum - Required Courses

Code	Title	Credits
MS in Analytics BEGINNER Courses (4 Courses):		
DATA 800	Introduction to Applied Analytic Statistics	3
DATA 801	Foundations of Data Analytics	3
DATA 802	Analytical Tools and Foundations	3
DATA 803	Introduction to Analytics Applications	3
MS in Analytics INTERMEDIATE & ADVANCED Courses (4 Courses):		
DATA 900	Data Architecture	3
DATA 901	Analytics Applications I	3
DATA 902	Analytics Methods	3
DATA 903	Analytics Applications II	3
MS in Analytics EXPERIENTIAL LEARNING Activities (2 Courses):		
DATA 911	Analytics Practicum I ¹	3
DATA 912	Analytics Practicum II ¹	3
Total Credits		30

¹ DATA 911 Analytics Practicum I and DATA 912 Analytics Practicum II must be policy-relevant to fulfill the MPP program's PPOL 990 Policy Capstone requirement. Consult with your MPP Academic Advisor prior to the Practicum courses for details and guidance.

Please consult the MS in Analytics program website for program information and detailed requirements.

Public Policy and Analytics Dual Degree Credit Summary

Code	Title	Credits
Master in Public Policy Program Course Credits		31
MS in Analytics Program Course Credits		30
Total Credits		61

Analytics (Graduate Certificate)

<https://www.unh.edu/analytics/graduate-certificate-analytics>

Description

The Graduate Certificate in Analytics is a full time, 10 week, on campus program that provides a "real-time, real world" introduction to today's tools, methods and uses of data. The program is highly applied, and completed alongside the MS in Analytics students during the summer semester. Students will complete an applied 5-week applied, data driven project.

This is an excellent program for anyone exploring a career in data analytics or individuals working in data analytics positions with no formal academic background in analytics. Students spend the summer in a mix of didactic and applied learning through case studies, team work and course curriculum.

- 3 months to certificate completion
- Two-track focus: master analytics and professional conduct and development
- Real-time case studies with strong link to industry
- Learn programming languages like Python, SQL, R and SAS

Admissions Requirements

Please see the Graduate School website (<http://www.gradschool.unh.edu/php/posd.php?major=QM71>) for admissions requirements.

Please visit the program website (<http://www.unh.edu/analytics>) for program or Analytics & Data Science information.

Requirements

The graduate certificate in Analytics requires the completion of 4 core courses.

Code	Title	Credits
DATA 800	Introduction to Applied Analytic Statistics	3
DATA 801	Foundations of Data Analytics	3
DATA 802	Analytical Tools and Foundations	3
DATA 803	Introduction to Analytics Applications	3
Total Credits		12

Data Science (Graduate Certificate)

<https://www.unh.edu/analytics/online-graduate-certificate-data-science>

Description

The Introduction to Data Science Certificate is an online 16 week graduate program that exposes students to current, cutting edge data programming, statistical modeling and visualization tools through guided, online instruction and applied case studies. This certificate program offers a flexible, short-turnaround time to completion allowing busy employees to participate. Enjoy applied learning in a self-paced but facilitated environment with course instructors and a student success coach.

- Introduction to Data Science to provide basic level of quantitative training
- In as little as 16 weeks to Certificate completion

- Exposure to the tools and methods used in today's ever changing data science environment
- Interdisciplinary and applied nature

Who Should Enroll?

Professionals who want to increase their earning potential, advance their careers, and make a greater impact within their business or organization with advanced data analytic and coding skills. This certificate is beneficial to those in the fields of business analyst, data analyst, financial analyst, computer scientist, programmers, database administrators, researchers, statisticians, and marketing.

Admissions Information

Please see the Graduate School website (<http://www.gradschool.unh.edu/php/posd.php?major=QM72>) for admissions requirements.

Learn more about the program at the program website (<http://www.unh.edu/analytics>).

Requirements

The graduate certificate in Data Science requires the completion of 4 core courses.

Code	Title	Credits
DATA 800	Introduction to Applied Analytic Statistics	3
DATA 820	Programming for Data Science	3
DATA 821	Data Architecture	3
DATA 822	Data Mining and Predictive Modeling	3
Total Credits		12

Biochemistry (BCHM)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Department of Molecular, Cellular, and Biomedical Sciences offers an accelerated master's program (B.S./M.S.), a master's of science, and a doctor of philosophy degree in biochemistry. Graduate students in biochemistry are typically supported by teaching or research assistantships, as well as by competitive internal and external fellowship programs. For more information about the program, including admission and degree requirements, please contact the Department of Molecular, Cellular, and Biomedical Sciences at mcbs.dept@unh.edu.

Distinctive Features of the Program

The Graduate Program in Biochemistry combines a rigorous curriculum in biochemistry with diverse research opportunities at the frontier of chemical, molecular and cellular biology. The program aims to train interdisciplinary future researchers, savvy in modern technologies and data-science, to advance a mechanistic understanding of biology. Incoming students are given the opportunity for laboratory rotations to explore the various areas of biochemistry in those cases where a thesis advisor has not been identified or where exposure to a variety of experimental approaches is advantageous.

The Graduate Program in Biochemistry offers:

- Outstanding research training in many cutting-edge research areas in cellular structure and function, genome stability, protein structure and function, lipid metabolism, signal transduction, structural biology, and transcriptional and translational regulation.
- Weekly seminar series that includes both distinguished invited speakers and graduate student research presentations.
- Opportunities to gain teaching and mentoring experiences with undergraduate students in the biological sciences.
- Strong track record for graduates attaining careers in academia, biomedical research institutes, biotechnology and pharmaceutical companies, and state and federal governmental agencies.

Admission Requirements

An applicant is expected to have completed basic courses in chemistry, biological sciences, mathematics, and physics. Otherwise well-qualified applicants will be permitted to correct deficiencies in undergraduate education by enrollment in the appropriate courses or by independent study during the first year. Applicants must submit a personal statement, current scores (within five years) from the general GRE test, and three letters of recommendation. If possible, the personal statement should specify the applicant's research interests and potential faculty mentors. International applicants living outside the U.S. should initially complete a free online pre-application (<http://gradschool.unh.edu/international.php>).

Applicants from non-English-speaking countries must also provide TOEFL (Test of English as a Foreign Language) scores.

5 Year Accelerated Master's Degree Requirements

This accelerated five-year program leading to a combined bachelor and master's degree in biochemistry is designed for highly motivated and qualified students seeking additional training to further their career goals as a researcher in the life sciences.

Admission to the combined degree program is highly competitive. Students wishing to pursue this option must have a grade point average greater than 3.2 at the time of application. A thesis advisor must be identified during the junior year, and the approval of the advisor must be obtained. Prior to the first semester of the senior year, the student must formally apply through the Graduate School and receive early admission to the Biochemistry Graduate Program. The requirement for the Graduate Record Examination is waived for combined degree applicants.

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences>

Programs

- Biochemistry (Ph.D.) (p. 34)
- Biochemistry (M.S.) (p. 36)

Faculty

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/people>

Biochemistry (Ph.D.)

<https://colsa.unh.edu/mcbs/grad/biochemistry/biochemistry-phd>

Description

The Ph.D. in Biochemistry combines a rigorous curriculum in biochemistry and related disciplines with interdisciplinary research opportunities at the frontiers of biochemistry, molecular biology, and cell biology. Graduates of the program are equipped for leadership positions in biotechnology and pharmaceutical companies, academic and government research laboratories, and successful careers in teaching and research at the college and university level.

Distinctive Features of the Program

- Advanced course offerings include signal transduction pathways, pharmacology, physical biochemistry, proteomics, endocrinology, structural biology, bioinformatics, and cancer biology
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant

Research Opportunities

- Tumor cell biology
- Protein structure, function, and regulation
- Signal transduction pathways
- Molecular neurobiology
- Genomics and bioinformatics
- Transcriptional and translational regulation
- Proteomics and glycomics

Financial Support

- Students admitted to the Ph.D. Program are typically supported by Research Assistantships or Teaching Assistantships
- Internal summer and academic year fellowships are available to students on a competitive basis.

Career Prospects

- Research directors in biotechnology and pharmaceutical industries
- Principle investigators of academic research labs and research institutes, state and federal government agencies
- Academic preparation for future teaching roles in a college or university environment

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics

- Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online pre-application, which can be found on the Graduate School's website.
- Three letters of recommendation
- Personal statement, including research interests and two or three potential Biochemistry faculty thesis advisors.

Requirements

Ph.D. Requirements

The Ph.D. in biochemistry requires the completion of significant, original independent research and preparation of a thesis for submission to the Graduate School. A minimum of two semesters of Doctoral Research (MCBS 999) is required. Graduate credits are earned for courses numbered 800-999. In most cases, it is expected that the Ph.D. degree will be completed within four to six years of admission to the graduate program. Demonstration of proficiency in physical chemistry and biochemistry will be assessed in the first year by examination or coursework.

Guidance Committee: During the first semester, the Graduate Program Coordinator will assist the student in choosing courses. Following selection of the thesis advisor, the student and the advisor jointly agree on the members of the Guidance Committee, and communicate this recommendation to the Biochemistry Graduate Program Coordinator. The Doctoral Guidance Committee Nomination Form must be completed and submitted to the Graduate School by the end of the first year. The Guidance Committee consists of five faculty members: the advisor (as chairperson), two other members of the biochemistry graduate faculty, and up to two faculty members from other graduate programs. However, only three members of the guidance committee are required for the second-year exam. The committee meets soon after selection of a thesis project to determine the student's curriculum. Courses required by the guidance committee must be taken for credit and completed with a passing grade (at least a B-). Courses recommended by the committee may be audited or taken for credit, but in either case, the student is expected to be familiar with the subject matter of these courses. It is recommended that the Guidance Committee meet each semester thereafter to assess the student's academic and research progress.

Doctoral Dissertation Committee: The Doctoral Committee is composed of the faculty advisor (as chairperson), two other faculty members in the graduate program in biochemistry, and up to two faculty members from other graduate programs. In most cases, the Guidance Committee constitutes the Doctoral Committee. The Doctoral Committee evaluates the dissertation and administers the final examination. The Doctoral Committee meets annually to assess the progress toward completion of the Ph.D. requirements.

Candidacy: Candidacy is reached after passing:

1. *Qualifying Exam – Part 1*

The student will prepare and defend a written research proposal on a topic that is outside the thesis topic and approved by the Guidance Committee. To pass *Part 1 of Qualifying Exam*, the student is expected to demonstrate the ability to write a coherent proposal, and broad knowledge of biochemistry and molecular that ranges beyond the research project.

2. *Qualifying Exam – Part 2*

The student will submit to the Guidance Committee a written description of the thesis problem, summary of research progress to date, and outline of research goals yet to be attained. To pass Part 2 of Qualifying Exam, the student is expected to demonstrate ability to plan and conduct research, to think critically and creatively about questions in the student's area of interest, and to be aware of current and recent research literature in these areas.

Further details can be found at <http://colsa.unh.edu/mcbs/biochemistry/diagnostic-exams>.

Dissertation: The student is required to prepare a written doctoral dissertation for submission to the Doctoral Committee. The dissertation must represent significant and original research written in a clear, comprehensible style. A copy of the complete thesis must be made available to the committee at least two weeks before the date of the final examination. Publication of the dissertation by ProQuest is required.

Final Defense: An oral examination of the doctoral dissertation consists of two parts: an oral presentation of the research that is open to the public, and an oral defense of the dissertation conducted by the doctoral committee. Final approval of the doctoral dissertation will be determined by a majority vote of the doctoral committee. The final examination must be completed by the date listed in the Graduate School calendar.

Teaching Requirement: Teaching assignments in the laboratory, in lectures, or in an individual instruction format are an essential part of the graduate academic programs of the department and are designed to give graduate students practical teaching experience. Normally, one year of part-time teaching will be required of each doctoral student.

Biochemistry (M.S.)

<https://colsa.unh.edu/mcbs/grad/biochemistry/biochemistry-ms>

Description

The M.S. in Biochemistry combines a rigorous curriculum in biochemistry and related disciplines with interdisciplinary research opportunities at the frontiers of biochemistry, molecular biology, and cell biology. Graduates of the program are equipped for successful careers in biotechnology and pharmaceutical companies, academic and government research laboratories, and as preparation for doctoral programs, medical school, and health-related professional programs.

Distinctive Features of the Program

- Advanced course offerings include signal transduction pathways, pharmacology, physical biochemistry, proteomics, endocrinology, structural biology, bioinformatics, and cancer biology
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus

- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant
- Accelerated M.S. program available to UNH students enrolled in the B.S. program in Biochemistry, Molecular, and Cellular Biology

Research Opportunities

- Tumor cell biology
- Protein structure, function, and regulation
- Signal transduction pathways
- Molecular neurobiology
- Genomics and bioinformatics
- Transcriptional and translational regulation
- Proteomics and glycomics

Financial Support

- Students admitted to the M.S. Program are typically supported by Research Assistantships or Teaching Assistantships
- Internal summer and academic year fellowships are available to students on a competitive basis.
- Teaching Assistantships are not available for students enrolled in the Accelerated M.S. program

Career Prospects

- Research scientists in biotechnology and pharmaceutical industries
- Lab managers in academic research labs and research institutes, state and federal government agencies
- Academic preparation for doctoral programs and professional health programs (e.g., medical school)

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
 - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online pre-application, which can be found on the Graduate School's website.
- Three letters of recommendation
- Personal statement, including research interests and two or three potential Biochemistry faculty thesis advisors.

Accelerated M.S. Program Requirements

- Current junior standing in the B.S. in Biochemistry, Molecular, and Cellular Biology program at the time of application
- GPA of 3.2 or greater
- Thesis advisor identified who supports entry into the program

- Three letters of recommendation (one of which is from the thesis advisor)
- Personal statement of research interests and career aspirations
- GRE is waived

Requirements

M.S. Degree Requirements

Student must meet the Graduate School's requirements for the master's degree (minimum 30 credits) and are expected to develop a culminating thesis based on the completion of a research project. Demonstration of proficiency in physical chemistry and biochemistry will be assessed in the first year by examination or coursework. All candidates for the M.S. degree must pass an oral examination based on the thesis or project report and on the graduate courses completed in the degree program.

Credits: A minimum of 30 graduate credits is required including 6-10 master's thesis credits (MCBS 899 Master's Thesis). Graduate credits are earned for courses numbered 800-999. Up to 12 credits earned in non-Biochemistry courses numbered 700-799 may be taken for graduate credit upon approval of the Graduate School. Typically, master's students enroll in BCHM 851-852 *Principles of Biochemistry* during their first year of study, unless diagnostic examinations indicate that undergraduate preparation in general biochemistry is sufficient.

Thesis Committee: During the first semester, the Graduate Program Coordinator will assist the student in choosing courses. Following selection of the research advisor, the student and the advisor jointly agree on the members of the Thesis Committee during the second semester and communicate this recommendation to the Biochemistry Graduate Program Coordinator. A Master's Supervisory Committee Nomination Form must be completed and submitted to the Graduate School. The Thesis Committee consists of the advisor as chair and two other members. The committee meets soon after selection of a thesis project to approve the student's proposed curriculum.

Courses required by the Thesis Committee must be taken for credit and completed with a passing grade (B-minus or better). Courses recommended by the committee may be audited or taken for credit, but in either case the student is expected to be familiar with the subject matter of these courses. It is recommended that the student meet with their Thesis Committee every semester to review progress of the thesis project and academics.

Written Thesis and Oral Presentation: Students must prepare a written master's thesis for submission to their Thesis Committee. A copy of the complete thesis must be made available to the committee at least 14 days before the date of the final examination. Consult the *Thesis and Dissertation Manual* provided by the Graduate School for details on preparing the manuscript.

The oral examination of the master's thesis consists of two parts: an oral presentation of the research that is open to the public and an oral defense of the master's thesis conducted by the Thesis Committee.

Final approval of the master's thesis will be determined by the Thesis Committee. The final thesis must be submitted to the Graduate School via the procedures outlined in the *Thesis and Dissertation Manual*. As their program nears completion, students must submit the Intent-to-Graduate prior to the deadline posted on the Graduate School's calendar.

Biological Sciences (BIOL)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Biological Sciences Graduate Program offers M.S. and Ph.D. degrees in Biological Sciences, with options in Integrative and Organismal Biology and Marine Biology.

Integrative and Organismal Biology (IOB)

This option offers a home to students interested in basic organismal biology in all of its diverse aspects (physiology, neurobiology, behavior, cell biology, genetics, evolution, ecology, systematics, etc.), in both terrestrial and aquatic environments. Modern biology employs approaches and tools ranging from molecular to ecological levels to gain a deep understanding of organismal functions and adaptations. Students in IOB approach their studies with a focus on organisms, and apply whatever tools are necessary to answer thematic and specific questions. Students interested in combining hands-on biological projects with research on teaching and learning biology at the post-secondary level should choose this option.

Marine Biology (MB)

This option is intended for students interested in marine, coastal, and estuarine ecosystems, and the organisms that inhabit them, at all levels of inquiry. Some faculty at UNH study/use marine organisms as model systems for molecular phylogeny, cellular metabolism, and neurobiology; others focus on the structure and function of marine ecosystems. Faculty interests range from basic research to applied areas such as aquaculture and fisheries# many combine the two.

Related programs

Students interested in fields such as agriculture and animal science should review programs available through the Department of Agriculture, Nutrition, and Food Systems (<https://colsa.unh.edu/agriculture-nutrition-food-systems>); those interested in molecular biology and genomics should review programs in the Department of Molecular, Cellular and Biomedical Sciences, including Genetics and Molecular & Evolutionary Systems Biolog (<https://colsa.unh.edu/mcbs>); those interested in ecosystems, wildlife and forestry should review programs in the Department of Natural Resources and the Environment (<https://colsa.unh.edu/natural-resources-environment>), including Natural Resources and Earth Systems Science (NRESS) (<https://www.unh.edu/nressphd>).

Admission Requirements

Applicants ordinarily will have completed an undergraduate major in biology or a related field. A basic array of courses including general biology, development, ecology, genetics, morphology, and physiology is recommended# applicants should have completed organic chemistry and a semester each of calculus and physics. Applicants whose preparation does not meet these criteria can be admitted to the program, but may need to remedy any deficiencies via courses that do not give graduate credit. Applicants must submit scores from the general test of the Graduate Record Examination (GRE), taken within the past five years. The GRE subject test is not required.

All applicants are strongly encouraged to communicate with potential advisors (<https://colsa.unh.edu/biological-sciences/people>) as part of

the application process. Identifying an advisor is normally a prerequisite for admission.

Research and Facilities

The Biological Sciences graduate program is enhanced by research in other departments and institutes across the University.

These include the School for Marine Sciences and Ocean Engineering (<https://marine.unh.edu>) and its associated programs and facilities:

- N.H. Sea Grant Program (<http://seagrant.unh.edu>);
- the Center for Collaborative Science;
- the Institute for the Study of Earth, Oceans, and Space (<http://www.eos.unh.edu>) (EOS);
- the UNH Center for Coastal and Ocean Mapping (<http://ccom.unh.edu>) (CCOM);
- the Joint Hydrographic Center (<https://marine.unh.edu/program/center-coastal-and-ocean-mappingjoint-hydrographic-center>); and
- the Ocean Processes Analysis Laboratory (<http://www.opal.sr.unh.edu>) (OPAL).

There are five aquatic laboratories:

- Jackson Estuarine Lab (<https://marine.unh.edu/facility/jackson-estuarine-laboratory>),
- Judd Gregg Marine Research Complex (<https://marine.unh.edu/facility/judd-gregg-marine-research-complex>),
- Anadromous Fish and Aquatic Invertebrate Research Lab (<https://marine.unh.edu/facility/anadromous-fish-and-aquatic-invertebrate-research-laboratory-afair-lab>) (AFAIR),
- the Aquaculture Research Center (<http://colsa.unh.edu/dbs/zoology/facilities>) (ARC), and
- the Shoals Marine Laboratory (<http://marine.unh.edu/SML>) (SML).

The Center for Freshwater Biology (<http://cfb.unh.edu>) (CFB) jointly administers (with the UNH Cooperative Extension) the Lakes Lay Monitoring Program (<https://extension.unh.edu/programs/lakes-lay-monitoring-program>), which is dedicated to the preservation and sound management of lakes through citizen-based monitoring and research.

The University of New Hampshire Collection of insects and other arthropods (<http://unhcollection.unh.edu>) is the largest arthropod depository and research collection in Northern New England (700,000 specimens and growing). Over 12,000 species are represented from different regions of New England, featuring many specimens collected from the White Mountains.

In addition, research in plant biology and agriculture is carried out in the Macfarlane Research Greenhouses (<https://colsa.unh.edu/nhaes/macfarlane-research-greenhouses>), the Hodgdon Herbarium (<http://www.unh.edu/herbarium>), and UNH's agricultural facilities (<https://www.colsa.unh.edu/nhaes/facilities>).

The Hubbard Center for Genomic Studies (<http://hcgs.unh.edu>) provides training and research in comparative and environmental genomics, with a special emphasis on novel model species. It provides expertise in constructing DNA libraries, DNA sequencing, fragment analysis, and the analysis of gene expression.

<https://colsa.unh.edu/biological-sciences>

Programs

- Biological Sciences: Integrative and Organismal Biology (Ph.D.) (p. 38)
- Biological Sciences: Marine Biology (Ph.D.) (p. 39)
- Biological Sciences: Integrative and Organismal Biology (M.S.) (p. 40)
- Biological Sciences: Marine Biology (M.S.) (p. 41)

Faculty

<https://colsa.unh.edu/biological-sciences/people>

Biological Sciences: Integrative and Organismal Biology (Ph.D.)

<https://colsa.unh.edu/biological-sciences/program/phd/biological-sciences-integrative-and-organismal-biology>

Description

The Integrative and Organismal Biology (IOB) option offers a home to students interested in basic organismal biology in all of its diverse aspects (physiology, neurobiology, behavior, cell biology, genetics, evolution, ecology, systematics, etc.), in both terrestrial and aquatic environments. Modern biology employs approaches and tools ranging from molecular to ecological levels to gain a deep understanding of organismal functions and adaptations. Students in IOB approach their studies with a focus on organisms, and apply whatever tools are necessary to answer thematic and specific questions. Students interested in combining hands-on biological projects with research on teaching and learning biology at the post-secondary level should choose this option. Students completing degrees in IOB will be prepared for a wide range of professional careers in animal and/or plant biology, whether in academia, government, research, or nonprofit organizations.

Requirements

Ph.D. Degree Requirements

Students work with their advisor and their Doctoral Guidance Committee to plan a program of study including the required core courses and competencies, and develop a viable research proposal. The Guidance Committee is normally established by the end of the first semester, and should meet by the end of the second semester. The student presents to the Guidance Committee a preliminary research proposal in which the soundness, originality, and feasibility of the planned research are clearly described. The Guidance Committee is responsible for approving the proposal, and also oversees the qualifying examination through which the student is admitted to doctoral candidacy. The Doctoral Dissertation Committee is established at this point. To earn the Ph.D. degree, students must complete an original dissertation project, present the results at a public seminar, pass an oral dissertation defense consisting of questions from members of the Dissertation Committee, and have the dissertation approved by the Dissertation Committee and accepted by the Graduate School.

Number of Credits Required

There is no specific credit requirement for the Ph.D., though students must take required core courses and meet competency requirements. The Biological Sciences Program specifies 2 credits' worth of required coursework (BIOL 901 Introductory Graduate Seminar); most students use 6 more credits to satisfy the competency requirement in experimental design/analysis (BIOL 811 Applied Biostatistics II or BIOL 933 Design, Analysis, and Interpretation of Experiments, 4 credits) and recommended coursework in writing/communication (BIOL 902 Writing and Publishing Science or BIOL 950 Scientific Communication, 2 credits). Other graduate coursework approved by the student's committee can substitute for any of these courses except BIOL 901 Introductory Graduate Seminar.

Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

Required Courses, Competencies, and Electives

All students in the Biological Sciences Graduate Program are required to take Introductory Graduate Seminar (BIOL 901) and fulfill all applicable competency requirements (these may vary by option). Those with teaching assistantships (TAs) must enroll in College Teaching (LSA 900) before or concurrent with their first teaching assignment.

1. Core Course. Introductory Graduate Seminar (BIOL 901). This first-semester course focuses on key information and skills for a successful transition into the graduate program, familiarizing students with program requirements and faculty and providing an opportunity to meet others in their cohort.
2. Competency in experimental design and analysis. This may be fulfilled by previous graduate coursework (as determined by the student's advisor and committee), or by taking one graduate-level course. Two advanced courses in experimental design and analysis are offered, normally in alternate years. The first is Applied Biostatistics II (BIOL 811) and the second is Design, Analysis and Interpretation of Experiments (BIOL 933). Either course, or an equivalent approved by the student's advisor and committee (e.g. NR 909 Analysis of Ecological Communities and Complex Data), can be used to fulfill this competency requirement.
3. Electives. Students will work with their advisor and committee to identify additional courses appropriate for their area of specialization and their career objectives. Recommendations often include coursework in professional writing and communication: Scientific Writing (BIOL 902) is taught fall semester, and open to students at any stage of the program. Scientific Communication (BIOL 950) is usually taught in spring. A course in Grant Writing (NR 905) is offered by the Department of Natural Resources.

Additional Information/Requirements

All students in the Biological Sciences Program are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

A summary of degree requirements is available at <https://colsa.unh.edu/biological-sciences/program/phd/biological-sciences-integrative-and->

organismal-biology, along with the program's graduate handbook, which includes expectations, guidelines, and detailed policies.

Biological Sciences: Marine Biology (Ph.D.)

<https://colsa.unh.edu/biological-sciences/program/phd/biological-sciences-marine-biology>

Description

The Marine Biology (MB) option is intended for students interested in marine, coastal, and estuarine ecosystems, and the organisms that inhabit them, at all levels of inquiry. Some UNH faculty use marine organisms as model systems for molecular phylogeny, cellular metabolism, and neurobiology, while others study the structure and function of marine ecosystems. Some faculty members focus primarily on basic research# others work in more applied areas such as aquaculture and fisheries# many combine the two. Students who have earned advanced degrees at UNH lead agencies involved in managing valuable marine resources, teach marine biology in academic and public settings, own aquaculture companies, or earn a living as researchers. In addition to on-campus facilities, UNH owns the Coastal Marine Laboratory (<https://marine.unh.edu/facility/judd-gregg-marine-research-complex>) and the Jackson Estuarine Laboratory (<https://marine.unh.edu/facility/jackson-estuarine-laboratory>), and a range of research vessels. UNH has an excellent SCUBA diving program for students interested in becoming certified to dive as part of their research. The Marine Biology option is also affiliated with UNH's School of Marine Sciences and Ocean Engineering (<https://marine.unh.edu/>).

Requirements

Ph.D. Degree Requirements

Students work with their advisor and their Doctoral Guidance Committee to plan a program of study including the required core courses and competencies, and develop a viable research proposal. The Guidance Committee is normally established by the end of the first semester, and should meet by the end of the second semester. The student presents to the Guidance Committee a preliminary research proposal in which the soundness, originality, and feasibility of the planned research are clearly described. The Guidance Committee is responsible for approving the proposal, and also oversees the qualifying examination through which the student is admitted to doctoral candidacy. The Doctoral Dissertation Committee is established at this point. To earn the Ph.D. degree, students must complete an original dissertation project, present the results at a public seminar, pass an oral dissertation defense consisting of questions from members of the Dissertation Committee, and have the dissertation approved by the Dissertation Committee and accepted by the Graduate School.

Number of Credits Required

There is no specific credit requirement for the Ph.D., though students must take required core courses and meet competency requirements. The Biological Sciences Program specifies 2 credits' worth of required coursework (BIOL 901 Introductory Graduate Seminar); most students use 6 more credits to satisfy the competency requirement in experimental design/analysis (BIOL 811 Applied Biostatistics II or BIOL 933 Design, Analysis, and Interpretation of Experiments, 4 credits) and recommended

coursework in writing/communication (BIOL 902 Writing and Publishing Science or BIOL 950 Scientific Communication, 2 credits). Other graduate coursework approved by the student's committee can substitute for any of these courses except BIOL 901 Introductory Graduate Seminar.

Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

Required Courses, Competencies, and Electives

All students in the Biological Sciences Graduate Program are required to take Introductory Graduate Seminar (BIOL 901) and fulfill all applicable competency requirements (these may vary by option). Those with teaching assistantships (TAs) must enroll in College Teaching (LSA 900) before or concurrent with their first teaching assignment.

1. **Core Course.** Introductory Graduate Seminar (BIOL 901). This first-semester course focuses on key information and skills for a successful transition into the graduate program, familiarizing students with program requirements and faculty and providing an opportunity to meet others in their cohort.
2. **Competency in experimental design and analysis.** This may be fulfilled by previous graduate coursework (as determined by the student's advisor and committee), or by taking one graduate-level course. Two advanced courses in experimental design and analysis are offered, normally in alternate years. The first is Applied Biostatistics II (BIOL 811), and the second is Design, Analysis and Interpretation of Experiments (BIOL 933). Either course, or an equivalent approved by the student's advisor and committee (e.g. NR 909 Analysis of Ecological Communities and Complex Data), can be used to fulfill this competency requirement.
3. **Electives.** Students will work with their advisor and committee to identify additional courses appropriate for their area of specialization and their career objectives. Recommendations often include coursework in professional writing and communication: Scientific Writing (BIOL 902) is taught fall semester, and open to students at any stage of the program. Scientific Communication (BIOL 950) is usually taught in spring. A course in Grant Writing (NR 905) is offered by the Department of Natural Resources.

Additional Information/Requirements

All students in the Biological Sciences Program are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

A summary degree requirements is available at <https://colsa.unh.edu/biological-sciences/program/phd/biological-sciences-marine-biology>, along with the program's graduate handbook, which includes expectations, guidelines, and detailed policies.

Biological Sciences: Integrative and Organismal Biology (M.S.)

<https://colsa.unh.edu/biological-sciences/program/ms/biological-sciences-integrative-and-organismal-biology>

Description

The Integrative and Organismal Biology (IOB) option offers a home to students interested in basic organismal biology in all of its diverse aspects (physiology, neurobiology, behavior, cell biology, genetics, evolution, ecology, systematics, etc.), in both terrestrial and aquatic environments. Modern biology employs approaches and tools ranging from molecular to ecological levels to gain a deep understanding of organismal functions and adaptations. Students in IOB approach their studies with a focus on organisms, and apply whatever tools are necessary to answer thematic and specific questions. Students interested in combining hands-on biological projects with research on teaching and learning biology at the post-secondary level should choose this option. Students completing degrees in IOB will be prepared for a wide range of professional careers in animal and/or plant biology, whether in academia, government, research, or nonprofit organizations.

Requirements

M.S. Degree Requirements

Students plan a program of study in conjunction with their advisor and Master's Thesis Committee, including the required core courses and competencies. Completion of at least 30 credits, including research credits, is required. A thesis proposal is developed within the first year. Students complete thesis research for 6 to 10 credits; the degree is completed when results are acceptable, a formal thesis presentation and defense has occurred, and the thesis is approved by the Master's Thesis Committee and accepted by the Graduate School.

A common set of policies and guidelines applies to both Biological Sciences degree options (IOB and MB). Additional option specific course recommendations or requirements may be established by the faculty within each option.

Number of Credits Required

The M.S. degree requires completion of a minimum of 30 credits, 6-10 of which may be earned for thesis research (BIOL 899 Master's Thesis). The Biological Sciences Program specifies 2 credits' worth of required coursework (BIOL 901 Introductory Graduate Seminar); most students use 6 more credits to satisfy the competency requirement in experimental design/analysis (BIOL 811 Applied Biostatistics II or BIOL 933 Design, Analysis, and Interpretation of Experiments, 4 credits) and recommended coursework in writing/communication (BIOL 902 Writing and Publishing Science or BIOL 950 Scientific Communication, 2 credits). Other graduate coursework approved by the student's committee can substitute for any of these courses except BIOL 901 Introductory Graduate Seminar.

Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

Required Courses, Competencies, and Electives

All students in the Biological Sciences Graduate Program are required to take Introductory Graduate Seminar (BIOL 901 Introductory Graduate Seminar) and fulfill all applicable competency requirements (these may

vary by option). Those with teaching assistantships (TAs) must enroll in College Teaching (LSA 900 College Teaching) before or concurrent with their first teaching assignment.

1. Core Course. Introductory Graduate Seminar (Introductory Graduate Seminar (BIOL 901)). This first-semester course focuses on key information and skills for a successful transition into the graduate program, familiarizing students with program requirements and faculty and providing an opportunity to meet others in their cohort.
2. Competency in experimental design and analysis. This may be fulfilled by previous graduate coursework (as determined by the student's advisor and committee), or by taking one graduate-level course. Two advanced courses in experimental design and analysis are offered, normally in alternate years. The first is Applied Biostatistics II (Applied Biostatistics II (BIOL 811)), and the second is Design, Analysis and Interpretation of Experiments (Design, Analysis, and Interpretation of Experiments (BIOL 933)). Either course, or an equivalent approved by the student's advisor and committee (e.g. Analysis of Ecological Communities and Complex Data (NR 909)), can be used to fulfill this competency requirement.
3. Electives. Students will work with their advisor and committee to identify additional courses appropriate for their area of specialization and their career objectives. Recommendations often include coursework in professional writing and communication: Scientific Writing (Writing and Publishing Science (BIOL 902)) is taught fall semester, and open to students at any stage of the program. Scientific Communication (Scientific Communication (BIOL 950)) is usually taught in spring. A course in Grant Writing (Grant Writing (NR 905)) is offered by the Department of Natural Resources.

Additional Information/Requirements

All students in the Biological Sciences Program are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

A summary of M.S. and Ph.D. degree requirements is available at <https://colsa.unh.edu/biological-sciences/program/ms/biological-sciences-integrative-and-organismal-biology>, along with the program's graduate handbook, which includes expectations, guidelines, and detailed policies.

Biological Sciences: Marine Biology (M.S.)

<https://colsa.unh.edu/biological-sciences/program/ms/biological-sciences-marine-biology>

Description

The Marine Biology (MB) option is intended for students interested in marine, coastal, and estuarine ecosystems, and the organisms that inhabit them, at all levels of inquiry. Some UNH faculty use marine organisms as model systems for molecular phylogeny, cellular metabolism, and neurobiology, while others study the structure and function of marine ecosystems. Some faculty members focus primarily on basic research# others work in applied areas such as aquaculture and fisheries# many combine the two. Students who have earned advanced degrees at UNH lead agencies involved in managing valuable marine resources, teach marine biology in academic and public settings, own aquaculture companies, or earn a living as researchers. In addition to on-campus facilities, UNH owns the Coastal Marine Laboratory (<https://>

marine.unh.edu/facility/judd-gregg-marine-research-complex) and the Jackson Estuarine Laboratory (<https://marine.unh.edu/facility/jackson-estuarine-laboratory>), and a range of research vessels. UNH has an excellent SCUBA diving program for students interested in becoming certified to dive as part of their research. The Marine Biology option is also affiliated with UNH's School of Marine Sciences and Ocean Engineering (<https://marine.unh.edu>).

Requirements

M.S. Degree Requirements

Students plan a program of study in conjunction with their advisor and Master's Thesis Committee, including the required core courses and competencies. Completion of at least 30 credits, including research credits, is required. A thesis proposal is developed within the first year. Students complete thesis research for 6 to 10 credits# the degree is completed when results are acceptable, a formal thesis presentation and defense has occurred, and the thesis is approved by the Master's Thesis Committee and accepted by the Graduate School.

A common set of policies and guidelines applies to both Biological Sciences degree options (IOB and MB). Additional option specific course recommendations or requirements may be established by the faculty within each option.

Number of Credits Required

The M.S. degree requires completion of a minimum of 30 credits, 6-10 of which may be earned for thesis research (BIOL 899 Master's Thesis). The Biological Sciences Program specifies 2 credits' worth of required coursework (BIOL 901 Introductory Graduate Seminar); most students use 6 more credits to satisfy the competency requirement in experimental design/analysis (BIOL 811 Applied Biostatistics II or BIOL 933 Design, Analysis, and Interpretation of Experiments, 4 credits) and recommended coursework in writing/communication (BIOL 902 Writing and Publishing Science or BIOL 950 Scientific Communication, 2 credits). Other graduate coursework approved by the student's committee can substitute for any of these courses except BIOL 901 Introductory Graduate Seminar.

Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

Required Courses, Competencies, and Electives

All students in the Biological Sciences Graduate Program are required to take Introductory Graduate Seminar (Introductory Graduate Seminar (BIOL 901) and fulfill all applicable competency requirements (these may vary by option). Those with teaching assistantships (TAs) must enroll in College Teaching (College Teaching (LSA 900) before or concurrent with their first teaching assignment.

1. Core Course. Introductory Graduate Seminar (Introductory Graduate Seminar (BIOL 901)). This first-semester course focuses on key information and skills for a successful transition into the graduate program, familiarizing students with program requirements and faculty and providing an opportunity to meet others in their cohort.

2. Competency in experimental design and analysis. This may be fulfilled by previous graduate coursework (as determined by the student's advisor and committee), or by taking one graduate-level course. Two advanced courses in experimental design and analysis are offered, normally in alternate years. The first is Applied Biostatistics II (Applied Biostatistics II (BIOL 811), and the second is Design, Analysis and Interpretation of Experiments (Design, Analysis, and Interpretation of Experiments (BIOL 933). Either course, or an equivalent approved by the student's advisor and committee (e.g. Analysis of Ecological Communities and Complex Data (NR 909), can be used to fulfill this competency requirement.
3. Electives. Students will work with their advisor and committee to identify additional courses appropriate for their area of specialization and their career objectives. Recommendations often include coursework in professional writing and communication: Scientific Writing (Writing and Publishing Science (BIOL 902) is taught fall semester, and open to students at any stage of the program. Scientific Communication (Scientific Communication (BIOL 950) is usually taught in spring. A course in Grant Writing (Grant Writing (NR 905) is offered by the Department of Natural Resources.

Additional Information/Requirements

All students in the Biological Sciences Program are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

A summary of M.S. and Ph.D. degree requirements is available at <https://colsa.unh.edu/biological-sciences/program/ms/biological-sciences-marine-biology>, along with the program's graduate handbook, which includes expectations, guidelines, and detailed policies.

Business Administration (ADMN)

University of New Hampshire Peter T. Paul College of Business and Economics

Degree Offered: M.B.A.

Programs available in Durham, Manchester, and Online.

A nationally ranked M.B.A. program that YOU design.

Earn your M.B.A. from Paul College at the University of New Hampshire, the state's flagship university. What sets us apart is our distinct combination of rigor, relevance and world-class faculty. Our students come from various industries and functional areas like finance and marketing to engineering, law, healthcare and the military. Some are seeking growth within their current organizations, while others are looking to gain the skills and knowledge to change professions. You will fit right in.

We stand out from the competition:

- We are one of only 5 percent of business schools worldwide to hold AACSB (Association to Advance Collegiate Schools of Business) accreditation - the gold standard in business education.
- We are the only M.B.A. in northern New England with Part-Time and Online M.B.A. programs ranked among the nation's top 100 by U.S. News & World Report. That makes us #1 in northern New England.
- Our research-active faculty brings the analytical tools and cutting edge insights to teaching and our former executives and managers bring real world perspective.

- International and New York City residencies are built into the Full-Time M.B.A. curriculum.
- M.B.A. programs are offered in Durham, on New Hampshire's seacoast, and in Manchester, the state's urban center - both situated an hour north of Boston - or 100 percent online.
- Beginning with a core curriculum focused on today's business needs, you can customize your education by choosing one of six industry-focused specializations - finance, information systems & business analytics, marketing, global business, growth & innovation, and hospitality management.
- We have a dedicated Career and Professional Success office to help you chart your post-graduation course. The placement rate in 2017 was 92 percent.

Our Programs

Full-Time M.B.A.

If you are able to step away from your full time career and you want to expedite reaching your next career goal, then the UNH Paul College Full-Time M.B.A. program is for you. A small cohort of like-minded individuals who are equally driven to excel will become your teammates. Completing your M.B.A. in less than one year is a great return on your investment of both time and money. The core curriculum includes 11 courses that grow your skills in multiple areas of management, five electives, and optional specializations. The college also integrates strong partnerships with the corporate community and a corporate consulting project culminates your experience.

Part-Time M.B.A.

If you are a working professional who enjoys taking classes face-to-face, with online classes also available, then our nationally ranked Part-Time M.B.A. is for you. This innovative program offers evening classes taught at our Durham and Manchester campuses as well as the flexibility to take classes online. Taught by the same great faculty as our full-time program, the Part-Time program allows you to take classes at a pace that works for your life, earning your degree in as little as two years. The curriculum includes 9 core courses and seven electives. Start your program in August or in January.

Online M.B.A.

Our nationally ranked Online M.B.A. program has everything the part-time program offers with the bonus of taking classes from anywhere around the world. It has rapidly become our most popular M.B.A. model. The curriculum is identical to the part-time program allowing students to mix and match online and/or face-to-face course offerings. The same great faculty who teach in our other programs teach classes asynchronously adding to the flexibility of the online option. The quality of our student and faculty engagement and the services and technology support available make our online program stand out. Start your program in August or January.

Admission Requirements

The Paul College welcomes applicants with an above-average academic record in any undergraduate major. The crucial requirement for admission into the M.B.A. program is a history that demonstrates the applicant has the potential and desire for graduate study in business. Consequently, a portfolio approach to admissions is utilized in which an applicant's work and/or military experience along with other indicators of maturity, motivation, and self-discipline, are considered in addition to an applicant's test scores and academic record. All applicants to

the Full-Time, Online, and Part-Time M.B.A. programs are required to take the Graduate Management Admission Test (GMAT) unless they can demonstrate quantitative proficiency through prior professional or military experience, a prior graduate-level degree (e.g., M.S., M.A., Ph.D., Ed.D), or a quantitatively-oriented undergraduate degree such as engineering. GMAT waivers may be requested and will be considered when submitted along with an applicant's resume. Please contact the graduate programs office for more information.

Applicants are expected to have successfully completed one semester of calculus, statistics, or have otherwise demonstrated proficiency in quantitative reasoning.

Interested applicants are encouraged to contact the Paul College Graduate Programs Office at 603-862-1367 or:

Cynthia Traver
Admissions & Recruiting
Paul College Suite 201
10 Garrison Avenue
Durham, NH 03824
(603) 862-5488

cynthia.traver@unh.edu

<https://paulcollege.unh.edu/mba>

Programs

- Business Administration and Juris Doctor Dual Degree (J.D./M.B.A.) (p. 43)
- Business Administration: Full-Time (M.B.A.) (p. 43)
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Faculty

See <https://paulcollege.unh.edu/directory/all>

Business Administration and Juris Doctor Dual Degree (J.D./M.B.A.)

<https://law.unh.edu/academics/degrees-certificates/dual-degrees>

Description

J.D./M.B.A. - Juris Doctor and Master of Business Administration

The J.D./M.B.A. is a dual degree program which allows students to earn both a Juris Doctorate and a Master of Business Administration degree in 3 ½ years, saving time and money when compared to pursuing the two degrees separately. Students complete year one at the UNH School of Law, attend the Full-Time M.B.A. program at UNH in Durham in year two, and return to the law school for the duration of their J.D. program. The J.D./M.B.A. allows students to gain comprehensive knowledge of the interconnection between law and business to better position themselves for success.

J.D./M.B.A. students are fully integrated into the Full-Time M.B.A. cohort. Refer to the Full-Time M.B.A. page for more detailed program information.

Registration Policies

M.B.A. courses are primarily intended for matriculated students who have been admitted to the M.B.A. program. Other degree seeking students and M.B.A. alumni may request permission to register for courses on a space-available basis.

Audit: Required M.B.A. core courses cannot accommodate auditors. Other degree-seeking students and M.B.A. alumni may request permission from the instructor to audit M.B.A. electives.

Requirements

Code	Title	Credits
Full-Time Curriculum		
ADMN 912	Managing Yourself & Leading Others	3
ADMN 919	Accounting/Financial Reporting, Budgeting, and Analysis	3
ADMN 926	Leveraging Technology for Competitive Advantage	3
ADMN 970	Economics of Competition	3
ADMN 930	Financial Management/Raising and Investing Money	3
ADMN 950	Data Driven Decisions	3
ADMN 960	Marketing/Building Customer Value	3
ADMN 840	International Business	3
ADMN 940	Managing Operations	3
ADMN 982	Creating Winning Strategies	3
ADMN 905	Corporate Consulting Project I	3
	Elective or ADMN 902 Internship	3
	4 Electives ¹	12
Total Credits		48

¹ The Full-Time M.B.A. curriculum is complete at the end of Term 4 with a total of 48 credits. Students have the option of taking courses in Term 5 to complete a specialization or for their own interest. These courses are offered at the continuing education cost.

Business Administration: Full-Time (M.B.A.)

<https://paulcollege.unh.edu/business-administration/program/mba/business-administration-full-time>

Description

Full-Time M.B.A.

Earn your Master's in Business Administration from Paul College of Business and Economics at the University of New Hampshire, the state's flagship university. What sets us apart is our distinct combination of rigor, relevance and a world-class faculty. Our students come from various industries - from more traditional business fields like finance and marketing, to engineering, law, healthcare and the military. Some are

seeking growth within their current organizations while others are looking to gain the skills and knowledge to change professions.

The Full-Time program format is designed for students interested in devoting one full academic year to complete their MBA.

The new and innovative curriculum is designed to accelerate a student's progress through this highly-ranked AACSB (<http://www.aacsb.edu>)-accredited M.B.A. program in 10 months. The program does so by integrating courses, identifying key skills and concepts necessary for success in business, and then helping students master these skills and concepts through class discussions, cases, guest lectures, and applied projects. Throughout the program, students are exposed to knowledge that builds insight into complex organizations.

The Full-Time MBA program includes a New York City residency, an international residency, and a corporate consulting project.

Students have the option to finish their coursework in late May or in July, dependent upon whether they elect to take courses in Term 5, and have May or September graduation dates respectively.

Registration Policies

M.B.A. courses are intended for matriculated students who have been admitted to the M.B.A. program. Other degree seeking students and M.B.A. alumni may request permission to register for courses on a space-available basis.

Audit: Required M.B.A. core courses cannot accommodate auditors. Other degree-seeking students and M.B.A. alumni may request permission from the instructor to audit M.B.A. electives.

Requirements

Full-time M.B.A. Degree Requirements

The curriculum for the one-year intensive Full-Time M.B.A. program begins in August when students start classes on the Durham campus following an orientation program. Students continue together as a cohort through the academic year. The 48-credit program is comprised of ten required courses, five electives (or four electives and one internship), a three-day financial residency in NYC, a ten-day international residency, and culminates with an eight-week, 3-credit corporate consulting project. Electives can be taken in such areas as marketing, finance, global business, growth and innovation, information systems and business analytics, and hospitality management which each feature optional three- or four-course specializations.

Students with less than two years of professional work experience are required to complete a 140 hour internship that satisfies one elective course. Students with more than two years of professional work experience are also encouraged to engage in an internship in order to explore new fields or functions.

Core courses focus on developing leadership and managerial skills through informed through informed decision making grounded in rigorous analysis. Students will learn the behavioral and social skills that empower effective leaders in any organization as well as the technical skills necessary to understand complex business processes, manage the development of technology projects, and utilize data for effective decision-making.

Core courses and electives build an understanding of the business environment. The corporate consulting project (CCP) provides an immediate opportunity to apply this knowledge to the real world of business. The cohort is divided into small teams which are each assigned to a local organization. Each team works closely with the client organization and faculty advisers to solve a real-life problem for their company. At the end of the CCP, each team presents their results to their organizational sponsors and classmates.

Code	Title	Credits
Full-Time Curriculum		
ADMN 912	Managing Yourself & Leading Others	3
ADMN 919	Accounting/Financial Reporting, Budgeting, and Analysis	3
ADMN 926	Leveraging Technology for Competitive Advantage	3
ADMN 970	Economics of Competition	3
ADMN 930	Financial Management/Raising and Investing Money	3
ADMN 950	Data Driven Decisions	3
ADMN 960	Marketing/Building Customer Value	3
ADMN 840	International Business	3
ADMN 940	Managing Operations	3
ADMN 982	Creating Winning Strategies	3
ADMN 905	Corporate Consulting Project I	3
	Elective or ADMN 902 Internship	3
	4 Electives ¹	12
Total Credits		48

¹ The Full-Time M.B.A. curriculum is complete at the end of Term 4 with a total of 48 credits. Students have the option of taking courses in Term 5 to complete a specialization or for their own interest. These courses are offered at the continuing education cost.

M.B.A. Specializations

- A specialization is not required.
- Specialization courses are open to all Paul College M.B.A. students as electives.
- Some specialization courses are available only online or in one physical location.
- Not all specializations can be completed in one academic year.
- In order to complete a specialization, students may need to take courses in Term 5 (Summer).

Code	Title	Credits
FINANCE: this specialization provides students with the tools necessary to make informed financial decisions for themselves and their organizations. Finance students and professionals utilize an exciting mix of quantitative analysis, strategic thinking, and creativity. Opportunities exist in a variety of fields, including commercial and investment banking, corporate finance, asset management, risk management, real estate, and private equity.		
Required:		
ADMN 829	Corporate Financial Strategy	
ADMN 830	Investments	
Select one of the following:		
ADMN 835	Financial Institutions	
ADMN 846	International Financial Management	

ADMN 898 Topics (Applied Financial Modeling and Analytics)

ADMN 898 Topics (Applied Equity Analysis and Firm Valuation)

ADMN 898 Topics (Financial Innovation and Derivatives)

ADMN 898 Topics (Financial Technology and Big Data)

INFORMATION SYSTEMS & BUSINESS ANALYTICS: This specialization provides students with knowledge and skills in the areas of business analytics: descriptive, predictive, and prescriptive. These tangible abilities will enable graduates to bring added value to any organization through data analysis and visualization; predicting/forecasting future probabilities and trends; and helping decision makers evaluate and determine the best ways to achieve business objectives in resource-constrained environments, while also quantifying the risk present in business situations due to uncertainty.

Required:

ADMN 898 Topics (Data Management and Visualization)

ADMN 898 Topics (Predictive Analytics)

Select one of the following:

ADMN 845 Supply Chain Management

ADMN 863 Marketing Analytics

ADMN 898 Topics (Prescriptive Analytics)

ADMN 898 Topics (Applied Financial Modeling and Analytics)

ADMN 898 Topics (Financial Technology and Big Data)

MARKETING: this specialization is designed around the three strategic initiatives of the marketing department: Marketing Analytics, Digital Marketing, and New Product Development. Flexibility within specialization provides tracks for less seasoned students (Marketing Analytics and tools), and for more seasoned students (Product and Service innovation focus). Designed to help students recognize, prioritize, and execute opportunities for growth through new and existing customers.

Required: Select two or three:

ADMN 852 Marketing Research

ADMN 863 Marketing Analytics

ADMN 864 New Product Development

ADMN 898 Topics (Digital Marketing)

Select one of the following or take three of the required courses above:

ADMN 888 Strategic Pricing

ADMN 860 International Marketing

ADMN 898 Topics (Consumer Behavior)

ADMN 898 Topics (Integrated Marketing Communications)

GLOBAL BUSINESS: this specialization helps students develop their global awareness, understanding, and competence so to that they can compete and lead effectively in a transnational environment. Job outlook includes graduate careers abroad or in organizations that are engaged in business or initiatives with a global scope.

Required:

ADMN 840 International Business

Select two of the following:

ADMN 841 International Management

ADMN 846 International Financial Management

ADMN 860 International Marketing

GROWTH & INNOVATION: this specialization provides students with knowledge, skills, and an entrepreneurial mindset to apply in smaller, newer firms as well as in larger, established companies in order to drive organizational growth, innovation and change. These can be applied in a range of contexts, including new ventures, corporate entrepreneurship, and social enterprises.

Required:

ADMN 898 Topics (Managing Growth & Innovation)

Select two of the following:

ADMN 834 Private Equity/Venture Capital

ADMN 841 International Management

ADMN 864 New Product Development

ADMN 898 Topics (Leading Organizational Change)

HOSPITALITY MANAGEMENT (available to Part-Time and Online students only): this specialization is directed toward working professionals, positioning them for additional career growth and advancement in the industry. For students who wants to take a coherent set of advanced hospitality management courses offered within the general framework of the MBA, these course offerings provide opportunities in a wide variety of areas, including human resources, operations, and asset management and finance.

Required:

ADMN 898 Topics (Human Resource Management)

ADMN 898 Topics (Hospitality Operations & Financial Metrics)

ADMN 898 Topics (Hospitality Asset & Financial Management)

ADMN 898 Topics (Hospitality Revenue Management & Pricing Strategies)

Degree Plan

Code	Title	Credits
Full-Time Curriculum Schedule (8 week Terms)		
Term 1 (Aug-Oct):		
ADMN 912	Managing Yourself & Leading Others	3
ADMN 919	Accounting/Financial Reporting, Budgeting, and Analysis	3
ADMN 926	Leveraging Technology for Competitive Advantage	3
ADMN 970	Economics of Competition	3
Term 2 (Oct-Dec):		
ADMN 930	Financial Management/Raising and Investing Money	3
ADMN 950	Data Driven Decisions	3
ADMN 960	Marketing/Building Customer Value	3
	Elective	3
Term 3 (Jan-March):		
ADMN 840	International Business	3
ADMN 940	Managing Operations	3
	Elective or ADMN 902 Internship	3
	Elective	3
Term 4 (March-May):		
ADMN 982	Creating Winning Strategies	3
ADMN 905	Corporate Consulting Project I	3
	Elective	3

Elective	3
Term 5 (May-July)	
Optional Electives	
Total Credits	48

Business Administration: Part-time or Online (M.B.A.)

<https://paulcollege.unh.edu/business-administration/program/mba/business-administration-part-time-or-online>

- Students have the opportunity to participate in a 10 day international residency as part of the international management course. The residency combines lectures, corporate visits, and cultural activities.
- Six areas of specialized concentration are available - finance, information systems & business analytics, marketing, global business, growth and Innovation, and hospitality management - as well as a variety of elective courses.

ONLINE M.B.A.

<https://paulcollege.unh.edu/academics/graduate-programs/mba/online-mba>

The Online M.B.A. degree is an excellent choice for professionals in the workforce who are seeking to advance their careers, but who cannot regularly attend classes on campus. This innovative program provides students with the opportunity to earn a degree in as little as two years from anywhere in the world and has rapidly grown to become the Paul School's most popular M.B.A. program.

The Online model is primarily designed for those who are highly motivated and capable of balancing a full-time work schedule with online study. Courses are designed to facilitate information sharing outside the constraints of time and place among a network of people.

The Online M.B.A. program follows the same curriculum as the Part-Time M.B.A. allowing students to move back and forth between the two models if they choose. Admission points are in mid August and January. The program is primarily asynchronous. Students can log on anytime during the week to complete their work adding to the flexibility of the online option. NB: The online courses, like those that are face to face, may require team projects that necessitate coordinating the schedules of those involved from time to time.

Highlights

- The only Online M.B.A. program in northern New England ranked among the nation's top 100 by U.S. News & World Report making this program #1 in northern New England.
- The Online M.B.A. option allows students to earn an advanced degree from an AACSB accredited institution in two to three and a half years from anywhere in the world.

Registration Policies

M.B.A. courses are primarily intended for matriculated students who have been admitted to the M.B.A. program. Other degree-seeking students and M.B.A. alumni may request permission to register for courses on a space-available basis.

Audit: Required M.B.A. core courses cannot accommodate auditors. Other degree-seeking students and M.B.A. alumni may request permission from the instructor to audit M.B.A. electives.

Requirements

Part--Time and Online M.B.A. Requirements

Part-time (evening) and online students typically begin the program in the fall term, although January admission with a reduced course load is possible. The degree is comprised of nine required core courses and seven electives. ADMN 982 Creating Winning Strategies is the capstone experience. Students may petition to waive up to three core courses. A

Description

Part--time and Online M.B.A.

Earn your Master's in Business Administration from Paul College of Business and Economics at the University of New Hampshire, the state's flagship university. What sets us apart is our distinct combination of rigor, relevance and a world-class faculty. Our students come from various industries - from more traditional business fields like finance and marketing, to engineering, law, healthcare and the military. Some are seeking growth within their current organizations while others are looking to gain the skills and knowledge to change professions.

PART-TIME M.B.A. PROGRAM

<https://paulcollege.unh.edu/academics/graduate-programs/mba/part-time-mba>

The M.B.A. Part-Time evening option is an excellent choice for professionals in the workforce who are seeking to advance their careers. This innovative program provides the opportunity for students to earn a degree in as little as two years. Courses are offered at the Durham and Manchester campuses.

Instituted in 1996, the Part-Time evening M.B.A. program is primarily designed for those who are highly motivated and capable of balancing a full-time work schedule with evening study. Classes meet from 5:30-9:15 p.m. The Part-Time, Online and Full-Time programs all share the same faculty. Admission points are in late August and January.

The new and innovative curriculum common to all the MBA programs at UNH - Full-Time, Part-Time and Online - is specifically designed to align the learning objectives in the core courses and free up more time for elective/specialization courses. The curriculum does this by integrating courses, identifying key skills and concepts necessary for success in business, and then helping students master these skills and concepts through class discussions, cases, guest lectures, and projects. Throughout the program, students will be exposed to knowledge that builds insight into complex organizations.

Highlights

- The only Part-Time M.B.A. program in northern New England ranked among the nation's top 100 by U.S. News & World Report making this program #1 in northern New England.
- The fast-track M.B.A. Part-Time option gives students the flexibility to earn an advanced degree from an AACSB accredited institution in as little as two years. Students have up to three and a half years to complete the curriculum.

waiver is typically granted if the student possesses a major (five to six courses from an AACSB accredited institution) in a core area earned within five years of matriculation, e.g., a student with a major in finance may petition to waive the M.B.A. core course in finance. The program is designed to permit students who begin in the fall to complete the degree in less than two years, although a more relaxed pace is also possible. Students have up to three and a half years to complete the curriculum.

COURSES

Code	Title	Credits
ADMN 912	Managing Yourself & Leading Others	3
ADMN 919	Accounting/Financial Reporting, Budgeting, and Analysis	3
ADMN 970	Economics of Competition	3
ADMN 926	Leveraging Technology for Competitive Advantage	3
ADMN 960	Marketing/Building Customer Value	3
ADMN 950	Data Driven Decisions	3
ADMN 930	Financial Management/Raising and Investing Money	3
ADMN 940	Managing Operations	3
ADMN 982	Creating Winning Strategies	3
7 Electives - one must be an international course		21
Total Credits		48

M.B.A. Specializations

- A specialization is not required.
- Specialization courses are open to all Paul College M.B.A. students as electives.
- Some specialization courses are available only online or in one physical location.
- Not all specializations can be completed in one academic year.
- In order to complete a specialization, students may need to take courses in Term 5 (Summer).

Code	Title	Credits
FINANCE: this specialization provides students with the tools necessary to make informed financial decisions for themselves and their organizations. Finance students and professionals utilize an exciting mix of quantitative analysis, strategic thinking, and creativity. Opportunities exist in a variety of fields, including commercial and investment banking, corporate finance, asset management, risk management, real estate, and private equity.		
Required:		
ADMN 829	Corporate Financial Strategy	
ADMN 830	Investments	
Select one of the following:		
ADMN 835	Financial Institutions	
ADMN 846	International Financial Management	
ADMN 898	Topics (Applied Financial Modeling and Analytics)	
ADMN 898	Topics (Applied Equity Analysis and Firm Valuation)	
ADMN 898	Topics (Financial Innovation and Derivatives)	
ADMN 898	Topics (Financial Technology and Big Data)	

INFORMATION SYSTEMS & BUSINESS ANALYTICS: This specialization provides students with knowledge and skills in the areas of business analytics: descriptive, predictive, and prescriptive. These tangible abilities will enable graduates to bring added value to any organization through data analysis and visualization; predicting/forecasting future probabilities and trends; and helping decision makers evaluate and determine the best ways to achieve business objectives in resource-constrained environments, while also quantifying the risk present in business situations due to uncertainty.

Required:

ADMN 898	Topics (Data Management and Visualization)
ADMN 898	Topics (Predictive Analytics)

Select one of the following:

ADMN 845	Supply Chain Management
ADMN 863	Marketing Analytics
ADMN 898	Topics (Prescriptive Analytics)
ADMN 898	Topics (Applied Financial Modeling and Analytics)
ADMN 898	Topics (Financial Technology and Big Data)

MARKETING: this specialization is designed around the three strategic initiatives of the marketing department: Marketing Analytics, Digital Marketing, and New Product Development. Flexibility within specialization provides tracks for less seasoned students (Marketing Analytics and tools), and for more seasoned students (Product and Service innovation focus). Designed to help students recognize, prioritize, and execute opportunities for growth through new and existing customers.

Required: Select two or three:

ADMN 852	Marketing Research
ADMN 863	Marketing Analytics
ADMN 864	New Product Development
ADMN 898	Topics (Digital Marketing)

Select one of the following or take three of the required courses above:

ADMN 888	Strategic Pricing
ADMN 860	International Marketing
ADMN 898	Topics (Consumer Behavior)
ADMN 898	Topics (Integrated Marketing Communications)

GLOBAL BUSINESS: this specialization helps students develop their global awareness, understanding, and competence so to that they can compete and lead effectively in a transnational environment. Job outlook includes graduate careers abroad or in organizations that are engaged in business or initiatives with a global scope.

Required:

ADMN 840	International Business
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Select two of the following:

ADMN 841	International Management
ADMN 846	International Financial Management
ADMN 860	International Marketing

GROWTH & INNOVATION: this specialization provides students with knowledge, skills, and an entrepreneurial mindset to apply in smaller, newer firms as well as in larger, established companies in order to drive organizational growth, innovation and change. These can be applied in a range of contexts, including new ventures, corporate entrepreneurship, and social enterprises.

Required:

ADMN 898	Topics (Managing Growth & Innovation)
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Select two of the following:

ADMN 834	Private Equity/Venture Capital
ADMN 841	International Management
ADMN 864	New Product Development
ADMN 898	Topics (Leading Organizational Change)

HOSPITALITY MANAGEMENT (available to Part-Time and Online students only): this specialization is directed toward working professionals, positioning them for additional career growth and advancement in the industry. For students who wants to take a coherent set of advanced hospitality management courses offered within the general framework of the MBA, these course offerings provide opportunities in a wide variety of areas, including human resources, operations, and asset management and finance.

Required:

ADMN 898	Topics (Human Resource Management)
ADMN 898	Topics (Hospitality Operations & Financial Metrics)
ADMN 898	Topics (Hospitality Asset & Financial Management)
ADMN 898	Topics (Hospitality Revenue Management & Pricing Strategies)

Degree Plan

Code	Title	Credits
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EXAMPLE PART-TIME and ONLINE 2-YEAR CURRICULUM MAP FALL/AUGUST START (8 week Terms)²

FIRST YEAR COURSE SCHEDULE - FALL/AUGUST START

Term 1 (Aug-Oct):

ADMN 912	Managing Yourself & Leading Others	3
ADMN 919	Accounting/Financial Reporting, Budgeting, and Analysis	3

Term 2 (Oct-Dec):

ADMN 926	Leveraging Technology for Competitive Advantage	3
ADMN 950	Data Driven Decisions	3

Term 3 (Jan-March):

ADMN 970	Economics of Competition	3
ADMN 960	Marketing/Building Customer Value	3

Term 4 (March-May):

ADMN 930	Financial Management/Raising and Investing Money	3
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Elective ¹		3
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Term 5 (May-July)²

Elective Option (online) ¹		3
Elective Option (online) ¹		3

Code	Title	Credits
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SECOND YEAR COURSE SCHEDULE - FALL/AUGUST START

Term 1 (Aug-Oct):

Elective ¹		3
Elective ¹		3

Term 2 (Oct-Dec):

Elective ¹		3
Elective ¹		3

Term 3 (Jan-March):

Elective ¹		3
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Elective ¹		3
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Term 4 (March-May):

ADMN 940	Managing Operations	3
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ADMN 982	Creating Winning Strategies	3
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Term 5 (May-July)²

Elective Option (online) ¹		3
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Elective Option (online) ¹		3
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Code	Title	Credits
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EXAMPLE PART-TIME and ONLINE CURRICULUM MAP SPRING/JANUARY START (8 week Terms)²

FIRST YEAR COURSE SCHEDULE - SPRING/JANUARY START

Term 1 (Aug-Oct):

Term 2 (Oct-Dec):

Term 3 (Jan-March):

ADMN 912	Managing Yourself & Leading Others	3
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ADMN 970	Economics of Competition	3
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Term 4 (March-May):

Elective ¹		3
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Term 5 (May-July)²

Elective Option (online) ¹		3
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Elective Option (online) ¹		3
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Code	Title	Credits
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SECOND YEAR COURSE SCHEDULE - SPRING/JANUARY START

Term 1 (Aug-Oct):

ADMN 919	Accounting/Financial Reporting, Budgeting, and Analysis	3
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Elective ¹		3
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Term 2 (Oct-Dec):

ADMN 926	Leveraging Technology for Competitive Advantage	3
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ADMN 950	Data Driven Decisions	3
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Term 3 (Jan-March):

ADMN 960	Marketing/Building Customer Value	3
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Elective ¹		3
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Term 4 (March-May):

ADMN 930	Financial Management/Raising and Investing Money	3
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ADMN 940	Managing Operations	3
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Term 5 (May-July)²

Elective Option (online) ¹		3
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Elective Option (online) ¹		3
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Code	Title	Credits
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THIRD YEAR COURSE SCHEDULE - SPRING/JANUARY START

Term 1 (Aug-Oct):

Elective ¹		3
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Elective ¹		3
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Term 2 (Oct-Dec):

Elective ¹		3
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Term 3 (Jan-March):

Elective ¹		3
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Term 4 (March-May):

ADMN 982	Creating Winning Strategies	3
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Term 5 (May-July)²

¹ Seven electives are required for graduation in addition to the 9 core courses. One of these electives must be an international course.

² Students are not required to take two courses each term, but doing so leads to faster degree completion. A program advisor will help students map out their curriculum pathway upon matriculation.

Chemical Engineering (CHE)

Degrees Offered: Ph.D., M.Eng., M.S.

This program is offered in Durham.

The Department of Chemical Engineering offers the M.Eng. degree, M.S. degree, and Ph.D. degree in chemical engineering. All levels include research opportunities in biofuels, biomedical engineering, biochemical engineering, electrochemical engineering, tissue engineering, advanced materials, reaction engineering, energy, and environmental engineering.

<https://ceps.unh.edu/chemical-engineering>

Programs

- Chemical Engineering (Ph.D.) (p. 49)
- Chemical Engineering (M.Eng.) (p. 49)
- Chemical Engineering (M.S.) (p. 50)

Faculty

See <http://ceps.unh.edu/faculty/chemical-engineering> for faculty.

Chemical Engineering (Ph.D.)

<https://ceps.unh.edu/chemical-engineering/chemical-engineering-phd>

Description

Ph.D. Admission Requirements

Students admitted to the Ph.D. program normally have a master's degree in chemical engineering. Exceptional students with a baccalaureate degree in chemical engineering are eligible for admission to the program. To be admitted, students must present evidence that they have a strong foundation in chemical engineering. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination. International students are required to submit TOEFL test scores. IELTS scores are accepted on a case-by-case basis, and students must have a minimum score of 6.5.

Requirements

Ph.D. Degree Requirements

PhD students will complete the following core chemical engineering courses:

Code	Title	Credits
CHE 900	Seminar ¹	1
CHE 913	Advanced Fluid Mechanics	3
CHE 915	Heat Transfer	3
CHE 916	Diffusive Mass Transfer	3
CHE 923	Advanced Chemical Engineering Thermodynamics	3
CHE 932	Advanced Chemical Engineering Kinetics	3

¹ Students should register for CHE 900 for 1 credit in their first semester and CHE 900 for 0 credits each additional semester until their degree is granted.

Those students admitted with a master's degree in chemical engineering are required to take an additional 3 courses at the 800- or 900- level to complete the course work requirements. Those students admitted with a baccalaureate degree in chemical engineering are required to complete an additional 6 courses at the 800- or 900- level to complete the course work requirement for the PhD. These elective courses will be chosen in consultation with the student's advisor.

Students in the PhD program are expected to complete the five required core courses within the first year of graduate study. After completion of the core courses, the graduate coordinator will administer a written qualifying exam on each of the core subjects. The graduate coordinator also conducts an annual review of each student's progress in the program. All course work, including electives, should be completed by the end of the second year of study and must be completed before the student can be advanced to candidacy.

To advance to candidacy, the student must prepare a research proposal, which is different from his/her PhD dissertation research, and defend the proposal in an oral examination before a doctoral guidance committee. After successful completion of the oral qualifying examination, the student is advanced to candidacy and upon recommendation of the graduate coordinator, a doctoral dissertation committee is appointed by the dean of the graduate school. The doctoral dissertation committee supervises and approves the dissertation and administers the final dissertation defense.

There is no language requirement.

Chemical Engineering (M.Eng.)

<https://ceps.unh.edu/chemical-engineering/chemical-engineering-meng>

Description

M.Eng. Admission Requirements

An applicant to the master of engineering program will have completed a baccalaureate degree in chemical engineering. Students with good undergraduate records but with deficiencies in certain areas may be admitted on condition that they complete specified courses without credit to make up for their deficiencies. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination. International students are required to submit TOEFL test scores. IELTS scores are accepted on a case-by-case basis, and students must have a minimum score of 6.5.

Requirements

Master of Engineering Degree Requirements

A master of engineering degree is a professional degree for chemical engineers. A minimum of 30 credits, which must include:

Code	Title	Credits
Required Courses		
CHE 900	Seminar ¹	1
CHE 913	Advanced Fluid Mechanics	3
CHE 915	Heat Transfer	3
CHE 916	Diffusive Mass Transfer	3
CHE 923	Advanced Chemical Engineering Thermodynamics	3
CHE 932	Advanced Chemical Engineering Kinetics	3
Electives		
Select 12 credits of course work ²		12
CHE 898	Chemical Engineering Project	3

¹ Students should register for CHE 900 for 1 credit in their first semester and CHE 900 for 0 credits each additional semester until their degree is granted.

² Can be made up of electives offered by the department or college. In addition, courses taken within the UNH School of Law and the Paul College of Business and Economics can apply with approval.

Chemical Engineering (M.S.)

<https://ceps.unh.edu/chemical-engineering/chemical-engineering-ms>

Description

M.S. Admission Requirements

An applicant is expected to have completed a baccalaureate degree in chemical engineering. Students with good undergraduate records but with deficiencies in certain areas may be admitted on condition that they complete specified courses without credit to make up for their deficiencies. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination. International students are required to submit TOEFL test scores. IELTS scores are accepted on a case-by-case basis, and students must have a minimum score of 6.5.

Requirements

M.S. Degree Requirements

A minimum of 30 credits, which must include:

Code	Title	Credits
Required Courses		
CHE 900	Seminar ¹	1
CHE 913	Advanced Fluid Mechanics	3
CHE 915	Heat Transfer	3
CHE 916	Diffusive Mass Transfer	3

CHE 923	Advanced Chemical Engineering Thermodynamics	3
CHE 932	Advanced Chemical Engineering Kinetics	3

Electives

Select 9 course credits ²		9
CHE 899	Master's Thesis	6

¹ Students should register for CHE 900 for 1 credit in their first semester and CHE 900 for 0 credits each additional semester until their degree is granted.

² Can be made up of electives offered by the department or by the college. Students take electives after consulting with their adviser.

Chemistry (CHEM)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Chemistry Department combines the personal contact that you would find at a small college with a research profile that you would find at a research-intensive institution. We are the only department that has existed for the entire history of UNH and we have a long-standing tradition of achievement in the molecular sciences. We aspire to be a place of educational, professional, and personal transformation, where young scientists work along side faculty members, participating in the process of discovering new knowledge about the molecular world. Students of chemistry receive a high quality, broad-based education in an atmosphere of close cooperation between faculty and students, between research and teaching, and between chemistry and other disciplines. Our graduate program is open to talented, qualified students who are eager to deepen their knowledge of Chemistry and who wish to contribute to its growth.

Graduate Degree Programs and Paths:

- Paths to both the M.S. and Ph.D. degrees have firm coursework foundations in Chemistry's traditional sub-disciplines, but are rooted in the interdisciplinary research projects of our Faculty.
- The M.S. program (with paths in analytical, inorganic, organic, and physical chemistry) provides students with the opportunity to develop a high degree of proficiency in a specialized research area. The program builds a solid foundation for careers in industry or teaching, for further graduate or professional school, or for those who would like to strengthen their Chemistry knowledge.
- The Ph.D. program (with paths in analytical, inorganic, organic, and physical chemistry) prepares students for careers in science as researchers and educators by expanding their knowledge of the discipline while developing their ability for critical analysis, creativity, and independent study. Graduates are well placed for careers as professional chemists in industry, academia, government, and related areas.
- The Ph.D. (Option in Chemistry Education) program is designed for students who plan a career at the interface of Science and Education (e.g. discipline-based education research, educational program assessment, STEM curriculum design, chemistry teaching, etc.).

Admission Requirements

Admission to the master of science and the doctor of philosophy degrees is based upon a strong undergraduate record and requires satisfactory work in the usual undergraduate courses in inorganic chemistry, analytical chemistry, organic chemistry, and physical chemistry, as well as the normal supporting courses in mathematics and physics. Applicants

are to submit GRE scores as a part of their admission application. Entering graduate students are expected to take proficiency examinations in chemistry to ensure they begin their graduate work at the appropriate level. These examinations will be offered the week prior to the opening of the Fall semester during the Department of Chemistry's graduate student orientation week.

Interdisciplinary Programs in Chemistry

Graduate students in chemistry may elect to enter one of the interdisciplinary programs offered jointly with the chemistry department and other departments. In these programs, the graduate student, with the advice of the guidance committee, elects courses in chemistry and in the related disciplines, and writes the dissertation on a research problem appropriate to the interdisciplinary research. Students interested in these programs should contact the Graduate Coordinator for further information.

Preparing Future Faculty (PFF)

Students who desire a career in college-level teaching will follow their regular degree program in addition to meeting the university's PFF requirements. Please see the PFF website for more information: <http://www.gradschool.unh.edu/pff.php>.

Teaching Experience

All chemistry Doctoral and Master of Science degree candidates will obtain some teaching experience during their program.

<https://ceps.unh.edu/chemistry/chemistry-graduate-programs>

Programs

- Chemistry (Ph.D.) (p. 51)
- Chemistry: Chemistry Education (Ph.D.) (p. 52)
- Chemistry (M.S.) (p. 52)

Faculty

See <https://ceps.unh.edu/directory/all> for faculty.

Chemistry (Ph.D.)

<https://ceps.unh.edu/chemistry/chemistry-phd>

Description

The Ph.D. program prepares students for careers in science as researchers and educators by expanding their knowledge of chemistry while developing their ability for critical analysis, creativity, and independent study. Graduates are well placed for careers as professional chemists in industry, academia, government, and related areas. All students take coursework, carry out original research with a faculty mentor, and submit a dissertation. The program has a focus on developing strong writing and oral communication skills. Financial support is typically available through a teaching assistantship.

Requirements

Ph.D. Degree Requirements

- Demonstration of a broad understanding of undergraduate chemistry by passing a series of basic examinations or satisfactory performance in approved courses.
- Satisfactory performance in a path-specific (analytical, inorganic, organic, or physical) series of 3-6 courses.
- Selection and completion of two courses outside the student's program area. One course must be a 900 level.
- Attendance at Department seminars and research Lunch Talks.
- Satisfactory presentation of a Research Progress Report in the second year of residence
- Present a department seminar on a topic unrelated to dissertation research in the third year of residence.
- Preparation and oral defense of an original research prospectus in the third year of residence. Successful completion of the research proposal defense enables the student to advance to candidacy.
- Preparation, public presentation, and oral defense of a written dissertation.
- Required 3.0 GPA or above to graduate.

THESIS Mentor and Committee

Students select a thesis mentor during the first semester in the program after interviewing at least three faculty members. During each semester thereafter, students conduct independent research under the supervision of this faculty member. In the second year of residence and before the Research Progress Report a committee is selected. This committee evaluates the student's Research Progress Report, the Research Proposal Defense and the Dissertation Defense.

Code	Title	Credits
General Program Requirements		
CHEM 800	Chemistry Teaching Seminar	1
CHEM 802	Critical and Creative Thinking for Chemists	1
CHEM 992	Graduate Writing Portfolio	1
CHEM 997	Seminar	1
CHEM 999	Doctoral Research	0
Analytical Program Requirements		
CHEM 930	Advanced Optical Methods	3
CHEM 933	Chemical Separations	3
CHEM 934	Chemical Equilibria	3
CHEM 935	Advanced Analytical Chemistry	3
MATH 835	Statistical Methods for Research	3
Inorganic Program Requirements		
CHEM 903	Advanced Inorganic Chemistry I	3
CHEM 904	Advanced Inorganic Chemistry II	3
CHEM 947	Inorganic Biochemistry	3
Organic Program Requirements		
CHEM 808	Spectroscopic Investigations of Organic Molecules	3
CHEM 855	Advanced Organic Chemistry	3
CHEM 902	Theoretical Organic Chemistry II	3
CHEM 911	Synthetic Organic Chemistry I	
CHEM 917	Special Topics in Organic Chemistry	2-4

CHEM 918	Special Topics in Organic Chemistry	2-4
Physical Program Requirements		
CHEM 905	Advanced Physical Chemistry I	3
CHEM 925	Surface Chemistry	3
CHEM 926	Physical Chemistry of Condensed Phases	3
CHEM 927	Chemical Kinetics and Reaction Dynamics	3
CHEM 995	Colloquium	1-4

Chemistry: Chemistry Education (Ph.D.)

<https://ceps.unh.edu/chemistry/chemistry-phd>

Description

The Ph.D. Option in Chemistry Education is designed for students who plan a career at the interface of Science and Education (e.g. discipline-based education research, educational program assessment, STEM curricular design, chemistry teaching, etc.). The rigorous program involves coursework in Chemistry, Psychology and Education and original research in Chemistry Education, leading to the submission of a dissertation. Students with a research-based MS (or equivalent) will be admitted directly to the program. Students with a BS (or equivalent) will first obtain an MS degree, carrying out original laboratory-based research with a faculty mentor, and submitting a thesis. The program has a focus on developing strong writing and oral communication skills. Financial support is typically available through a teaching assistantship.

Requirements

Ph.D. Option in Chemistry Education

- Demonstration of a broad understanding of undergraduate chemistry by passing a series of basic examinations or satisfactory performance in approved courses.
- Demonstration of chemistry laboratory research proficiency by completing a thesis-based M.S. (or equivalent) either at UNH or another university.
- Satisfactory performance in a series of courses in science education, cognition, and qualitative/quantitative research methods.
- Attendance at Department seminars and research Lunch Talks.
- Satisfactory presentation of a Research Progress Report in the second year of residence
- Present a department seminar on a topic unrelated to dissertation research in the third year of residence.
- Preparation and oral defense of an original research prospectus in the third year of residence. Successful completion of the research proposal defense enables the student to advance to candidacy.
- Preparation, public presentation, and oral defense of a written dissertation.
- GPA of 3.0 or higher required to graduate.
- Please contact the department for additional information on this option.

THESIS Mentor and Committee

Students select a thesis mentor during the first semester in the program after interviewing at least three faculty members. During each semester

thereafter, students conduct independent research under the supervision of this faculty member. In the second year of residence and before the Research Progress Report a committee is selected. This committee evaluates the student's Research Progress Report, the Research Proposal Defense and the Dissertation Defense .

Code	Title	Credits
Required department courses		
CHEM 802	Critical and Creative Thinking for Chemists	1
CHEM 992	Graduate Writing Portfolio	1
CHEM 997	Seminar	1
GRAD 971	Teaching and Learning in Science	3-4
GRAD 990	College Teaching Praxis	3-4

3 Chemistry CORE courses in a sub-discipline recommended by research advisor or MS degree

Quantitative Stats

Choose 1 course from:

PSYC 705	Tests and Measurement	4
PSYC 905	Research Methodology and Statistics I	4
PSYC 906	Research Methodology and Statistics II	4
PSYC 907	Research Methods and Statistics III	4
EDUC 981	Quantitative Inquiry: Methods and Techniques of Educational Research	4
MATH 835	Statistical Methods for Research	3
MATH 839	Applied Regression Analysis	3

Quantitative Stats

Choose 2 courses from:

SOC 794/894	Evaluation Research	4
EDUC #982	Issues and Methods in Ethnographic Research in Education	4

Cognition

Choose 1 course from:

PSYC 783	Cognitive Development	4
PSYC 710	Visual Perception	4
PSYC 712	Psychology of Language	4
PSYC 731	Brain and Behavior	4
PSYC 914	Advanced Seminar in Cognition	4
PSYC 917	Advanced Seminar in Sensory and Perceptual Processes	4

Chemistry (M.S.)

<https://ceps.unh.edu/chemistry/chemistry-ms>

Description

The M.S. program provides students with the opportunity to develop a high degree of proficiency in a specialized research area. The program serves as a stepping stone to jobs in industry, graduate school, professional school, teaching careers, or for those who would like to strengthen their Chemistry knowledge. All students take coursework, carry out original research with a faculty mentor, and submit a thesis. The program has a focus on developing strong writing and oral communication skills. Financial support is typically available through a teaching assistantship.

Requirements

M.S. Degree Requirements

- Demonstration of a broad understanding of undergraduate chemistry by passing a series of basic examinations or satisfactory performance in approved courses.
- Student must present a total of 30 credits for completion of the MS program. These 30 credits are as follows:
 - 20+ course credits, at least 8 credits of which must be in courses numbered 900 or above.
 - Satisfactory performance in at least three path-specific (analytical, inorganic, organic, or physical) courses, which is a portion of the 20+ course credits required.
 - 6 to 10 credits of CHEM 899 Thesis/Problems research credits.
- Mandatory attendance at Department Seminars and Research Lunch Talks.
- Satisfactory presentation of a Research Progress Report in the second year of residence.
- Preparation, public presentation, and oral defense of a written thesis.
- Student must maintain a GPA of 3.0 to graduate from the MS program.

Thesis Mentor and Committee

Students select a thesis mentor during the first semester in the program after interviewing at least three faculty members. During each semester thereafter, students conduct independent research under the supervision of this faculty member. In the second year of residence and before the Research Progress Report a committee is selected. This committee evaluates the student's Research Progress Report and Thesis defense.

Code	Title	Credits
General Program Requirements		
CHEM 800	Chemistry Teaching Seminar	1
CHEM 802	Critical and Creative Thinking for Chemists	1
CHEM 899	Thesis/Problems	1-10
CHEM 991	Graduate Presentation Portfolio	1
CHEM 992	Graduate Writing Portfolio	1
CHEM 997	Seminar	1
Analytical Program Requirements		
Select 3 from the following:		9
CHEM 930	Advanced Optical Methods	3
CHEM 933	Chemical Separations	3
CHEM 934	Chemical Equilibria	3
CHEM 935	Advanced Analytical Chemistry	3
Inorganic Program Requirements		
Select 3 from the following:		9
CHEM 903	Advanced Inorganic Chemistry I	3
CHEM 904	Advanced Inorganic Chemistry II	3
CHEM 947	Inorganic Biochemistry	3
Organic Program Requirements		
Select 3 from the following:		9
CHEM 808	Spectroscopic Investigations of Organic Molecules	3
CHEM 855	Advanced Organic Chemistry	3
CHEM 902	Theoretical Organic Chemistry II	3

CHEM 911	Synthetic Organic Chemistry I	4
Physical Program Requirements		9
Select 3 from the following:		
CHEM 905	Advanced Physical Chemistry I	3
CHEM 925	Surface Chemistry	3
CHEM 926	Physical Chemistry of Condensed Phases	3
CHEM 927	Chemical Kinetics and Reaction Dynamics	3
CHEM 995	Colloquium	1-4

Civil and Environmental Engineering (CEE)

Degrees Offered: Ph.D., M.Eng., M.S.

This program is offered in Durham.

The Department of Civil and Environmental Engineering offers the master of engineering degree in civil engineering, the master of science degree in civil engineering, and a Ph.D. degree in civil engineering with the following areas of specialization: structural, materials, geotechnical, water resources, and environmental engineering. Interested applicants are encouraged to visit the department website for information on current research in the department and to contact faculty members in their area of interest directly. The department website has information on program requirements and frequently asked questions. Applicants with questions not answered by the department or graduate school website should write to the graduate program coordinator for specific information.

Admission Requirements

An applicant must have completed a baccalaureate science degree in engineering, mathematics, or science at an accredited college or university. If coursework or laboratory experience is deficient, an admitted student will be required to fulfill, without graduate credit, all undergraduate prerequisites for graduate courses. In some cases, the student's adviser may require additional undergraduate courses in order to achieve a well-integrated program of study. Applicants must submit current scores (within five years) from the general test of the GRE, unless waived by the graduate coordinator (for current UNH CEE undergraduates CIVE - civil engineering or ENVE - environmental engineering).

For more information on the Civil and Environmental Engineering Graduate Program, please email CEE.Graduate@unh.edu.

<https://ceps.unh.edu/cee/graduate-programs>

Programs

- Civil and Environmental Engineering (Ph.D.) (p. 54)
- Civil and Environmental Engineering (M.Eng.) (p. 54)
- Civil and Environmental Engineering (M.S.) (p. 55)

Faculty

See <http://ceps.unh.edu/faculty/cee> for faculty.

Civil and Environmental Engineering (Ph.D.)

<https://ceps.unh.edu/cee/civil-engineering-phd>

Description

The goal of the Civil and Environmental Engineering program is to elucidate civil and environmental engineering technology by involving students in the design and construction of sustainable infrastructure projects that emphasize safety and public health. Our graduates enhance the quality of life for people both locally and around the world by providing safe structures such as bridges, highways, skyscrapers, tunnels and dams, and by helping to restore and maintain water quality and the environment. Civil Engineering has always been an exciting yet flexible profession filled with opportunities.

Requirements

Following admission into the program, a guidance committee is appointed for the student by the dean of the Graduate School upon recommendation of the advisor and graduate coordinator. This committee assists in outlining the student's course of study and may specify individual coursework requirements. The guidance committee administers the qualifying examination.

The student must pass a qualifying exam that includes both a written and an oral component. The content of the qualifying exam will be determined at the discretion of the guidance committee and will be based on the coursework (both graduate and undergraduate) completed to date. The qualifying exam is pass/fail. At the discretion of the guidance committee a student may conditionally pass the exam and be reevaluated after a specified time period. The qualifying exam must be completed within 18 months of admission for students that have a master's degree and within 30 months of admission for students that enter the PhD program with only a bachelor's degree.

Course Credit Requirements: The student must successfully complete at least 18 graded course credit hours beyond a master's degree or 36 graded course credit hours beyond a bachelor's degree. Additional course credits beyond these minimum levels may be required by the guidance committee.

Requirements for Optional Minor: An identifiable group of courses (9 credits minimum) in an area outside of the civil engineering department and approved by the guidance committee must be successfully completed to provide a minor to the Ph.D. degree. A minor may be satisfied by courses taken toward a master's degree other than civil engineering, but the credits will not be applied against the 18 or 36 credit-hour minimum.

Professional Outreach Experience: A minimum of one semester as a teaching assistant or comparable experience, or preparation and submission of article(s) to refereed journal(s), or presentations at professional meetings is required. The guidance committee will evaluate whether a student's past teaching assistantship satisfies this requirement.

Doctoral Candidates: Upon successful completion of the Ph.D. qualifying examination, a doctoral student is advanced to the status of doctoral candidate. When a student achieves candidacy, a doctoral committee

is established. The doctoral committee reviews research, reviews the student's progress, supervises and approves the doctoral dissertation, and administers the final examination (also known as the dissertation defense). The student must present and defend a research proposal within 6 months of achieving candidacy and no sooner than one year prior to the dissertation defense.

Upon completion of the dissertation, and with the approval of the doctoral committee, the student schedules an oral defense in accordance with the requirements of the Graduate School. For graduation, a B average (3.00 GPA) and successful dissertation defense must be achieved.

Civil and Environmental Engineering (M.Eng.)

<https://ceps.unh.edu/cee/civil-engineering-meng>

Description

The goal of the Civil and Environmental Engineering program is to elucidate civil and environmental engineering technology by involving students in the design and construction of sustainable infrastructure projects that emphasize safety and public health. Our graduates enhance the quality of life for people both locally and around the world by providing safe structures such as bridges, highways, skyscrapers, tunnels and dams, and by helping to restore and maintain water quality and the environment. Civil Engineering has always been an exciting yet flexible profession filled with opportunities. The Master of Engineering in Civil Engineering requires the completion of a research project in addition to coursework.

Requirements

All master of engineering degree students must complete a minimum of 30 total credits. UNH bachelor's degree students admitted to the Accelerated Master's Degree program may register for a maximum of 8 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may upon recommendation of the department and approval of the Graduate School count toward both a bachelor's and master's degree. M.Eng. students are required to complete one of the following options as a concluding experience:

- Option A, Masters Project: Students must complete a 3-credit master's project (CEE 898 Master's Project Paper) on a civil engineering topic.
- Option B, Oral Exam: Students must complete an oral exam. The oral exam does not count toward the number of required credits.
- Option C, Written Exam: Students must complete a written exam. The written exam does not count toward the number of required credits.

The M.Eng. option is designed to facilitate completion of B.S./M.Eng. civil engineering degrees within five years. M.Eng degree students are not eligible for an assistantship. For graduation, a grade of B- or better in each course, an overall B average (3.00 GPA), and successful completion of one of the above concluding experiences must be achieved.

Civil and Environmental Engineering (M.S.)

<https://ceps.unh.edu/cee/civil-engineering-ms>

Description

The goal of the Civil and Environmental Engineering program is to elucidate civil and environmental engineering technology by involving students in the design and construction of sustainable infrastructure projects that emphasize safety and public health. Our graduates enhance the quality of life for people both locally and around the world by providing safe structures such as bridges, highways, skyscrapers, tunnels and dams, and by helping to restore and maintain water quality and the environment. Civil Engineering has always been an exciting yet flexible profession filled with opportunities. The Master of Science in Civil Engineering requires the completion of a thesis in addition to coursework.

Requirements

All master of science degree students must complete a minimum of **31 total credits** that includes a minimum of 24 credit hours of regular coursework, 6 thesis credits (CEE 899 Master's Thesis) and a one-credit seminar course. UNH bachelor's degree students admitted to the Accelerated Master's Program may register for a maximum of 8 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may upon recommendation of the department and approval of the Graduate School count toward both a bachelor's and master's degree.

A formal oral presentation/thesis defense is required. All M.S. degree students are eligible for teaching or research assistantships and are required to register for Master's Student Seminar (CEE 897 Masters Student Seminar) for one semester. Students are required to make one presentation during their programs of study. For graduation, a grade of B- or better in each course, an overall B average (3.00 GPA), and a successful thesis defense must be achieved.

College Teaching (GRAD)

Degree Offered: Cognate, Graduate Certificate

This program is offered in Durham.

The College Teaching Program helps to prepare graduate students for academic teaching positions, and to prepare and enhance the effectiveness of college teaching for faculty members, post-docs, and graduate students enrolled at institutions other than UNH. The transfer and relationship between theory and research and instructional practice is emphasized in all courses.

This is a University-wide program coordinated by the Office of the Dean of the Graduate School and involving the Center for Excellence and Innovation in Teaching and Learning as well as faculty members from many fields and disciplines. Two academic programs are offered: the **cognate** in college teaching and the **certificate** in college teaching.

Cognate in College Teaching: The Cognate in College Teaching is open to UNH graduate students in a doctoral program or a terminal master's degree program.

Certificate in College Teaching: Certificate is open to current faculty members, postdocs, and doctoral students enrolled at institutions other than UNH.

Admission Requirements

Applicants to the cognate program must have the support and recommendation of their doctoral program coordinator.

Test Scores: None

New England Regional: No

<https://www.unh.edu/cetl/academic-programs-college-teaching>

Programs

- Cognate in College Teaching (p. 55)
- College Teaching (Graduate Certificate) (p. 56)

Faculty

See <http://www.unh.edu/cetl/cetl-staff> for faculty.

Cognate in College Teaching

<https://www.unh.edu/cetl/cognate>

Description

The Cognate in College Teaching offers a series of core and elective courses to prepare individuals to teach at institutions of higher education. The Cognate is available to doctoral students and students in terminal master's degree programs at UNH.

Students must apply and be formally admitted to the program. The Cognate appears as a minor on the student's transcript, and is awarded concurrently with the PhD or Master's degree.

All courses must be taken at UNH.

Requirements

Code	Title	Credits
Core Courses		
GRAD 950	Issues in College Teaching (Face to face, Summer)	2
GRAD 951	Teaching with Writing (Face to face, Summer)	2
GRAD 961	Cognition, Teaching, and Learning (Online, Summer)	2
GRAD 965	Classroom Research and Assessment Methods (Online, Summer)	2
Electives		
Select four credits of the following:		4
GRAD 970	Special Topics in College Teaching (Online, Summer - every other year)	
GRAD 995	Independent Study (TBA, AY or Summer - permission required)	

With prior approval from the College Teaching Director, the appropriate course(s) or seminar(s) on teaching in a particular discipline (e.g., history, economics, psychology, etc.)(Face to face, AY)

GRAD 998 College Teaching Portfolio (TBA, Summer or AY)

Total Credits 12

Students must create a 1 credit electronic teaching portfolio and have it approved by the directors of the Center for Excellence in Teaching and Learning.

College Teaching (Graduate Certificate)

<https://www.unh.edu/cetl/graduate-certificate-college-teaching/>

Description

The Certificate in College Teaching offers, through a series of core and elective courses, a set of skills and understandings specific to effective teaching in a learner-centered environment. Courses focus on: theories and research in the area of cognitive science that are relevant to understanding and promoting student learning in educational contexts; how to design courses to enhance that learning; how to interact effectively with students; and how to assess teaching and learning. This program is designed to help faculty and post-docs learn and sharpen these skills, and to broaden their knowledge-base in the scholarship of college teaching.

All courses in the program are grounded in the latest research and scholarship in the field of college teaching. The curriculum offers a rich blend of teaching and learning theory, a comprehensive overview of the current best teaching practices in higher education, and practical strategies for applying what is learned.

This program requires the satisfactory completion of 12 academic credits. The certificate is available to faculty members, post-docs, and graduate students enrolled at institutions other than UNH. Requirements include 8 credits in core courses and 4 credits in elective courses.

Requirements

Code	Title	Credits
Core Courses		
GRAD 950	Issues in College Teaching	2
GRAD 951	Teaching with Writing	2
GRAD 961	Cognition, Teaching, and Learning	2
GRAD 965	Classroom Research and Assessment Methods	2
Electives		
Select a minimum of four credits of the following:		4
GRAD 970	Special Topics in College Teaching	
GRAD 995	Independent Study	
Total Credits		12

Communication Sciences and Disorders (COMM)

Degree Offered: M.S.

This program is offered in Durham.

The Department of Communications Sciences and Disorders offers a master of science degree. Students are prepared to practice in a variety of job settings within the field of speech-language pathology and to meet the academic and practicum requirements of the American Speech-Language-Hearing Association (ASHA) for the certificate of clinical competence in speech-language pathology. The master's degree education program in speech-language pathology at the University of New Hampshire is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association, 2200 Research Boulevard #310, Rockville, MD 20850; 800.498.2071 or 301.296.5700.

The graduate program integrates an array of academic and clinical experiences to prepare students for a variety of careers in speech-language pathology. Students can elect to self-design their program, choosing from an array of required and elective courses that best suit their career objectives. This is referred to as the "no option" concentration. Other concentrations in adult neurogenic communication disorders, and pediatric communication disorders, are available to those students seeking particular expertise in either of these areas. Irrespective of which of the options students select, the program of study will prepare them to treat the full range of communication disabilities across the life span.

The department houses a research facility in which faculty and students are actively engaged in research projects. Their projects include examinations of the efficacy of language intervention for adults with aphasia, management of motor speech deficits, functional outcomes of augmentative and alternative communication, role of communication in fostering inclusive education, relationships between language and literacy, and ways of enhancing the process of clinical supervision.

Admission Requirements

Applicants for admission must possess a bachelor's degree prior to beginning the master's program. While the degree need not be in communication sciences and disorders, the following courses, or their equivalents, are prerequisites:

- Anatomy and Physiology of the Speech and Hearing Mechanism
- Language Acquisition
- Clinical Phonetics
- Basic Audiology
- Speech-Hearing Science
- Neurology

One course, Aural Rehabilitation, may be taken at either the undergraduate level or as part of the master's program. In most cases, taking this course as part of the master's program will not increase the number of courses in the program.

Applicants must also complete coursework in typical human development, statistics, and both biological and physical sciences (chemistry or physics) in preparation for fulfillment of ASHA requirements.

Acceptance to the program is based primarily on grade-point average, GRE scores, letters of recommendation, and a written statement. Applicants must submit current scores of the **GRE Revised General Test**. After applications have been reviewed, highly qualified applicants are invited to interview online. Generally, accepted students have a minimum grade-point average of 3.6 and GRE scores at the 50th percentile or higher. Grade-point average, GRE scores, and other application materials are used for the awarding of scholarships, assistantships, and other sources of support.

<https://chhs.unh.edu/directory/all>

Programs

- Communication Sciences and Disorders (M.S.) (p. 57)
- Communication Sciences and Disorders: Adult Neurogenic Communication Disorders (M.S.) (p. 58)
- Communication Sciences and Disorders: Early Childhood Communication Disorders (M.S.) (p. 59)
- Communication Sciences and Disorders: Language and Literacy Disabilities (M.S.) (p. 61)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Communication Sciences and Disorders (M.S.)

<https://chhs.unh.edu/csd/communication-sciences-and-disorders-ms>

Description

This general option prepares students for professional practice as a generalist. Students design a course of study that matches their career goals. Practicum experiences in educational, rehabilitative, and private practice settings are available to enhance applied learning. Upon completion of coursework and clinical training, students are prepared to provide clinical services to individuals of all ages who face communication challenges.

Requirements

Regardless of the option selected, students will complete a combination of core, required, and elective courses to earn a minimum of **61 credits**. See course descriptions for a list of all CSD graduate courses.

Code	Title	Credits
Required Core Courses for All Options		
COMM 876	Ethical and Professional Issues in Communication Sciences and Disorders I	1
COMM 880	Principles of Assessment	3
COMM 890	Advanced Audiology for Speech-Language Pathologists	3
COMM 903	Therapy Process	2
COMM 910	Clinical Practicum (1 credit each semester years one and two)	4

COMM 911	Externship (4 cr. fall of year two, 4 cr. spring of year two)	8
COMM 914	Augmentative and Alternative Communication	3-4
COMM 917	Research Mthds Comm Sci Dis	3
COMM 915	Counseling Clients and Families with Communication Disorders	2

Total Credits 29-30

In addition to the academic and clinical requirements, the UNH Department of Communication Sciences & Disorders implemented an Essential Functions Policy on June 7, 2010. This policy identifies basic communication, motor, cognitive, sensory, and behavioral-social abilities that are necessary for completion of our master's program and professional practice. Some of these abilities should be in place when students begin the program, while others will be developed throughout the program.

Early each fall, the Essential Functions Policy will be reviewed with new students beginning our program. Students are expected to sign that they have reviewed and understand the policy and will follow the stated guidelines.

Code	Title	Credits
No Option/Generalist Required Courses		
COMM 900	Articulatory and Phonological Disorders in Children	3
COMM 901	Dysphagia	3
COMM 902	Stuttering	3
COMM 905	Motor Speech Disorders	3
COMM 906	Voice Disorders	2
Elective Courses		
Select six of the following:		18
COMM 875	Advanced Language Acquisition	
COMM 904	Aphasia in Adults	
COMM 907	Advanced Seminar in Aural Rehabilitation	
COMM 908	Disorders of Language and Literacy I	
COMM 891	Applied Neurology for Speech-Language Pathology	
COMM 909	Disorders of Language and Literacy II	
COMM 912	Language Disorders Birth to Five	
COMM 913	Cognitive Communication Disorders	
COMM 916	Autism Spectrum Disorders	
COMM 920	Graduate Seminar	
Other approved courses outside the department.		
Total Credits		32

Clinical Practicum

All students are required to complete four practicum rotations and two externships during their graduate studies. Practicum assignments take place at the UNH Speech-Language-Hearing Center (<http://chhs.unh.edu/speech-language-hearing>) (SLHC) and University-supervised satellite programs. Externships are available at a broad range of department-approved settings, including public and private schools, language-based preschool programs, early intervention programs, health care settings, and private practices. UNH requires students to have 15 documented observation hours prior to the start of clinical work.

During fall and spring semesters of year 1, students complete clinical work that directly and simultaneously corresponds to coursework.

Clinical assignments are completed at the UNH SLHC as well as University-supervised satellite programs. During year 2, students complete two semesters of diagnostic clinic at the UNH SLHC along with two externships at two different settings. Students shall participate in at least one externship that corresponds to their selected option in order to develop clinical skills in their area of interest. Since the UNH CSD Graduate Program is a full-time program, we expect students to be available for clinical assignments when not in class.

Students are responsible for transportation to satellite programs, externships, and other community learning experiences. Practicum sites may require a physical, including a tuberculin test; proof of immunizations such as poliomyelitis, rubella and hepatitis; health insurance; and drug/urine testing. In addition, students are responsible for meeting the criminal record clearances established by the practicum site. Failure to pass required medical and other clearance checks could render a student ineligible for a practicum assignment and thus unable to complete program requirements.

To learn more about the available externships please contact the CSD office (csd.department@unh.edu).

Capstone Experience

The capstone experience is divided into two phases:

Phase I: Year--One Comprehensive Exam

Phase I is a comprehensive exam scheduled at the end of the first year of graduate study. For the year--one comprehensive exam, all students will write for three hours, answering three out of four integrated questions addressing content specific to the first year.

Phase II: Year--Two Comprehensive Exam or Thesis Year--Two Comprehensive Exam (non-thesis)

All students except those writing a thesis must pass a year-two comprehensive exam designed to assess their mastery of the full two-year curriculum. Students will write for six hours, answering six out of eight integrated questions. Students who have selected either the Early Childhood Communication Disorders, Language/Literacy Disorders, or the Adult Neurogenic Communication Disorders options are required to respond to one question specific to their course of study during the year--two comprehensive exam.

Thesis

Students may choose to write a thesis in lieu of the year--two comprehensive exam. Upon completion of an original research project, students must defend the thesis in an oral examination and must gain approval of the thesis committee. In addition to required coursework, students must register for 6 credits of COMM 899 Master's Thesis.

Communication Sciences and Disorders: Adult Neurogenic Communication Disorders (M.S.)

<https://chhs.unh.edu/csd/communication-sciences-and-disorders-ms>

Description

This option prepares students for clinical practice in the diagnosis and treatment of neurogenic communication disorders in adults. Students receive extensive training in the theories and processes of

brain dysfunction (e.g., stroke, acquired brain injury, dementia, and other progressive diseases) as well as the current practices in the application of neurorehabilitation management. Practicum placements in medical and rehabilitative facilities provide applied experience to enhance learning. Upon completion of the coursework and clinical training, students are prepared to provide speech-language pathology services for a wide array of neurogenic communication disorders (i.e., acquired impairment in language, speech, and cognition) and collaborate as a contributing member with other professionals in medical and rehabilitation teams.

Requirements

Regardless of the option selected, students will complete a combination of core, required, and elective courses to earn a minimum of **61 credits**. See course descriptions for a list of all CSD graduate courses.

Code	Title	Credits
Required Core Courses for All Options		
COMM 876	Ethical and Professional Issues in Communication Sciences and Disorders I	1
COMM 880	Principles of Assessment	3
COMM 890	Advanced Audiology for Speech-Language Pathologists	3
COMM 903	Therapy Process	2
COMM 910	Clinical Practicum (1 credit each semester years one and two)	4
COMM 911	Externship (4 cr. fall of year two, 4 cr. spring of year two)	8
COMM 914	Augmentative and Alternative Communication	3-4
COMM 917	Research Mthds Comm Sci Dis	3
COMM 915	Counseling Clients and Families with Communication Disorders	2
Total Credits		29-30

In addition to the academic and clinical requirements, the UNH Department of Communication Sciences & Disorders implemented an Essential Functions Policy on June 7, 2010. This policy identifies basic communication, motor, cognitive, sensory, and behavioral--social abilities that are necessary for completion of our master's program and professional practice. Some of these abilities should be in place when students begin the program, while others will be developed throughout the program.

Early each fall, the Essential Functions Policy will be reviewed with new students beginning our program. Students are expected to sign that they have reviewed and understand the policy and will follow the stated guidelines. For additional information about the graduate program, see the Handbook for Graduate Students and Practicum Manual (<http://chhs.unh.edu/sites/chhs.unh.edu/files/docs/csd/Practicum%20Manual.pdf>).

Code	Title	Credits
Adult Neurogenic Required Courses		
COMM 900	Articulatory and Phonological Disorders in Children	3
COMM 901	Dysphagia	3
COMM 902	Stuttering	3
COMM 904	Aphasia in Adults	3
COMM 905	Motor Speech Disorders	3

COMM 906	Voice Disorders	2
COMM 908	Disorders of Language and Literacy I	3
or COMM 912	Language Disorders Birth to Five	
COMM 913	Cognitive Communication Disorders	3
Elective Courses		
Select three of the following:		7-12
COMM 875	Advanced Language Acquisition	
COMM 891	Applied Neurology for Speech-Language Pathology	
COMM 907	Advanced Seminar in Aural Rehabilitation	
COMM 908	Disorders of Language and Literacy I (if not chosen in required category)	
COMM 909	Disorders of Language and Literacy II	
COMM 912	Language Disorders Birth to Five (if not chosen in required category)	
COMM 916	Autism Spectrum Disorders	
COMM 920	Graduate Seminar (advanced medical options)	
PSYC 914	Advanced Seminar in Cognition	
Other approved courses outside the department.		
Total Credits		30-35

Clinical Practicum

All students are required to complete four practicum rotations and two externships during their graduate studies. Practicum assignments take place at the UNH Speech-Language-Hearing Center (<http://chhs.unh.edu/speech-language-hearing>) (SLHC) and University-supervised satellite programs. Externships are available at a broad range of department-approved settings, including public and private schools, language-based preschool programs, early intervention programs, health care settings, and private practices. UNH requires students to have 15 documented observation hours prior to the start of clinical work.

During fall and spring semesters of year 1, students complete clinical work that directly and simultaneously corresponds to coursework. Clinical assignments are completed at the UNH SLHC as well as University-supervised satellite programs. During year 2, students complete two semesters of diagnostic clinic at the UNH SLHC along with two externships at two different settings. Students shall participate in at least one externship that corresponds to their selected option in order to develop clinical skills in their area of interest. Since the UNH CSD Graduate Program is a full-time program, we expect students to be available for clinical assignments when not in class.

Students are responsible for transportation to satellite programs, externships, and other community learning experiences. Practicum sites may require a physical, including a tuberculin test; proof of immunizations such as poliomyelitis, rubella and hepatitis; health insurance; and drug/urine testing. In addition, students are responsible for meeting the criminal record clearances established by the practicum site. Failure to pass required medical and other clearance checks could render a student ineligible for a practicum assignment and thus unable to complete program requirements.

To learn more about the available externships please contact the CSD office.

Capstone Experience

The capstone experience is divided into two phases:

Phase I: Year--One Comprehensive Exam

Phase I is a comprehensive exam scheduled at the end of the first year of graduate study. For the year--one comprehensive exam, all students will write for three hours, answering three out of four integrated questions addressing content specific to the first year.

Phase II: Year--Two Comprehensive Exam or Thesis

Year--Two Comprehensive Exam (non-thesis)

All students except those writing a thesis must pass a year-two comprehensive exam designed to assess their mastery of the full two-year curriculum. Students will write for six hours, answering six out of eight integrated questions. Students who have selected either the Early Childhood Communication Disorders, Language/Literacy Disorders, or the Adult Neurogenic Communication Disorders options are required to respond to one question specific to their course of study during the year--two comprehensive exam.

Thesis

Students may choose to write a thesis in lieu of the year--two comprehensive exam. Upon completion of an original research project, students must defend the thesis in an oral examination and must gain approval of the thesis committee. In addition to required coursework, students must register for 6 credits of COMM 899 Master's Thesis.

Communication Sciences and Disorders: Early Childhood Communication Disorders (M.S.)

<https://chhs.unh.edu/csd/communication-sciences-and-disorders-ms>

Description

This option prepares students for professional practice in the diagnosis and treatment of early childhood communication disorders in young children. Students learn theory and practice for a variety of speech-language-communication--swallowing disorders typically seen in babies through early elementary age children. An essential component of this option is supporting families of young children with communication disorders. Practicum experiences in educational and pediatric rehabilitative settings, early intervention centers, and private practice are available to enhance applied learning. Upon completion of coursework and clinical training, students are prepared to diagnose and treat a wide array of early childhood speech-language-communication--feeding disorders and collaborate with their professional colleagues in educational and rehabilitative teams.

Requirements

Regardless of the option selected, students will complete a combination of core, required, and elective courses to earn a minimum of **61 credits**. See course descriptions for a list of all CSD graduate courses.

Code	Title	Credits
Required Core Courses for All Options		
COMM 876	Ethical and Professional Issues in Communication Sciences and Disorders I	1
COMM 880	Principles of Assessment	3

COMM 890	Advanced Audiology for Speech-Language Pathologists	3
COMM 903	Therapy Process	2
COMM 910	Clinical Practicum (1 credit each semester years one and two)	4
COMM 911	Externship (4 cr. fall of year two, 4 cr. spring of year two)	8
COMM 914	Augmentative and Alternative Communication	3-4
COMM 917	Research Mthds Comm Sci Dis	3
COMM 915	Counseling Clients and Families with Communication Disorders	2
Total Credits		29-30

In addition to the academic and clinical requirements, the UNH Department of Communication Sciences & Disorders implemented an Essential Functions Policy on June 7, 2010. This policy identifies basic communication, motor, cognitive, sensory, and behavioral-social abilities that are necessary for completion of our master's program and professional practice. Some of these abilities should be in place when students begin the program, while others will be developed throughout the program.

Early each fall, the Essential Functions Policy will be reviewed with new students beginning our program. Students are expected to sign that they have reviewed and understand the policy and will follow the stated guidelines. For additional information about the graduate program, see the Handbook for Graduate Students and Practicum Manual (<http://chhs.unh.edu/sites/chhs.unh.edu/files/docs/csd/Practicum%20Manual.pdf>).

Code	Title	Credits
Early Childhood Communication Disorders Required Courses		
COMM 900	Articulatory and Phonological Disorders in Children	3
COMM 901	Dysphagia	3
COMM 902	Stuttering	3
COMM 905	Motor Speech Disorders	3
COMM 906	Voice Disorders	2
COMM 908	Disorders of Language and Literacy I	3
COMM 912	Language Disorders Birth to Five	3
COMM 916	Autism Spectrum Disorders	3
EDUC 856	Supporting Families of Individuals with Exceptionalities	4
Elective Courses		
Select two of the following:		6-11
COMM 875	Advanced Language Acquisition	
COMM 904	Aphasia in Adults	
COMM 907	Advanced Seminar in Aural Rehabilitation	
COMM 909	Disorders of Language and Literacy II	
COMM 913	Cognitive Communication Disorders	
COMM 920	Graduate Seminar	
EDUC 941	Diversity and Child Development	
HHS 898	Special Topics	
Other approved courses outside the department.		
Total Credits		33-38

Clinical Practicum

All students are required to complete four practicum rotations and two externships during their graduate studies. Practicum assignments take place at the UNH Speech-Language-Hearing Center (<http://chhs.unh.edu/speech-language-hearing>) (SLHC) and University-supervised satellite programs. Externships are available at a broad range of department-approved settings, including public and private schools, language-based preschool programs, early intervention programs, health care settings, and private practices. UNH requires students to have 15 documented observation hours prior to the start of clinical work.

During fall and spring semesters of year 1, students complete clinical work that directly and simultaneously corresponds to coursework. Clinical assignments are completed at the UNH SLHC as well as University-supervised satellite programs. During year 2, students complete two semesters of diagnostic clinic at the UNH SLHC along with two externships at two different settings. Students shall participate in at least one externship that corresponds to their selected option in order to develop clinical skills in their area of interest. Since the UNH CSD Graduate Program is a full-time program, we expect students to be available for clinical assignments when not in class.

Students are responsible for transportation to satellite programs, externships, and other community learning experiences. Practicum sites may require a physical, including a tuberculin test; proof of immunizations such as poliomyelitis, rubella and hepatitis; health insurance; and drug/urine testing. In addition, students are responsible for meeting the criminal record clearances established by the practicum site. Failure to pass required medical and other clearance checks could render a student ineligible for a practicum assignment and thus unable to complete program requirements.

To learn more about the available externships please contact the CSD office.

Capstone Experience

The capstone experience is divided into two phases:

Phase I: Year--One Comprehensive Exam

Phase I is a comprehensive exam scheduled at the end of the first year of graduate study. For the year--one comprehensive exam, all students will write for three hours, answering three out of four integrated questions addressing content specific to the first year.

Phase II: Year--Two Comprehensive Exam or Thesis Year--Two Comprehensive Exam (non-thesis)

All students except those writing a thesis must pass a year-two comprehensive exam designed to assess their mastery of the full two-year curriculum. Students will write for six hours, answering six out of eight integrated questions. Students who have selected either the Early Childhood Communication Disorders, Language/Literacy Disorders, or the Adult Neurogenic Communication Disorders options are required to respond to one question specific to their course of study during the year--two comprehensive exam.

Thesis

Students may choose to write a thesis in lieu of the year--two comprehensive exam. Upon completion of an original research project, students must defend the thesis in an oral examination and must gain approval of the thesis committee. In addition to required coursework, students must register for 6 credits of COMM 899 Master's Thesis.

Communication Sciences and Disorders: Language and Literacy Disabilities (M.S.)

<https://chhs.unh.edu/csd/communication-sciences-and-disorders-ms>

Description

This option prepares students for professional practice in the diagnosis and treatment of language-based learning disorders in school age children. Students learn theory and practice in oral language as it relates to literacy acquisition and learning in the content areas. Practicum experiences in schools are available to enhance applied understanding. Upon graduating, students are equipped to meet the challenge of diagnosing and managing an array of language-based learning disabilities as team members alongside their professional colleagues in regular education, reading education, and learning disabilities. Those interested in obtaining dual certification in reading education and speech language pathology are encouraged to contact the Education Department.

Requirements

Regardless of option, students will complete a combination of core, required, and elective courses to earn a minimum of **61 credits**. See course descriptions for a list of all CSD graduate courses.

Code	Title	Credits
Required Core Courses for All Options		
COMM 876	Ethical and Professional Issues in Communication Sciences and Disorders I	1
COMM 880	Principles of Assessment	3
COMM 890	Advanced Audiology for Speech-Language Pathologists	3
COMM 903	Therapy Process	2
COMM 910	Clinical Practicum (1 credit each semester years one and two)	4
COMM 911	Externship (4 cr. fall of year two, 4 cr. spring of year two)	8
COMM 914	Augmentative and Alternative Communication	3-4
COMM 917	Research Mthds Comm Sci Dis	3
COMM 915	Counseling Clients and Families with Communication Disorders	2
Total Credits		29-30

In addition to the academic and clinical requirements, the UNH Department of Communication Sciences & Disorders implemented an Essential Functions Policy on June 7, 2010. This policy identifies basic communication, motor, cognitive, sensory, and behavioral-social abilities that are necessary for completion of our master's program and professional practice. Some of these abilities should be in place when students begin the program, while others will be developed throughout the program.

Early each fall, the Essential Functions Policy will be reviewed with new students beginning our program. Students are expected to sign that they have reviewed and understand the policy and will follow

the stated guidelines. For additional information about the graduate program, see the Handbook for Graduate Students and Practicum Manual (<http://chhs.unh.edu/sites/chhs.unh.edu/files/docs/csd/Practicum%20Manual.pdf>).

Code	Title	Credits
Language Literacy Disabilities Required Courses		
COMM 875	Advanced Language Acquisition	3
COMM 900	Articulatory and Phonological Disorders in Children	3
COMM 901	Dysphagia	3
COMM 902	Stuttering	3
COMM 905	Motor Speech Disorders	3
COMM 906	Voice Disorders	2
COMM 908	Disorders of Language and Literacy I	3
COMM 909	Disorders of Language and Literacy II	3
COMM 912	Language Disorders Birth to Five	3
Elective Courses		
Select two of the following:		6-8
COMM 891	Applied Neurology for Speech-Language Pathology	
COMM 904	Aphasia in Adults	
COMM 907	Advanced Seminar in Aural Rehabilitation	
EDUC 907	Foundations of Literacy Instruction	
COMM 913	Cognitive Communication Disorders	
COMM 916	Autism Spectrum Disorders	
COMM 920	Graduate Seminar	
Total Credits		32-34

Clinical Practicum

All students are required to complete four practicum rotations and two externships during their graduate studies. Practicum assignments take place at the UNH Speech-Language-Hearing Center (<http://chhs.unh.edu/speech-language-hearing>) (SLHC) and University-supervised satellite programs. Externships are available at a broad range of department-approved settings, including public and private schools, language-based preschool programs, early intervention programs, health care settings, and private practices. UNH requires students to have 15 documented observation hours prior to the start of clinical work.

During fall and spring semesters of year 1, students complete clinical work that directly and simultaneously corresponds to coursework. Clinical assignments are completed at the UNH SLHC as well as University-supervised satellite programs. During year 2, students complete two semesters of diagnostic clinic at the UNH SLHC along with two externships at two different settings. Students shall participate in at least one externship that corresponds to their selected option in order to develop clinical skills in their area of interest. Since the UNH CSD Graduate Program is a full-time program, we expect students to be available for clinical assignments when not in class.

Students are responsible for transportation to satellite programs, externships, and other community learning experiences. Practicum sites may require a physical, including a tuberculin test; proof of immunizations such as poliomyelitis, rubella and hepatitis; health insurance; and drug/urine testing. In addition, students are responsible for meeting the criminal record clearances established by the practicum site. Failure to pass required medical and other clearance checks could

render a student ineligible for a practicum assignment and thus unable to complete program requirements.

To learn more about the available externships please contact the CSD office.

Capstone Experience

The capstone experience is divided into two phases:

Phase I: Year--One Comprehensive Exam

Phase I is a comprehensive exam scheduled at the end of the first year of graduate study. For the year--one comprehensive exam, all students will write for three hours, answering three out of four integrated questions addressing content specific to the first year.

Phase II: Year--Two Comprehensive Exam or Thesis Year--Two Comprehensive Exam (non-thesis)

All students except those writing a thesis must pass a year-two comprehensive exam designed to assess their mastery of the full two-year curriculum. Students will write for six hours, answering six out of eight integrated questions. Students who have selected either the Early Childhood Communication Disorders, Language/Literacy Disorders, or the Adult Neurogenic Communication Disorders options are required to respond to one question specific to their course of study during the year--two comprehensive exam.

Thesis

Students may choose to write a thesis in lieu of the year--two comprehensive exam. Upon completion of an original research project, students must defend the thesis in an oral examination and must gain approval of the thesis committee. In addition to required coursework, students must register for 6 credits of COMM 899 Master's Thesis.

Community Development Policy and Practice (CSPP)

Degree offered: M.A.

This program is offered in Durham.

The Carsey School of Public Policy's public service graduate degrees offer a unique combination of academic rigor and real-life expertise to prepare you for a career with impact. The Master of Arts in Community Development Policy and Practice program helps you to tackle complex community development issues by engaging with leading experts and academics in a program designed for working professionals like you.

This unique program offers the best of both worlds by combining the rich, in-person learning experience gained through brief summer terms on campus with the convenience of interactive online coursework during the fall through spring terms. You will directly apply what you learn in the classroom within your community through your yearlong capstone project, developing a valuable toolkit that meets the gold standard in project management.

<https://carsey.unh.edu/macdpp>

Programs

- Community Development Policy and Practice (M.A.) (p. 62)

Faculty

See <https://carsey.unh.edu/macdpp/faculty> for faculty.

Community Development Policy and Practice (M.A.)

<https://carsey.unh.edu/macdpp>

Description

The Community Development Policy and Practice program prepares you to tackle complex community development issues by engaging with leading experts and academics in a program designed for working professionals like you. You will learn from seasoned practitioners in subjects ranging from economics and finance to organizational management and environmental factors in development.

- Gain hands-on learning through an applied yearlong capstone project in your community
- Connect with respected field experts across disciplines, including faculty and peers
- Graduate in 14 months (full time) or 24 months (part time), whichever works best for your schedule

Program Delivery & Location: *Academic courses are offered in person on the UNH Durham campus over two brief summer terms and online fall through spring, allowing students to carry out their capstone projects at the location of their chosen community.*

Requirements

Students enrolled in the Carsey School's Community Development Policy and Practice program are required to complete a thirty-nine (39) credit program, consisting of:

- Seven (7) CORE Curriculum Courses
- Four (4) EXPERIENTIAL LEARNING Courses
- Three (3) ELECTIVE Courses

These provide the foundational analytic, strategic, and practical skills for a successful career in community development, all levels of government, nonprofit and nongovernmental organizations, foundations, businesses, and research institutes. This program will examine each of the core disciplinary areas within the cross-cutting lenses of theory, policy, data collection and analysis as students directly apply what they learn through a yearlong, capstone project in their communities. Further opportunities for depth and specialization are provided through a variety of elective courses which vary each year.

Code	Title	Credits
CORE Required Courses (7 Courses)		
DPP 901	Integrative Approaches to Development Policy and Practice	3
DPP 902	Economic Analysis for Development	3
DPP 905	Fiscal Management for Development Organizations	3
DPP 906	Organizational Management and Leadership	3

DPP 908	Policy Seminar	3
DPP 910	Leadership and Development	2
DPP 911	Environmental Factors in Development Practice	1
EXPERIENTIAL LEARNING Courses (4 Courses) ¹		
DPP 980	Project Design	3
DPP 981	Project Implementation	3
DPP 982	Project Management	3
DPP 983	Project Monitoring and Evaluation	3
ELECTIVE Courses: Choose Three (3) Courses ²		
		9
Total Credits		39

¹ With full faculty support, students carry out a yearlong capstone project in their communities by completing actionable assignments throughout the series of four (4) applied project courses.

² A diverse offering of elective courses are available for students within the program. Students wishing to pursue elective courses outside of the program should consult with their Academic Advisor.

Computer Science (CS)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Department of Computer Science offers both the M.S. and the Ph.D. in computer science.

The M.S. program is designed to help students increase the breadth and depth of their computer science knowledge, strengthen their software development skills, and build their research skills.

The Ph.D. program is designed to develop a student's ability to carry out advanced research, as well as ensure the breadth and depth of computer science knowledge required to obtain a faculty position in academia or a research position in industry or at a national laboratory.

Admission Requirements

The computer science graduate program is designed for students with a B.S. degree in computer science. However, applications from students whose undergraduate degree is not in computer science are also welcome. In this case, a well-defined set of undergraduate prerequisites must be completed as part of the M.S. program of study. The prerequisites include an introduction to computer science, object-oriented programming, data structures, machine organization, operating systems, and computer science theory.

These prerequisites can be satisfied at UNH by the following undergraduate courses:

Code	Title	Credits
CS 415	Introduction to Computer Science I	4
CS 416	Introduction to Computer Science II	4
CS 515	Data Structures and Introduction to Algorithms	4
CS 520	Assembly Language Programming and Machine Organization	4
CS 620	Operating System Fundamentals	4
CS 659	Introduction to the Theory of Computation	4

Some students may need to take additional mathematics classes.

Students without a B.S. or M.S. in computer science are not normally admitted directly into the Ph.D. program, but it is possible to transfer from the M.S. program to the Ph.D. program.

Applicants must submit current scores (within five years) for the general test of the GRE. Students who have taken computer science courses at UNH can request a waiver of this requirement.

<https://ceps.unh.edu/computer-science/>

Programs

- Computer Science (Ph.D.) (p. 63)
- Computer Science (M.S.) (p. 64)

Faculty

<https://ceps.unh.edu/computer-science/faculty-staff-directory>

Computer Science (Ph.D.)

<http://cs.unh.edu/graduate-program>

Description

The Ph.D. program is designed to develop a student's ability to carry out advanced research, as well as ensure the breadth and depth of computer science knowledge required to obtain a faculty position in academia or a research position in industry or at a national laboratory. Students first work to obtain breadth knowledge and a faculty research mentor. Then, working with their mentor, they carry out advanced work that results in original research publications and a doctoral dissertation.

Requirements

Code	Title	Credits
CS 900	Graduate Seminar	1
Select six CS graduate courses (of at least 3 credits each) beyond the M.S. or twelve CS graduate courses beyond the B.S. ¹		18
Breadth Requirement ²		
Research Tool ³		
Depth Requirement ⁴		
Dissertation ⁵		
Total Credits		19

- ¹ The courses must satisfy the following requirements:
- Two must be implementation intensive (see list below).
 - All students must take CS 845 Formal Specification and Verification of Software Systems.
 - At most two can be CS 998 Independent Study. If two CS 998 courses are taken, they must be taught by different instructors.

- ² Courses must be taken from at least four breadth groups (see list below), with one of the groups being the Theory group. Students must obtain a 3.4 GPA in the four breadth courses. The student designates which four courses are used to compute the GPA.

- ³ A research tool represents knowledge and skills in another discipline that can help the student carry out his or her research plan. This is typically satisfied by taking a non-computer-science graduate level course.
- ⁴ Under the direction of a depth adviser and a depth committee, the student carries out some preliminary research that is likely to lead to a dissertation topic. The student must produce two written reports (a literature survey and a research report) and make a presentation as part of an oral examination on the material. After the student has successfully completed the depth exam and has satisfied the research tool requirement, the student is advanced to candidacy.
- ⁵ The student must complete original research and present and defend a dissertation describing that research. The research is carried out under the supervision of a faculty member dissertation adviser and a dissertation committee of at least five members, including one from outside the department.

Implementation Intensive Courses

Implementation intensive courses include:

Code	Title	Credits
CS 812	Compiler Design	3
CS 830	Introduction to Artificial Intelligence	3
CS 835	Introduction to Parallel and Distributed Programming	3
CS 870	Computer Graphics	3
CS 980	Advanced Topics (Data Science)	3

Breadth Course Groups

The list below identifies the seven breadth course groups and introductory (800-level) graduate courses in each group. It is also acceptable to satisfy a group requirement by taking an advanced course (900-level) in the specified area. (Note that there are courses in the curriculum that are not in any of the identified groups.)

Group: Introductory Course

Code	Title	Credits
Theory		
CS 845	Formal Specification and Verification of Software Systems	3
CS 858	Algorithms	3
Systems		
CS 823	Performance Evaluation of Computer Systems	3
Compiler and Language		
CS 812	Compiler Design	3
CS 835	Introduction to Parallel and Distributed Programming	3
CS 871	Web Programming Paradigms	3
Database		
CS 853	Information Retrieval	3
CS 875	Database Systems	3
Artificial Intelligence		
CS 830	Introduction to Artificial Intelligence	3
CS 850	Machine Learning	3
Interactive Systems		
CS 833	Mobile Robotics	3

CS 860	Introduction to Human-Computer Interaction	3
CS 870	Computer Graphics	3
Networks		
CS 825	Computer Networks	3

Computer Science (M.S.)

<http://cs.unh.edu/graduate-program>

Description

The M.S. program is designed to help students increase the breadth and depth of their computer science knowledge, strengthen their software development skills, and build their research skills. Professionally-oriented students often complete industry internships, and the program has an outstanding job placement record for its graduates. Research-oriented students complete an M.S. thesis under the guidance of a faculty mentor, which usually leads to publication and provides clear evidence of the developed research skills useful for obtaining a leadership position in industry or to go on to do a Ph.D. Applications are welcomed from students whose undergraduate degree is not in computer science. In this case, a well-defined set of undergraduate prerequisites must be completed as part of the M.S. program of study.

Requirements

The M.S. program has three options: thesis, project, and exam.

M.S. Thesis Option

Code	Title	Credits
CS 900	Graduate Seminar	1
Select eight CS graduate courses of at least 3 credits each ¹		24
CS 899	Master's Thesis ²	6
Total Credits		31

¹ The courses must satisfy the following requirements:

- Two must be implementation intensive (see list below).
- Three courses must be chosen from three different breadth groups (see list below).
- At least two courses must be above 900.
- At most one can be CS 998 Independent Study.

² The student must complete thesis under the supervision of a thesis adviser and a thesis committee of at least three members.

M.S. Project Option

Code	Title	Credits
CS 900	Graduate Seminar	1
Select ten CS graduate courses of at least 3 credits each ¹		30
CS 898	Master's Project ²	3
Total Credits		34

- ¹ The courses must satisfy the following requirements:
- Two must be implementation intensive (see list below).
 - Four courses must be chosen from four different breadth groups (see list below).
 - At least three courses must be above 900; one of these must be related to the project area.
 - At most one can be CS 998 Independent Study.
- ² The student must complete a project under the supervision of a faculty adviser.

M.S. Exam Option

Code	Title	Credits
CS 900	Graduate Seminar	1
Select ten CS graduate courses of at least 3 credits each ¹		30
Comprehensive exam that includes four different examination topics (see list below) ²		
Total Credits		31

- ¹ The courses must satisfy the following requirements:
- Two must be implementation intensive (see list below).
 - Four courses must be chosen from four different breadth groups (see list below).
 - At least three courses must be above 900.
 - At most one can be CS 998 Independent Study.
- ² One topic must be selected from one of the topics in the Theory breadth group (see list below). The other three topics must be selected from three different breadth groups (which can include a second theory topic).

Implementation Intensive Courses

Implementation intensive courses include:

Code	Title	Credits
CS 812	Compiler Design	3
CS 830	Introduction to Artificial Intelligence	3
CS 835	Introduction to Parallel and Distributed Programming	3
CS 870	Computer Graphics	3
CS 980	Advanced Topics (Data Science)	3

Breadth Course Groups

The list below identifies the seven breadth course groups and introductory (800-level) graduate courses in each group. It is also acceptable to satisfy a group requirement by taking an advanced course (900-level) in the specified area. (Note that there are courses in the curriculum that are not in any of the identified groups.)

GROUP: INTRODUCTORY COURSE

Code	Title	Credits
Theory		
CS 845	Formal Specification and Verification of Software Systems	3
CS 858	Algorithms	3
Systems		
CS 823	Performance Evaluation of Computer Systems	3
Compiler and Language		

CS 812	Compiler Design	3
CS 835	Introduction to Parallel and Distributed Programming	3
CS 871	Web Programming Paradigms	3
Database		
CS 853	Information Retrieval	3
CS 875	Database Systems	3
Artificial Intelligence		
CS 830	Introduction to Artificial Intelligence	3
CS 850	Machine Learning	3
Interactive Systems		
CS 833	Mobile Robotics	3
CS 860	Introduction to Human-Computer Interaction	3
CS 870	Computer Graphics	3
Networks		
CS 825	Computer Networks	3

Cybersecurity Policy and Risk Management

<https://online.unh.edu/cprm>

Overview

Degree Offered: M.S.

This program is offered online.

Our Security Studies faculty lead this interdisciplinary program that incorporates practicing experts and senior executives to help cultivate strategic thinking, policy development, and risk-management skills for cybersecurity. Students will learn how to assess organizational risk and to design, implement, and oversee the necessary cybersecurity policies and processes for resilient, secure, and successful organizations.

Programs

- Cybersecurity Policy and Risk Management (M.S.) (p. 65)

Faculty

See <https://online.unh.edu/cprm/faculty> for faculty.

Cybersecurity Policy and Risk Management (M.S.)

<https://online.unh.edu/CPRM>

Description

The M.S. in Cybersecurity Policy and Risk Management (CPRM) program cultivates strategic thinking, policy development, and risk-management skills for students interested in careers in business or government. The program features full-time faculty and industry experts who help blend

strategy and policy with preparedness, incident response, recovery, and resilience – the heart of our security studies discipline.

Students may come from business, public administration, healthcare, finance, homeland defense and security, retail, law, insurance, and a myriad of technical and engineering disciplines. Prior experience or undergraduate degrees in technical fields are not required.

This is an online only program, taught over five 8-week e-terms per academic calendar year. In the Capstone-Track (non-thesis), students must take a minimum of 30 credits pursuant to the CPRM requirements. In the Thesis-Track, students take 33 - 36 credits to graduate, depending on the specific nature of the thesis project.

Requirements

The M.S. CPRM program has two options: Capstone project (non-thesis) option, and Thesis option.¹

For the Capstone project (non-thesis) option, students must complete 30 credits (10 courses), consisting of the eight core courses, plus the methodology course CPRM 880 Cybersecurity Metrics and Evaluation, and the concluding experience of CPRM 898 Capstone: Non-Thesis Option.

For the Thesis option, students complete 33 or 36 credits, starting with the eight core courses. Then, depending on the goals and requirements of the thesis topic, the student (in consultation with an advisor and approved by the program coordinator) takes **one or both** methodology courses CPRM 879 Research Methods² and CPRM 880 Cybersecurity Metrics and Evaluation. The Thesis option concludes with the 6-credit CPRM 899 Capstone: Thesis Option. The thesis is expected to run at least two e-terms, allowing for the time needed to complete and defend a graduate-level thesis that could support potential candidacy for future doctoral work.

Code	Title	Credits
Core Courses (All Required)		
CPRM 810	Foundations of Cybersecurity Policy	3
CPRM 820	Policy Development and Communication	3
CPRM 830	Security Measures I	3
CPRM 840	Cybersecurity Standards, Regulations, and Laws	3
CPRM 850	Security Measures II	3
CPRM 860	Incident Response and Investigation	3
CPRM 870	Cybersecurity Risk Management	3
CPRM 890	Organizations, Change Management, and Leadership	3
Methodology Courses (select at least one)		
CPRM 880	Cybersecurity Metrics and Evaluation	3
CPRM 879	Research Methods ²	3
Concluding Experience		
CPRM 898	Capstone: Non-Thesis Option ³	3
or		
CPRM 899	Capstone: Thesis Option	6

- ¹ Note that in particular circumstances, the program coordinator may approve CPRM 895 to substitute for a required course in this program. This is by approval of the program coordinator only, and is intended for those rare circumstances that may be necessary due to work or family situations. CPRM 895 may be used no more than twice (up to 6 credits).
- ² Depending on availability and approval by the Education program and the CPRM program coordinator, the online section of EDUC 882 Introduction to Research Methods may substitute for (is an equivalent for) CPRM Research Methods.
- ³ The capstone (non-thesis) project is custom-designed by each student (in cooperation with an advisor) and requires that students synthesize, apply, and evaluate their knowledge to address real-world or work-related challenges in cybersecurity. The project also requires research into the chosen challenge / problem.

Earth Sciences (ESCI)

Degree Offered: M.S., Graduate Certificate

This program is offered in Durham.

The Department of Earth Sciences offers the master of science degree in Earth sciences with options in geology, ocean mapping, and a specialization in geochemical systems. The department also offers the master of science degree in hydrology, and a master of science and a Ph.D. in Oceanography (p. 144). A Ph.D. in Earth and environmental sciences is offered through the Natural Resources and Earth System Science Program (p. 125). Students may also pursue a graduate certificate in Ocean Mapping, offered in partnership with the Center for Coastal and Ocean Mapping. Graduate students in the department may conduct research with faculty members in the Department of Earth Sciences; the Institute for the Study of Earth, Oceans, and Space; and the Center for Coastal and Ocean Mapping.

The M.S. Geology option is intended for students with interests in petrology, mineralogy, structural geology, tectonics, geophysics, sedimentology, glacial geology, paleoclimate, glaciology, hydrogeology, stratigraphy, paleontology, low- or high-temperature geochemistry, and isotope geochemistry.

The M.S. Ocean Mapping option is intended for students with interests in hydrography and hydrographic survey technology.

The M.S. Geochemical Systems Specialization is intended for students with interests in all aspects of geochemistry: bedrock, sediment, water, ice, and air with particular emphasis on interpreting and modeling the interaction of these media (e.g., biogeochemistry, air quality, and climate change).

The M.S. in Hydrology is intended for students with interests in fluvial processes, global-scale hydrology, groundwater hydrology, hydroclimatology, surface-water hydrology, water quality, and quantitative hydrology.

Admission Requirements

An applicant to the M.S. program is expected to have completed one year of calculus and at least four semesters of college chemistry, physics, and/or biology; and to have an undergraduate degree or equivalent in geology, chemistry, physics, mathematics, engineering, or the biological sciences. Applicants must submit current scores (within five years) from the general test of the GRE. Students lacking some background in a

particular area may be admitted provided they are prepared to complete courses, without graduate credit, in which they may be deficient.

The program of study a student wishes to follow and the student's undergraduate major determine the level of preparation necessary. The preparation of each student is determined before the beginning of the first semester in residence in order to plan the course of study. Each entering student is assigned an academic adviser to assist in planning a program of study.

Degree Requirements

Students in the M.S. programs are required to complete the core curriculum for their respective areas and complete either the thesis or non-thesis option.

Students in the thesis option must satisfactorily complete at least 30 credits, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

<https://ceps.unh.edu/earth-sciences>

Programs

- Earth Sciences (M.S.) (p. 67)
- Earth Sciences: Geology (M.S.) (p. 67)
- Earth Sciences: Ocean Mapping (M.S.) (p. 68)
- Hydrology (M.S.) (p. 68)
- Ocean Mapping (Graduate Certificate) (p. 69)

Faculty

See <https://nextcatalog.unh.edu/graduate/programs-study/earth-sciences/> for faculty.

Earth Sciences (M.S.)

<https://ceps.unh.edu/earth-sciences/geochemical-systems-specialization-ms>

Description

The department of Earth Sciences offers a Master of Science degree with a specialization in Geochemical Systems. This program is intended for students with interests in all aspects of geochemistry: bedrock, sediment, water, ice, and air with particular emphasis on interpreting and modeling the interaction of these media (e.g., biogeochemistry, air quality, and climate change).

Requirements

Students in the thesis option must satisfactorily complete at least 30 credits, which include the credits accumulated in the core curriculum.

Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

Geochemical Systems Specialization

The core curriculum for the specialization in geochemical systems normally includes:

Code	Title	Credits
Select three of the following courses:		
ESCI 841	Geochemistry	9-12
ESCI 845	Isotope Geochemistry	
ESCI 847	Aqueous Geochemistry	
ESCI 852	Chemical Oceanography	
EOS/NR 844	Biogeochemistry	
Required Courses:		
ESCI 997	Seminar in Earth Sciences (first year)	
ESCI 998	Proposal Development (first year)	
Select Master's Thesis or Directed Research:		
ESCI 899	Master's Thesis	
ESCI 898	Directed Research	

Earth Sciences: Geology (M.S.)

<https://ceps.unh.edu/earth-sciences/geology-ms>

Description

This option is for students seeking a broad background in geology and also for those wishing to study one area in depth. These goals are accomplished through a set of common requirements, core courses and electives for a total of at least 30 credits (34 for non-thesis option). Most students who enter this program have undergraduate degrees in geology or earth sciences. Those with other majors may have to make up selected undergraduate courses.

Requirements

Students in the thesis option must satisfactorily complete at least 30 credits, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

Geology

The core curriculum for the option in geology normally includes:

Code	Title	Credits
Select at least three of the following courses:		
ESCI 826	Igneous and Metamorphic Petrology	11-12

ESCI #831	Geodynamics
ESCI 834	Geophysics
ESCI 835	Earthquakes and Faulting
ESCI 841	Geochemistry
ESCI 845	Isotope Geochemistry
ESCI 854	Sedimentology
ESCI 856	Geotectonics
ESCI 859	Geological Oceanography
ESCI 862	Glacial Geology
ESCI 866	Volcanology

Required Courses:

ESCI 997	Seminar in Earth Sciences (first year)
ESCI 998	Proposal Development (first year)

Select Master's Thesis or Directed Research:

ESCI 899	Master's Thesis
ESCI 898	Directed Research

Earth Sciences: Ocean Mapping (M.S.)

<https://ceps.unh.edu/earth-sciences/program/ms/ocean-mapping>

Description

A degree option in Ocean Mapping is for students who wish to prepare for careers in such areas as federal and institutional marine research, federal and international positions in hydrographic surveying, the environment, private sector offshore mineral resources exploration industries, and marine hardware and software development. The study of ocean mapping is a key niche in the ocean technology field.

Hydrography, in the context of this program, is the measurement and definition of the configuration of the bottoms and adjacent land areas of oceans, lakes, rivers, harbors, and other water areas, and the tides (or water levels) and currents that occur in those bodies of water. It includes elements of both physical oceanography, and surveying and mapping. Ocean mapping is a broader concept that includes not only the elements of hydrography, but also encompasses such topics as the geologic characterization of the seabed and the mapping of living resources and habitats.

More information about CCOM (Center for Coastal and Ocean Mapping), which oversees this degree program, can be found at <http://ccom.unh.edu/>.

Requirements

Students in the thesis option must satisfactorily complete at least 30 credits, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

Ocean Mapping

The core curriculum for the option in ocean mapping normally includes:

Code	Title	Credits
ESCI 858	Introduction to Physical Oceanography	
ESCI 859	Geological Oceanography	
ESCI 871	Geodesy and Positioning for Ocean Mapping	
ESCI 872	Applied Tools for Ocean Mapping	
ESCI 874	Integrated Seabed Mapping Systems	
ESCI 875	Fundamentals of Ocean Mapping II	
ESCI 972	Hydrographic Field Course	
MATH 831	Mathematics for Geodesy	

Required Courses:

ESCI 997	Seminar in Earth Sciences (first year)
ESCI 998	Proposal Development (first year)

Select Master's Thesis or Directed Research:

ESCI 899	Master's Thesis
ESCI 898	Directed Research

Students may fulfill the Category A (professional) International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO) Standards of Competence for Hydrographic Surveyors by completing some additional specialized requirements. For more information, please visit the Center for Coastal and Ocean Mapping website, www.ccom.unh.edu (<http://www.ccom.unh.edu>).

Hydrology (M.S.)

<https://ceps.unh.edu/earth-sciences/hydrology-ms>

Description

This program is intended for students with an interest in ground- and surface-water hydrology, water quality, quantitative and statistical hydrology, and water resource management. Durham, where the university is located, is situated where the Oyster River enters Great Bay, one of the most important estuaries of the Gulf of Maine. Only ten miles away are the Atlantic beaches and Portsmouth, a deep water harbor.

Requirements

Students in the thesis option must satisfactorily complete at least 30 credits, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

Hydrology

Code	Title	Credits
The core curriculum for the major in hydrology normally includes:		
ESCI 805	Principles of Hydrology	
ESCI 810	Groundwater Hydrology	

Required Courses:

ESCI 997	Seminar in Earth Sciences (first year)
ESCI 998	Proposal Development (first year)

Select Master's Thesis or Directed Research:

ESCI 899	Master's Thesis
ESCI 898	Directed Research

In each of the options listed above, additional electives are to be selected from 800- and 900-level courses in the department and/or from courses numbered 700 and above in related disciplines outside of the department (e.g., civil and environmental engineering, natural resources, chemistry, mathematics and statistics, and computer science). More detailed information is available from the department.

Ocean Mapping (Graduate Certificate)

<https://ccom.unh.edu/graduate-certificate>

Description

The program goal is to provide advanced graduate training to working professionals in the area of ocean mapping. These professionals will come from a variety of backgrounds ranging from Earth science, geology, and biology to engineering. The graduate certificate in ocean mapping is awarded for completion of the core courses and associated practicum. The graduate certificate program fulfills the Category A International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO/ICA) Standards of Competence for Hydrographic Surveyors.

For more information, please visit the ocean mapping website (<http://ccom.unh.edu/graduatecertificate>) or email info@ccom.unh.edu at the Center of Coastal and Ocean Mapping Joint Hydrographic Center.

Applying

Please visit the Graduate School website (<http://www.gradschool.unh.edu/php/posd.php?major=MW73>) for detailed instructions about applying to the certificate program.

Requirements

Required Courses

Code	Title	Credits
ESCI/OE 871	Geodesy and Positioning for Ocean Mapping	4
ESCI 872	Applied Tools for Ocean Mapping	2
MATH 831	Mathematics for Geodesy	3
ESCI/OE 874	Integrated Seabed Mapping Systems	4
ESCI/OE 875	Fundamentals of Ocean Mapping II	4
ESCI/OE 972	Hydrographic Field Course	4
OE 677	Seamanship and Marine Weather for Ocean Engineers and Scientists (for the optional Remote Sensing specialty)	P/ F
ESCI 896	Topics ¹	3
Total Credits		24

¹ Coastal Remote Sensing (3 cr) for the optional Remote Sensing specialty

Economics (ECON)

Degree Offered: Ph.D., M.A.

This program is offered in Durham.

Programs are offered through the Peter T. Paul College of Business and Economics.

The Department of Economics (hereafter the Department) at Paul College has two of the most distinctive graduate programs in the country. Our Master of Arts (M.A.) is an intensive, 10-month program that provides rigorous training in economic theory and applied econometrics. Students also pursue applied course work in International Economics, Environmental and Resource Economics, Health Economics, Data Analysis and Information Management, International Business, and History of Economic Thought. At the doctoral level, our program has a dual emphasis on developing both research economists and college teachers. Students learn economic theory and econometrics and can pursue course work and receive supervised training in the teaching of economics. Beyond its strengths in the fields of International Economics, Health Economics, and Environmental Economics, the department is known for its emphasis on the History of Economic Thought and Economic Methodology. The graduate programs draw on faculty from the Business, Natural Resources, Health Management and Policy, and Mathematics departments. The Department maintains a high quality weekly research seminar, which attracts leading economists and researchers from around the country.

Admission Requirements

In addition to requirements established by the Graduate School, applicants must submit current scores (within five years) from the general test of the Graduate Record Exam (GRE). The graduate programs seek students whose undergraduate experiences provide evidence of superior ability and promise of independent scholarship. At a minimum, undergraduate preparation should include undergraduate courses in economics at the intermediate level, as well as in calculus and statistics. Coursework in econometrics is strongly encouraged.

<https://paulcollege.unh.edu/economics>

Programs

- Economics (Ph.D.) (p. 69)
- Economics (M.A.) (p. 71)

Faculty

See <https://paulcollege.unh.edu/directory/all> for faculty.

Economics (Ph.D.)

<https://paulcollege.unh.edu/economics/program/phd/economics>

Description

Admission to the doctoral program is reserved for students who demonstrate exceptional promise in economics. Students pursue the Ph.D. for various reasons, including wanting to make research contributions to the field and to teach economics at the college level.

The doctoral program encourages students to develop research skills early on through an integrative research experience. A cornerstone of this experience is the department's weekly research seminar. Students participate in the seminar by writing critical reviews and referee reports on the papers presented, acting as discussants, and presenting their own research.

A distinctive feature of UNH's doctoral program is its dual emphasis on developing research economists and college teachers.

Cognate in College Teaching

The Ph.D. degree in economics from UNH is a research degree that provides students with a deep understanding of economic theory, institutions, and empirical analysis. Most graduates of the program move into faculty positions at other institutions of higher learning where teaching is an important component of their responsibilities.

In conjunction with the Graduate School's Teaching Excellence Program, the department has developed a nationally known program that provides formal training in pedagogy for students whose career goals include teaching at the college level. This program, called the Cognate in College Teaching, is an option that Ph.D. students may select in addition to the requirements of the doctoral degree (discussed above). The Cognate is a 13-credit program and is awarded, upon satisfaction of all requirements, concurrently with the Ph.D. The Cognate can only be awarded in conjunction with the Ph.D. and none of the course requirements of the Cognate can be substituted for those of the Ph.D.

To enter the program, a student must formally apply to the Graduate Dean after at least one year of full-time graduate studies in economics. Admission to the Cognate is decided by the graduate dean, based upon recommendations of the Economics Graduate Program Coordinator and the Teaching Excellence Program Director.

Requirements

The degree requirements include: nine core courses, two comprehensive theory exams, field courses, two fields of concentration (one major and the other minor), field and research workshops, a major field exam, doctoral dissertation proposal defense and final defense, and proficiency in one foreign language if deemed necessary by the student's dissertation chair. Candidacy is reached following successful completion of:

1. comprehensive theory examinations in microeconomics and macroeconomics;
2. exam in major field (health economics, environmental economics or international economics);
3. an advisor willing to chair the student's dissertation committee and a viable dissertation topic.

Code	Title	Credits
Core Courses		
ECON 976	Microeconomics I	3
ECON 977	Microeconomics II	3
ECON 972	Macroeconomics I	3
ECON 973	Macroeconomics II	3
ECON 970	Advanced Economic Theory	3
ECON 926	Econometrics I	3
ECON 927	Econometrics II	3
ECON 957	History of Economic Thought	3
ECON 958	Topics in Economic Thought and Methodology	3
Graduate Economics Seminar		
ECON 988	Graduate Economics Seminar ¹	
Research Workshop		
ECON 996	Research Workshop ²	
Comprehensive Examinations in Microeconomics and Macroeconomics		
Fields of Concentration (one major and one minor)		

¹ Students are required to sign up for the Graduate Economics Seminar in Terms 2, 3, and 4 during their first two years of study

² Beyond their second year of study, students continue to participate in the department's weekly seminar by enrolling in two terms of Research Workshop.

Comprehensive Examinations in Microeconomics and Macroeconomics

Written evidence of proficiency in economic theory is demonstrated by passing comprehensive examinations in Microeconomics and Macroeconomics. These examinations are given twice a year, after term III and at the end of June. Students should sit for *both* theory examinations after the third term of their second year of study. The Graduate Studies Coordinator conveys information regarding performance in writing. Departmental policy restricts the number of attempts at the comprehensive theory examinations to two per examination. If a student fails a theory comprehensive exam twice, the student may, in the case of extenuating circumstances, petition for a third attempt. The petition must be submitted within 4 weeks of the date that the department notifies the student of his or her second failure. A student who does not show up on a scheduled test date will have the examination counted as one of his or her attempts.

Fields of Concentration

Students must complete the requirements for one major field and one minor field. A student designates his or her major field during Field Workshop (ECON 992) and must have departmental approval to change the major field thereafter.

Environmental Economics

Code	Title	Credits
Major Field Requirements		
ECON 908	Environmental Economics: Theory and Policy	3
ECON 909	Environmental Valuation	3
RECO 911	Natural and Environmental Resource Management (or other approved course)	4
ECON 992	Field Workshop	3

Minor Field Requirements

Select two of the following: 6-7

ECON 908	Environmental Economics: Theory and Policy
ECON 909	Environmental Valuation
RECO 911	Natural and Environmental Resource Management

Health Economics

Code	Title	Credits
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Major Field Requirements

ECON 941	Survey of Health Economics	3
ECON 942	Selected Topics in Health Economics	3
ECON 992	Field Workshop	3
Select one of the following:		3

PHP 901	Epidemiology
PHP 907	Public Health Policy
PHP 922	Public Health Economics

Minor Field Requirements

ECON 941	Survey of Health Economics	3
ECON 942	Selected Topics in Health Economics	3

International Economics

Code	Title	Credits
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Major Field Requirements

ECON 945	International Trade	3
ECON 946	International Finance	3
ECON 992	Field Workshop	3
Select one of the following:		3

ADMN 846	International Financial Management
ECON 868	Seminar in Economic Development
ADMN 841	International Management

Minor Field Requirements

ECON 945	International Trade	3
ECON 946	International Finance	3

Examination in Major Field

Comprehensive field examinations are given twice a year, in January and June. Students should take their major field examination on the first date possible following the completion of Field Workshop (ECON 992). To sit for the field examination, students must have passed *both* of their theory comprehensive examinations. Students are permitted *two* attempts to pass the field examination. Petitions for a third attempt are possible, but must be submitted within 4 weeks of the date that the department notifies the student of his or her second failure. A petition is granted only in the case of extenuating circumstances. A student who does not show up on a scheduled test date will have the examination counted as one of his or her attempts.

Elective Course

Beyond the core theory courses and field requirements, students must take one additional graduate course from the department or an approved 800-level class from another department.

Graduate Economics Seminar

Students are required to sign up for the Graduate Economics Seminar (ECON 988) in Terms 2, 3, and 4 during their first two years of study.

Research Workshop

Beyond their second year of study, students continue to participate in the department's weekly seminar by enrolling in two terms of Research Workshop (ECON 996). Research Workshop students present their own research in the research seminar series. They may also serve as discussants for outside speakers and write referee reports for the papers presented. Students must secure a dissertation adviser prior to signing up for their first term of Research Workshop. The research-workshop requirement should be completed by the end of the fifth year of study.

Foreign Language Requirement

Students may need to demonstrate reading knowledge of one foreign language if it is determined to be essential to the student's area of research by his or her dissertation chair.

Dissertation Proposal Defense

Prior to defending his/her proposal, a student must find a dissertation chair and form a dissertation committee. The dissertation proposal may be defended as part of the Research Workshop or separately from the Workshop.

**Final Dissertation Defense
Cognate in College Teaching
Requirements**

The Cognate in College Teaching offers a series of core and elective courses to prepare individuals to teach at institutions of higher education. The Cognate is available to doctoral students and students in selected master's degree programs at UNH.

Students must apply and be formally admitted to the program. The Cognate appears as a minor on the student's transcript, and is awarded concurrently with the Ph.D. or Master's degree.

This program requires the satisfactory completion of 13 academic credits. Students elect, with the permission of their graduate coordinator, to add the cognate to their graduate degree. The cognate will be awarded at the time of the award of the qualifying graduate degree. Requirements include 12 credits toward developing core competencies and the submission of an electronic teaching portfolio for 1 credit. For more information please visit the Teaching Excellence web site: http://www.unh.edu/teaching-excellence/Academic_prog_in_coll_teach/index.html

Economics (M.A.)

<https://paulcollege.unh.edu/economics/program/ma/economics>

Description

The M.A. program in economics shares core economic theory and econometrics classes with the Ph.D. program. This coursework is considerably more rigorous than that typically found in stand alone M.A.

programs. Consequently, UNH's Master's students are exceptionally well trained.

The 10-month M.A. program is based on four terms, a 5-week (Term 1) and three 10-week terms (Terms 2-4). Classes run from the end of August through the end of May. The program consists of four components: the foundation (Term 1), the core (Term 2), concentrations and capstone experience (Terms 3 and 4). Students participate in weekly research seminars in Terms 2-4, where they are exposed to cutting-edge research presented by UNH faculty and scholars from around the country. The culminating experience for the program is a first-year research paper that students complete in Term 4. Students work closely with faculty members in conducting original research and completing their paper.

Requirements

Students must earn 36 credits to graduate, usually consisting of ten, 3-credit courses, plus 6 hours of graduate economics seminar.

Code	Title	Credits
The Foundation		
ECON 825	Mathematical Economics ¹	3
ECON 898	Economic Problems (Special Topics: Econometric Skills) *	
The Core ²		
ECON 976	Microeconomics I	3
ECON 972	Macroeconomics I	3
ECON 926	Econometrics I	3
Electives		
ECON 927	Econometrics II (or an approved skills course)	3
Field/elective courses ³		12
Graduate Economics Seminar		
ECON 988	Graduate Economics Seminar ⁴	6
Master's Paper		
ECON 979	Research Skills ⁵	3
Total Credits		36

* This course is not required, but strongly encouraged. It meets twice a week during Term 1. Students earn 2 credits.

¹ The course is offered in the five-week Term 1 and meets four days a week. The class provides the mathematical foundation needed in the Term 2 theory and econometric classes. Students earn 3 credits, the same as in the other terms.

² These courses enable students to advance to specialized areas in the third and fourth terms with a strong background in theory and econometrics.

³ Students may take a variety of economic electives or choose to specialize in an area such as international finance, environmental and resource economics, health economics, data analysis and information management, or international business. Up to two electives may be taken in courses offered outside of the department as substitutes for economics electives, subject to approval by the department. All elective courses must be at the 800 level or higher.

⁴ Students are required to register and participate in the Graduate Economics Seminar (ECON 988) in Terms 2, 3, and 4. No more than 6 credits can be counted toward the M.A. degree.

⁵ Students are required to take Research Skills (ECON 979), which will help them complete their first-year research paper. The paper is the capstone experience for the M.A. degree. Students conduct research under the direct supervision of a faculty member and present their work at the end of Term 4.

Education (EDUC)

Degrees Offered: Ph.D., Ed.S., M.Ed., M.A.T., Graduate Certificate

Programs are offered in Durham, Manchester, and online.

The Department of Education offers a variety of programs leading to the master's degree, the doctor of philosophy degree, and the education specialist degree. The department also offers six graduate certificate programs.

The master of arts in teaching is offered in secondary education. The master of education is offered in early childhood education (including an option in special needs), elementary education, secondary education, and special education. Special education certification is also available to those who complete the M.Ed. programs in elementary or secondary education or who complete the M.A.T. program in secondary education.

The M.Ed. in Educational Studies does not lead to certification and can be completed fully online.

The education specialist degree is offered in educational administration and supervision. The doctor of philosophy is offered in education.

The master of science for teachers is offered through the departments of chemistry, English, and mathematics. (See those departments for information.) Most programs are available to part-time admitted graduate students.

Graduate certificates are offered in Assessment, Evaluation and Policy; Autism Spectrum Disorder; Curriculum and Instructional Leadership; Mentoring Teachers; Special Education Administration; and Technology Integration

Admission Requirements

In addition to the materials required by the Graduate School, individual programs within the department may have additional admissions requirements. Applicants should refer to specific program descriptions. Consultation with a program faculty member is recommended. In all cases, the applicant's relevant experience, references, and professional goals will be considered in the admission process.

Action on applications to Department of Education programs varies by individual program. Applicants to this program must refer to the online Programs of Study listing for additional application instructions. This can be done by referring to the Graduate School's Admissions web page and then Application Requirements. The additional application instructions can be found under Requirements and Supplemental Documents.

<https://cola.unh.edu/education>

Programs

- Education (Ph.D.) (p. 73)
- Administration & Supervision (Ed.S.) (p. 74)

- Administration & Supervision Option in Leadership in Counseling (Ed.S.) (p. 75)
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Faculty

See <https://cola.unh.edu/education/faculty-staff-directory> for faculty.

Education (Ph.D.)

<https://cola.unh.edu/education/program/phd/education>

Description

The program of Education offers a Ph.D. in education with specialization in fields related to the areas of:

1. children and youth in communities;
2. curriculum and instruction/teacher education;
3. experiential/outdoor education;
4. leadership and policy studies

The doctoral program is designed to engender a broad understanding of the field of education by encouraging focused scholarly inquiry grounded in the reality of educational practice across varied formal and informal settings. Professors and students work to place educational issues in philosophical, socio-cultural, and policy-related contexts. The program enrolls full- and part-time students.

An individual program of study is planned by the student and her or his guidance committee. Each student's program includes a set of common core courses, specialized study, a number of selected electives from across areas of inquiry, and required research preparation. Students must meet specific University, department, and program requirements. Within this framework, individual programs can vary widely from student to student depending upon the student's own interests and goals.

The Ph.D. in education provides students with preparation for research, teaching, and leadership in a variety of settings. Graduates hold positions at all levels of schooling, from colleges and universities to K-12 schools. Former students are also involved in work as policy makers, community agency directors, consultants, and research analysts.

Program information: Please contact education department.

Admission

Students admitted to the program must have completed a master's degree in education or a related field and will normally have worked full time as an educator at the elementary, secondary, or college level. Entering students are expected to have completed some graduate-level coursework in educational psychology, curriculum and instruction, educational structure and change, and the philosophical and social foundations of education. Exceptional candidates who do not meet all of these course prerequisites will be considered. To apply, candidates must submit a Graduate School application, transcripts of all undergraduate and graduate coursework, and Graduate Record Examination (GRE) general test scores.

In addition to the personal statement required on the Graduate School application, candidates must submit an essay on an educational issue. This essay should discuss one issue in the field of education that is of interest to the candidate. It should explore the opportunities and challenges this issue poses and explain why the applicant finds it personally compelling (1,000 to 1,500 words in length).

Prior to completing and submitting the application, it is highly recommended that the candidate arrange for an on-campus interview with the director of doctoral studies or with an appropriate department faculty member. Applicants from distant locations may interview by phone. Contact the Department of Education by phone: (603) 862-2310 or email: education.department@unh.edu. (education.department@unh.edu)

Requirements

Degree Requirements

Candidates for the degree must meet admission requirements, develop and complete an approved program of study in consultation with their guidance committee, complete required coursework, undergo an annual assessment review by the Doctoral Advisory Committee (for first- and second-year students), pass a qualifying examination to advance to candidacy, establish a dissertation committee, develop an approved dissertation proposal, write and present the dissertation, and pass the final oral examination.

Program of Studies

Upon acceptance to the program, students are assigned an adviser. During the first year of study, students identify, either in consultation with their adviser or with the director of doctoral studies, faculty members to serve as their guidance committee. Programs for the doctoral degree in education are planned individually by students and their guidance committees. The program of study consists of four major elements: common core courses, specialization specific to the student's scholarly interests, a number of selected electives from across areas of inquiry, and research preparation, including specific advanced research modules.

Students typically complete **52 to 64** hours in graduate coursework following their matriculation. These hours do not include (EDUC 999 Doctoral Research).

At least five of the below common core courses are required of all students:

Code	Title	Credits
Required Common Core Courses		
EDUC 902	Doctoral Pro-seminar	4
EDUC 904	Qualitative Inquiry in Education	4
EDUC 905	Critical Inquiry in Education	4
EDUC 906	The Literature Review in Educational Research: Interdisciplinary Perspectives	4
EDUC 981	Quantitative Inquiry: Methods and Techniques of Educational Research	4
Pre-requisites for EDUC 981:		
EDUC 881	Introduction to Statistics: Inquiry, Analysis, and Decision Making	4
EDUC 978	Applied Regression Analysis in Educational Research	4
Specialization Areas and Requirements:		
Children and Youth in Communities		
Childhood Focus required courses:		
EDUC 941	Diversity and Child Development or HDFS 930 Child Development in Context	
EDUC 948	Leadership and Advocacy in Early Childhood Education	
EDUC 950	Research in Culture, Behavior, and Development	
RMP 970	Teaching Practicum	
Adolescent Focus required courses:		
EDUC 950	Research in Culture, Behavior, and Development	
EDUC 983	Advanced Psychology of Human Learning	
EDUC 985	Contemporary Issues and Theories in Human Learning and Development	
HDFS 950	Contemporary Issues in Adolescent Development	
EDUC 970	Foundations for Leadership in Higher Education	
Curriculum and Instruction/Teacher Education		
Select five courses from the following:		
EDUC 950	Research in Culture, Behavior, and Development	
EDUC 958	Analysis of Teaching and Learning	
EDUC 959	Issues in Education	
EDUC 960	Curriculum Development	
EDUC 983	Advanced Psychology of Human Learning	
EDUC 985	Contemporary Issues and Theories in Human Learning and Development	
EDUC 986	Philosophy of Education	
EDUC #990	Developmental Perspectives on Adulthood	
EDUC 991	Curriculum Theory I	
EDUC 992	Curriculum Theory II	
Experiential/Outdoor Education		
Select five courses from the following:		
EDUC 986	Philosophy of Education	
KIN 882	Therapeutic Applications of Adventure Programming	
KIN 883	Psych Factors of Adventure Ed	
KIN 884	Historical Foundations of Outdoor Experiential Education	
KIN 885	Program Models and Evaluation in Outdoor Education	

KIN 886	Organization and Administration of Outdoor Education Programs
KIN 895	Advanced Studies
KIN 897	Advanced Topics in Outdoor Education
KIN 998	Special Topics
Leadership and Policy Studies	
EDUC 964	Human Resources in Education
P-12 Focus required courses:	
EDUC 973	Policy, Politics, and Planning in Education
EDUC 977	Leadership: The District Level Administrator
Higher Education Focus required courses:	
EDUC 970	Foundations for Leadership in Higher Education
EDUC 976	Policy and Governance in Higher Education
Select a minimum of eight credits of elective coursework from the following:	
EDUC 951	Laws and Regulations Affecting the Education of Students with Disabilities
EDUC 959	Issues in Education
EDUC 962	Educational Finance and Business Management
EDUC 968	Collective Bargaining in Public Education
EDUC 967	School Law
EDUC #971	School Facilities Management
EDUC 897	Special Topics in Education (Topics: Students, the Law & Higher Education, and Faculty & Higher Education Law)

Integrative Coursework

Select two advanced inquiry education courses, courses in a different specialization, or courses taken in another department.

EDUC 979 Applied Multilevel Modeling
Methods courses in other UNH departments with permission of PhD director, e.g., psychology, sociology, economics, family studies.

Qualifying Examination

To be advanced to Ph.D. candidacy, students must satisfactorily complete qualifying examinations as well as other program requirements. After completing at least two-thirds of their coursework, students may take the qualifying examination. The examination is a written exam to be developed, supervised, and evaluated by the student's guidance committee. The qualifying examination is used to evaluate the student's general knowledge in relevant areas of inquiry, and his or her fitness for engaging in research, particularly in the subject proposed for the dissertation.

Dissertation

To complete the degree, the student must present and defend a dissertation of original research and publishable quality.

Administration & Supervision (Ed.S.)

<https://cola.unh.edu/education/program/eds/administration-supervision>

Description

This program, formerly the C.A.G.S. degree program, is designed for those who possess a master's degree in school administration or a master's degree in a related educational field. This program offers advanced preparation for those educators who desire careers as school superintendents, assistant superintendents, state department of education personnel, vocational education coordinators, curriculum coordinators, or educational personnel in private organizations. This program leads to certification as a superintendent in New Hampshire. It is possible to also receive certification as a principal under special circumstances.

Requirements

Code	Title	Credits
Core Requirements		
EDUC 964	Human Resources in Education	4
EDUC 968	Collective Bargaining in Public Education	4
EDUC #971	School Facilities Management	4
EDUC 973	Policy, Politics, and Planning in Education	4
EDUC 977	Leadership: The District Level Administrator	4
Electives		
Select eight credits in consultation with the program adviser ¹		8
Concluding Experience		
A student must complete a field internship and a significant field project in an approved administrative setting.		8
Total Credits		36

¹ A student who does not hold a master's degree in administration may be required to take specific courses as electives.

Administration & Supervision Option in Leadership in Counseling (Ed.S.)

<https://cola.unh.edu/education/program/eds/administration-supervision-option-leadership-counseling>

Description

The Education Specialist degree (Ed.S.) option in Leadership in Counseling requires a minimum of thirty-six (36) credits in counseling and administration coursework. The program is designed to meet the requirements for certification by the New Hampshire State Department of Education for Guidance and Counseling Director. Certification has not yet been approved by the New Hampshire State department of Education. Graduate students interested in New Hampshire certification must discuss this option with the faculty advisor prior to starting the program.

Admission Requirements

Applicants to the program must possess a master's degree in counseling and hold certification as a school counselor. The applicant must also have completed a minimum of three years of paid service with progressively responsible experience in the field of school guidance and counseling, with recent leadership experience.

Course Credits

The option in Leadership and Counseling requires a minimum of 36 credits. However, if prerequisites listed below have not been met prior to admission to the program, the total number of credits may exceed the minimum of 36 credits.

Requirements

Prerequisites

Code	Title	Credits
The following three courses, or their equivalents, must be completed before the required courses can be taken:		
EDUC 919	Counseling Practicum: Professional and Ethical Orientation	4
EDUC 932	Society and Culture: Contemporary Issues in Counseling	4
EDUC 933	Developmental Models of Comprehensive School Guidance	4
Total Credits		12

Requirements

Code	Title	Credits
Required Courses		
EDUC 964	Human Resources in Education	4
EDUC 967	School Law	4
EDUC 972	Introduction to Educational Evaluation	4
EDUC 973	Policy, Politics, and Planning in Education	4
EDUC 977	Leadership: The District Level Administrator	4
EDUC 974/975	Educational Administrative Internship ¹	4
Electives		
Select eight credits (approval of advisor) ²		8
Total Credits		32

¹ Ed.S. students in the Leadership in Counseling Option will have specific requirements associated with their certification requirements incorporated into their internship. The internship will be conducted at the district office level or at the school level with a practicing Director of Counseling.

² If the admitted student has met the prerequisites stated above, she/he must select at least two electives/8 graduate credits that the advisor for the program has approved. If the student needs to complete prerequisites up to two of the prerequisite courses can be used as the elective course consistent with Graduate School policies. Other acceptable electives include courses in counseling, administration (e.g., EDUC 968 Collective Bargaining in Public Education), and special education (e.g., EDUC 951 Laws and Regulations Affecting the Education of Students with Disabilities).

Secondary Education (M.A.T.)

<https://cola.unh.edu/education/program/mat/secondary-education>

Description

The Secondary Education program provides certification and an M.A.T. degree for those who wish to teach in secondary schools.

What is the difference between an M.Ed. and the M.A.T in Secondary Education? The M.A.T. requires that at least three graduate-level courses be in an area of subject matter concentration rather than in education.

The basic program to achieve these ends is the five-year program in which students begin preparation for teaching at the undergraduate level with a semester of field experience and professional course work in education. Students complete a baccalaureate degree outside of education and move into a fifth year of study and full-year internship which lead to either the M.Ed. or M.A.T. degree and licensure for teaching. Students who have already completed a baccalaureate degree may also enter the teacher preparation program at the graduate level. With no prior course work in education, these programs will normally require two years to achieve licensure and a degree.

Admission Criteria

In determining admission of students to teacher education graduate programs, several criteria are used:

1. The undergraduate record. The undergraduate overall minimum grade point average for admission is 3.0. The undergraduate grade point average of students admitted to the graduate programs in teacher education is approximately 3.52 (based on 2016 admissions).
2. Positive recommendations from EDUC 500, Exploring Teaching, EDUC 935A or the equivalent and from those able to relay information about a candidate's performance in teaching situations or related areas.
3. Praxis Core Academic Skills for Educators (Core) exam scores are required. Applicants must obtain, at a minimum, a qualifying score (as set by the state of New Hampshire at the time of testing) on all three (Reading, Writing, and Mathematics) Core exams in order to be considered for admission. Current NH qualifying scores may be found at the ETS Praxis Website (<https://www.ets.org/praxis/nh/requirements>) under the "Tests required for all licensure areas" page.
4. Additional required application materials can be found at <http://www.gradschool.unh.edu/php/pos.php> under programs.

Requirements

The M.A.T. degree requires a minimum of 32 hours of graduate-level credits. The exact number of credit hours will depend on the student's academic background, competencies, and professional goals, and will be determined by the adviser.

Any Education course taken for a teacher licensure requirement must be completed with a grade of **B-** or better. This applies to any courses from other departments that have been designated as equivalent to an Education course.

Code	Title	Credits
Core Requirements		
EDUC 500 or EDUC 935A	Exploring Teaching Seminar and Practicum in Teaching	4
EDUC 800	Educational Structure and Change	4
EDUC 801	Human Development and Learning: Educational Psychology	4

EDUC 805	Contemporary Educational Perspectives	4
EDUC 807	Teaching Reading through the Content Areas (807 is required for licensure in Art, Biology, Chemistry, Earth Science, General Science, Physics, and Social Studies)	2
EDUC 851B	Educating Exceptional Learners: Secondary Subject Field Curriculum Methods Course(s) (for example, EDUC 791/ EDUC 891 Methods of Teaching Secondary School Science)	4
EDUC 900A	Internship and Seminar in Teaching (Fall semester)	3 1
		or 6
EDUC 901A	Internship and Seminar in Teaching (Spring semester)	3
		or 6

- ¹
- In addition to the 12 credit internship, three graduate level courses (9-12 credits) must be in the subject area concentration. The remaining credits can be in Education or another department.
 - The number of credits for EDUC 900A and EDUC 901A will be determined by the advisor based on professional goals

Early Childhood Education (M.Ed.)

<https://cola.unh.edu/education/program/med/early-childhood-education>

Description

The Department of Education offers the master of education degree in early childhood education and an option in special needs. When completed in conjunction with a degree, certification is available as an early childhood teacher (PreK - 3rd). Certification requirements are additional to the master's degree but may be completed as electives for the degree. This program is an advanced course of study designed for teachers, administrators, and other early childhood practitioners who wish to improve their professional competence and broaden their career opportunities. The program emphasizes the acquisition of knowledge and competencies in child development (birth through eight years), learning environments, developmentally appropriate curriculum, developmental and cultural diversity, and professional leadership. The coursework culminates in extensive field-based experience.

Admission Requirements

All admitted students are expected to have had at least one course in child development at the upper division level and at least 200 hours of supervised classroom experience with children from birth through eight years of age, or the equivalent.

Admission Criteria

In determining admission of students to teacher education graduate programs, several criteria are used:

1. The undergraduate record. The undergraduate overall minimum grade point average for admission is 3.0. The undergraduate grade point average of students admitted to the graduate programs in teacher education is approximately 3.52 (based on 2016 admissions).
2. Praxis Core Academic Skills for Educators (Core) exam scores are required. Applicants must obtain, at a minimum, a qualifying score (as set by the state of New Hampshire at the time of testing) on all three (Reading, Writing, and Mathematics) Core exams in order to

be considered for admission. Current NH qualifying scores may be found at the ETS Praxis Website (<https://www.ets.org/praxis/nh/requirements>) under the "Tests required for all licensure areas" page.

- Additional required application materials can be found at <http://www.gradschool.unh.edu/php/pos.php> under programs.

Requirements

Credit Hours

The M.Ed. degree requires a minimum of 36 hours of graduate-level credits. The exact number of credit hours will depend on the student's background, competencies, and professional goals, and will be determined by the adviser.

Code	Title	Credits
Core Requirements		
EDUC 861	Inclusive Curriculum for Young Children with Special Needs	4
EDUC 941	Diversity and Child Development	4
EDUC 942	Socio-cultural Perspectives on Teaching and Learning	4
EDUC 948	Leadership and Advocacy in Early Childhood Education	4
Special Needs Requirement; (Select one of the following):		4
EDUC 856	Supporting Families of Individuals with Exceptionalities	
EDUC 860	Introduction to Young Children with Special Needs	
EDUC 862	Curriculum for Young Children with Special Needs: Evaluation and Program Design	
Internship Requirements:		
EDUC 900B	Internship and Seminar in Early Childhood Education	3
EDUC 901B	Internship and Seminar in Early Childhood Education	3
Electives		
Selected in consultation with the program adviser based on interest or certification requirements.		10
Concluding Experience		
All degree candidates must successfully complete two concluding experiences.		
Select one of the following:		
Comprehensive written and oral exam		
Research Thesis		
Graduation Portfolio		
Total Credits		36

Early Childhood Education: Special Needs (M.Ed.)

<https://cola.unh.edu/education/program/med/early-childhood-education-special-needs>

Description

The Department of Education offers the master of education degree in early childhood education with an option in special needs. When completed in conjunction with a degree, certification is available as an early childhood special education teacher (birth through eight years). Certification requirements are additional to the master's degree but may be completed as electives for the degree.

This program is an advanced course of study designed for teachers, administrators, and other early childhood practitioners who wish to improve their professional competence and broaden their career opportunities. The program emphasizes the acquisition of knowledge and competencies in child development (birth through eight years), learning environments, developmentally appropriate curriculum, developmental and cultural diversity, and professional leadership. The coursework culminates in extensive field-based experience.

Admission Requirements

All admitted students are expected to have had at least one course in child development at the upper division level and at least 200 hours of supervised classroom experience with children from birth through eight years of age, or the equivalent.

In addition to the early childhood core requirements described above, students choosing this option will concentrate on young children who are at risk for, or have, developmental difficulties and special needs. Coursework emphasizes an understanding of the role of the family, community, and social policy in early development and intervention. The program is non categorical in its approach to assessment and educational planning.

Admission Criteria

In determining admission of students to teacher education graduate programs, several criteria are used:

- The undergraduate record. The undergraduate overall minimum grade point average for admission is 3.0. The undergraduate grade point average of students admitted to the graduate programs in teacher education is approximately 3.52 (based on 2016 admissions).
- Praxis Core Academic Skills for Educators (Core) exam scores are required. Applicants must obtain, at a minimum, a qualifying score (as set by the state of New Hampshire at the time of testing) on all three (Reading, Writing, and Mathematics) Core exams in order to be considered for admission. Current NH qualifying scores may be found at the ETS Praxis Website (<https://www.ets.org/praxis/nh/requirements>) under the "Tests required for all licensure areas" page.
- Additional required application materials can be found at <http://www.gradschool.unh.edu/php/pos.php> under programs.

Requirements

Credit Hours

The M.Ed. degree requires a minimum of 36 hours of graduate-level credits. The exact number of credit hours will depend on the student's background, competencies, and professional goals, and will be determined by the adviser.

Code	Title	Credits
Core Requirements		
EDUC 861	Inclusive Curriculum for Young Children with Special Needs	4
EDUC 941	Diversity and Child Development	4
EDUC 942	Socio-cultural Perspectives on Teaching and Learning	4
EDUC 948	Leadership and Advocacy in Early Childhood Education	4
Internship Requirements		
EDUC 900B	Internship and Seminar in Early Childhood Education	3
EDUC 901B	Internship and Seminar in Early Childhood Education	3
Additional Special Needs Requirements		
EDUC 860	Introduction to Young Children with Special Needs	4
EDUC 862	Curriculum for Young Children with Special Needs: Evaluation and Program Design	4
EDUC 856	Supporting Families of Individuals with Exceptionalities	4
Electives		
Selected in consultation with the program adviser based on interest and certification requirements		2-8
Concluding Experience		
A degree candidate must successfully complete two concluding experiences.		
Select one of the following:		
Comprehensive written and oral examination		
Research thesis		
Graduation Portfolio		
Total Credits		36-42

Educational Studies (M.Ed.)

<https://cola.unh.edu/education/program/med/educational-studies>

Description

The Master of Education in Educational Studies is a master's degree program that can be completed fully or partially online. It is designed for educators who wish to expand their knowledge of education, improve their educational practice, and positively impact public and private schools. The M.Ed. is also intended to provide a foundation in educational studies for individuals broadly interested in education in a variety of settings, including business, educational and research centers, and national and state agencies. The program provides a context in which participants can develop tools of inquiry to investigate questions about teaching, mentoring, learning and school reform, and to inspire others to work toward educational change. This program does not lead to a teaching or administrative credential.

The 30 – 32 credit program is structured around a knowledge and application core (12 credits) that includes a course on contemporary issues in education, a course on the analysis of teaching, mentoring and learning, and a course on educational research methods. Program participants will also complete four electives (14 - 16 credits), designed to provide depth or breadth to their course of study. Finally, program

participants will complete an inquiry project course in which they develop a literature review on an educational issue of their choice, conduct research, and present their findings in the context of the course (4 credits). The program includes flexible options for study, including a fully online option.

Applying

Please visit the Graduate School website (<http://www.gradschool.unh.edu>) for detailed instructions about applying to the program.

Requirements

Code	Title	Credits
Core Required Courses		
EDUC 959	Issues in Education	4
EDUC 958	Analysis of Teaching and Learning	4
EDUC 882	Introduction to Research Methods	4
Elective Courses		
Select a set of four elective courses ¹		14-16
Concluding Experience Course		
EDUC 884	Educators as Researchers	4
Total Credits		30-32

¹ Program participants choose a set of four elective courses in consultation with their advisor, reflecting their personal, professional, and academic interests, needs, and goals. The electives are intended to provide breadth and depth to each participant's course of study. At least two electives must be courses in the Education Department at UNH (8 credits). The other two elective courses may be taken in education, another department at UNH, or another approved institution with the appropriate permission and consistent with Graduate School transfer credit policies (6 – 8 credits, depending on school / department). Electives can be online, hybrid, or face-to-face courses.

Elementary Education (M.Ed.)

<https://cola.unh.edu/education/program/med/elementary-education>

Description

The Elementary Education program provides an M.Ed. degree and leads to certification for those who wish to teach in elementary schools. The basic program to achieve these ends is the five-year program in which students begin preparation for teaching at the undergraduate level with a semester of field experience and professional course work in education. Students complete a baccalaureate degree outside of education and move into a fifth year of study and full-year internship which lead to either the M.Ed. degree and licensure for teaching. Students who have already completed a baccalaureate degree may also enter the teacher preparation program at the graduate level. With no prior course work in education, these programs will normally require two years to achieve licensure and a degree.

Admission Criteria

In determining admission of students to teacher education graduate programs, several criteria are used:

1. The undergraduate record. The undergraduate overall minimum grade point average for admission is 3.0. The undergraduate grade point average of students admitted to the graduate programs in teacher education is approximately 3.52 (based on 2016 admissions).
2. Positive recommendations from EDUC 500 Exploring Teaching, EDUC 935A Seminar and Practicum in Teaching or the equivalent and from those able to relay information about a candidate's performance in teaching situations or related areas.
3. Praxis Core Academic Skills for Educators (Core) exam scores are required. Applicants must obtain, at a minimum, a qualifying score (as set by the state of New Hampshire at the time of testing) on all three (Reading, Writing, and Mathematics) Core exams in order to be considered for admission. Current NH qualifying scores may be found at the ETS Praxis Website (<https://www.ets.org/praxis/nh/requirements>) under the "Tests required for all licensure areas" page.
4. Additional required application materials can be found at <http://www.gradschool.unh.edu/php/pos.php> under programs.

Requirements

The M.Ed. degree requires a minimum of 32 hours of graduate-level credits. The exact number of credit hours will depend on the student's academic background, competencies, and professional goals, and will be determined by the adviser.

Any Education course taken for a teacher licensure requirement must be completed with a grade of **B-** or better. This applies to any courses from other departments that have been designated as equivalent to an Education course.

Core Requirements

Code	Title	Credits
EDUC 500 or EDUC 935A	Exploring Teaching Seminar and Practicum in Teaching	4
EDUC 800	Educational Structure and Change	4
EDUC 801	Human Development and Learning: Educational Psychology	4
EDUC 803F	Teaching Elementary School Science	4
EDUC 803M	Teaching Elementary Social Studies	4
EDUC 805	Contemporary Educational Perspectives	4
EDUC 806	Introduction to Reading in the Elementary School	4
MATH 801 or MATH 601	Exploring Mathematics for Teachers I Exploring Mathematics for Teachers I	3
EDUC 808	Literacy Assessment for Elementary Classroom Teachers	4
Must be taken concurrently with EDUC 900A		
EDUC 809	Supporting Readers in Elementary Classrooms	4
Must be taken concurrently with EDUC 901A		
EDUC 841	Exploring Mathematics with Young Children	4
EDUC 851A	Educating Exceptional Learners: Elementary	4
EDUC 900A	Internship and Seminar in Teaching (Fall semester)	4

EDUC 901A	Internship and Seminar in Teaching (Spring semester)	4
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1.
 - EDUC 808 must be taken concurrently with EDUC 900A. EDUC 808 must be taken concurrently with EDUC 809.
 - Note: All coursework listed above must be completed, therefore some students may exceed the minimum credit requirement while completing the required coursework. A culminating project is required in EDUC 809.

Secondary Education (M.Ed.)

<https://cola.unh.edu/education/program/med/secondary-education>

Description

The Secondary Education program provides certification and an M.Ed. degree for those who wish to teach in secondary schools.

What is the difference between an M.Ed. and the M.A.T in Secondary Education? The M.A.T. requires that at least three graduate-level courses be in an area of subject matter concentration rather than in education.

The basic program to achieve these ends is the five-year program in which students begin preparation for teaching at the undergraduate level with a semester of field experience and professional course work in education. Students complete a baccalaureate degree outside of education and move into a fifth year of study and full-year internship which lead to either the M.Ed. or M.A.T. degree and licensure for teaching.

Admission Criteria

In determining admission of students to teacher education graduate programs, several criteria are used:

1. The undergraduate record. The undergraduate overall minimum grade point average for admission is 3.0. The undergraduate grade point average of students admitted to the graduate programs in teacher education is approximately 3.52 (based on 2016 admissions).
2. Positive recommendations from EDUC 500 Exploring Teaching, EDUC 935A Seminar and Practicum in Teaching or the equivalent and from those able to relay information about a candidate's performance in teaching situations or related areas.
3. Praxis Core Academic Skills for Educators (Core) exam scores are required. Applicants must obtain, at a minimum, a qualifying score (as set by the state of New Hampshire at the time of testing) on all three (Reading, Writing, and Mathematics) Core exams in order to be considered for admission. Current NH qualifying scores may be found at the ETS Praxis Website (<https://www.ets.org/praxis/nh/requirements>) under the "Tests required for all licensure areas" page.
4. Additional required application materials can be found at <http://www.gradschool.unh.edu/php/pos.php> under programs.

Requirements

The M.Ed. degree requires a minimum of 32 hours of graduate-level credits. The exact number of credit hours will depend on the student's academic background, competencies, and professional goals, and will be determined by the adviser.

Any Education course taken for a teacher licensure requirement must be completed with a grade of **B-** or better. This applies to any courses

from other departments that have been designated as equivalent to an Education course.

Code	Title	Credits
EDUC 500	Exploring Teaching	4
or EDUC 935A	Seminar and Practicum in Teaching	
EDUC 800	Educational Structure and Change	4
EDUC 801	Human Development and Learning: Educational Psychology	4
EDUC 805	Contemporary Educational Perspectives	4
EDUC 807	Teaching Reading through the Content Areas ¹	2
EDUC 851B	Educating Exceptional Learners: Secondary	4
Subject Field Curriculum Methods Course(s) ²		
EDUC 900A	Internship and Seminar in Teaching (Fall semester) ³	3 or 6
EDUC 901A	Internship and Seminar in Teaching (Spring semester) ³	3 or 6
Degree (Minimum of 32 Graduate credits)		

- ¹ Required for licensure in Art, Biology, Chemistry, Earth Science, General Science, Physics, and Social Studies.
- ² For example, EDUC 791 Methods of Teaching Secondary Science/EDUC 891 Methods of Teaching Secondary Science
- ³ In addition to the 12 credit internship, 10 graduate credits must be UNH Education courses. The remaining credits can in Education or another department.
The number of credits for EDUC 900A Internship and Seminar in Teaching and EDUC 901A Internship and Seminar in Teaching will be determined by the advisor based on professional goals.

Special Education (M.Ed.)

<https://cola.unh.edu/education/program/med/special-education>

Description

The special education program prepares highly qualified educators who possess the knowledge, disposition, and skills necessary to take the lead in establishing effective teaching and learning environments for a diverse population of learners, who are capable of collaborating with classroom teachers as team leaders or consultants, and who utilize these skills within their school communities, and within the profession itself. The program meets current certification requirements in the state of New Hampshire in General Special Education, intellectual and developmental disabilities, and Special Education Administration.

Admission Criteria

In determining admission of students to teacher education graduate programs, several criteria are used:

1. The undergraduate record. The undergraduate overall minimum grade point average for admission is 3.0. The undergraduate grade point average of students admitted to the graduate programs in teacher education is approximately 3.52 (based on 2016 admissions).
2. Praxis Core Academic Skills for Educators (Core) exam scores are required. Applicants must obtain, at a minimum, a qualifying score (as set by the state of New Hampshire at the time of testing) on all

three (Reading, Writing, and Mathematics) Core exams in order to be considered for admission. Current NH qualifying scores may be found at the ETS Praxis Website (<https://www.ets.org/praxis/nh/> requirements) under the "Tests required for all licensure areas" page.

3. Additional required application materials can be found at <http://www.gradschool.unh.edu/php/pos.php> under programs.

Requirements

Degree Requirements

Prerequisites for General Special Education Certification

1. All candidates are required to complete a course in mathematics teaching methods and a course in reading teaching methods. At UNH, courses that meet the requirements are EDUC 806 Introduction to Reading in the Elementary School and EDUC 907 Foundations of Literacy Instruction. Courses that meet the mathematics requirement are MATH 601 Exploring Mathematics for Teachers I and EDUC 741 Exploring Mathematics with Young Children. Equivalent courses taken at another college or university may be substituted.
2. All students are required to complete EDUC 850 Introduction to Exceptionality, and EDUC 851A Educating Exceptional Learners: Elementary, or EDUC 851B Educating Exceptional Learners: Secondary. Equivalent courses taken at another college or university may be substituted.
3. Credits for prerequisite courses will not count toward those needed for the M.Ed. degree.

Required Courses for All Students

The M.Ed. degree requires a minimum of **36** hours of graduate-level credits. The exact number of credit hours will depend on the student's background, competencies, and professional goals, and will be determined by the adviser.

Code	Title	Credits
Core Courses (12 credits)		
EDUC 856	Supporting Families of Individuals with Exceptionalities ¹	4
EDUC 882	Introduction to Research Methods (or equivalent)	4
EDUC 938	Advanced Seminar in Special Education	4
or EDUC 959	Issues in Education	
Elective Courses (24 credits)		
Students will elect a minimum of 24 graduate credits in consultation with their academic advisor. ²		
Concluding Experience ³		
All students will have the option of one of two concluding experiences:		
Research project with a defense, or		
EDUC 899	Master's Thesis	6-10
Additional requirements for students seeking certification		
EDUC 900C	Internship and Seminar in Special Education	3 or 6
EDUC 901C	Internship and Seminar in Special Education	3 or 6
EDUC 939	Assessment and Teaching of Children with Learning Difficulties	4

EDUC 940	Assessment and Teaching of Children with Learning Difficulties	4
1	Students need to take EDUC 856 Supporting Families of Individuals with Exceptionalities only if they didn't take EDUC 756 Supporting Families of Individuals with Exceptionalities during undergraduate.	
2	Students will select elective courses in consultation with their advisor. At most, 4 credit hours of EDUC 899 Master's Thesis, may count as elective work. Other courses may be included on recommendation from the advisor.	
3	The research thesis meet the requirements of the Graduate School and the Education department. Requirements for the thesis are explained in the Graduate School publication entitled Thesis and Dissertation Manual. Which can be found at www.gradschool.unh.edu (http://www.gradschool.unh.edu). Requirements for the project may be obtained from the adviser or on the program website.	

Concluding Experience

All students will have the option of one of two concluding experiences:

1. Research project with a defense, or
2. A research thesis (EDUC 899) that meets the requirements of the Graduate School and the Education Department (6-10 credits).

Requirements for the thesis are explained in the Graduate School publication entitled Thesis and Dissertation Manual. Requirements for the project may be obtained from the advisor.

Optional Certifications

Optional additional certifications are available in Intellectual and Developmental Disabilities Certification, and Special Education Administration Certification.

Intellectual and developmental disabilities certification

In addition to the coursework necessary for the M.Ed. and certification in General Special Education, those wishing to obtain additional certification in Intellectual and Developmental Disabilities should take the following courses:

Code	Title	Credits
Core Courses		
EDUC #854	Contemporary Issues of Developmental Disabilities	4
EDUC #855	Facilitating Social Understanding and Relationships for Students with Disabilities	2
EDUC 876	Reading for Learners with Special Needs	4
EDUC #952	Inclusive Assessment, Curriculum, Instruction, and Communication Supports	4
EDUC 954		
EDUC 956	Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors	4
EDUC 914	Seminar in Reading Research	4

Special Education Administration Certification

In addition to the coursework necessary for the M.Ed. and certification in General Special Education, those wishing to obtain additional certification in Special Education Administration should take the following courses:

Code	Title	Credits
Core Courses		
EDUC 951	Laws and Regulations Affecting the Education of Students with Disabilities	4
EDUC 956	Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors	4
EDUC #961	Public School Administration	4
EDUC 962	Educational Finance and Business Management	4
EDUC 964	Human Resources in Education	4
EDUC 974	Educational Administrative Internship	4

Grades

Graduate credit is normally granted only for coursework completed with a grade of B- or higher. Any grade below B- will not count for graduate credit and will count toward the accumulation of nine (9) failing credits which may require the student to withdraw from the program.

Assessment, Evaluation and Policy (Graduate Certificate)

<https://cola.unh.edu/education/program/certificate/assessment-evaluation-policy>

Description

The Certificate in Assessment, Evaluation, and Policy provides the skills and knowledge to design, develop, implement, and analyze a broad range of assessment systems; evaluate teaching, learning and educational programming; and develop multiple strategies to synthesize, share, and use data for decision-making purposes.

Embedded in each of the courses is an emphasis on the role of broader policy contexts in assessment, evaluation, and decision-making. The intended audience of this certificate includes professionals in education and related fields (e.g., psychology, social work, family studies, and nonprofit management) such as teachers, administrators, district office staff, museum educators, policymakers, consultants, among others. This post-baccalaureate certificate can be completed in roughly one and a half years through completion of five four-credit courses.

Requirements

Code	Title	Credits
Required Courses		
EDUC 885	Introduction to Assessment	4
EDUC 886	Issues in Assessment: Historical Contexts, Perennial Dilemmas, Current Trends	4
EDUC 972	Introduction to Educational Evaluation	4
EDUC 998	Special Topics (Evidence, Data and Decision-Making)	4
Electives		
Select one of the following:		4
EDUC 881	Introduction to Statistics: Inquiry, Analysis, and Decision Making	
EDUC 882	Introduction to Research Methods	
EDUC 884	Educators as Researchers	

EDUC 904	Qualitative Inquiry in Education
EDUC 958	Analysis of Teaching and Learning
EDUC 959	Issues in Education
EDUC 978	Applied Regression Analysis in Educational Research

Autism Spectrum Disorder (Graduate Certificate)

<https://cola.unh.edu/education/program/certificate/autism-spectrum-disorder>

Description

This program will serve the professional development needs of a wide variety of individuals, including:

1. parents of children with ASD;
2. special and general education teachers and administrators; speech-language pathologists, occupational therapists, behavioral consultants, recreation therapists; and
3. graduate students in other University majors such as sociology or psychology.

For more information please visit the Autism Spectrum Disorder website (<http://cola.unh.edu/education/program/autism-spectrum-disorders-certificate>).

Applying

Please visit the Graduate School website (<http://www.gradschool.unh.edu>) for detailed instructions about applying to the certificate program.

Requirements

The coursework for the graduate certificate consists of 13-15 credits from the following required and elective course offerings. Highly qualified individuals may petition for permission to waive a required course. Applicants are urged to schedule an appointment with the program coordinators to develop their individualized course of study. Applications for graduate certificates are available through the Graduate School website. (<http://www.gradschool.unh.edu/pbacc.html>)

Code	Title	Credits
Required Courses		
EDUC 857	Contemporary Issues in Autism Spectrum Disorders	4
COMM 916	Autism Spectrum Disorders	3
Electives 6-8		
Select two of the following based on individual advising: ¹		
EDUC #853	Contemporary Issues in Behavioral Disabilities	4
EDUC #854	Contemporary Issues of Developmental Disabilities	4
EDUC #855	Facilitating Social Understanding and Relationships for Students with Disabilities	2
EDUC #952	Inclusive Assessment, Curriculum, Instruction, and Communication Supports	4

EDUC 956	Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors	4
OT courses in Assistive Technology including:		
OT 822	Introduction to Assistive Technology	4
OT 826	Assistive Technology and Sensory, Communicative, and Cognitive Disabilities	4
COMM 914	Augmentative and Alternative Communication	3-4
HDFS 897	Special Topics (Impact of Autism on the Family)	1-4

Curriculum and Instructional Leadership (Graduate Certificate)

<https://cola.unh.edu/education/program/certificate/curriculum-instructional-leadership>

Description

This program provides the skills and knowledge for educators to understand curriculum and instruction and to lead educational programs at the school and district office level. It is comprised of curriculum, supervision, instruction, and data analysis components.

Applying

Applicants must have a minimum of five years of successful teaching experience or administrative experience. Please visit the Graduate School website for detailed instructions about applying to the certificate program.

Requirements

Required Courses

A minimum of five courses (20 credits) is required for this Graduate Certificate; at least 16 credits must be completed after admission to the program.

Code	Title	Credits
EDUC 953	Seminar in Curriculum Study (or an equivalent course)	4
Select one course from each of the following four strands		16
Curriculum:		
EDUC 960	Curriculum Development	
EDUC 991	Curriculum Theory I	
EDUC 992	Curriculum Theory II	
Supervision of Instruction:		
EDUC 965	Educational Supervision and Evaluation	
EDUC 957	Collaborative Models of Teaching, Learning, and Leading	
Instruction:		
EDUC 958	Analysis of Teaching and Learning	
Data Analysis:		
EDUC 881	Introduction to Statistics: Inquiry, Analysis, and Decision Making	
EDUC 885	Introduction to Assessment	

EDUC 972	Introduction to Educational Evaluation	
Total Credits		20

With the approval of their advisor and the Division, students may make modifications to the Graduate Certificate's course of study.

Mentoring Teachers (Graduate Certificate)

<https://cola.unh.edu/education/program/certificate/mentoring-teachers>

Description

The Teacher Education Program works with approximately 150 "cooperating teachers" and more than 25 supervisors each year in its full-year internship program. Mentoring is a crucial element in the preparation of effective teachers, as well as in the transition from teacher preparation programs to the first years of teaching. The N.H. Department of Education has also recognized the need for mentoring early-career public school teachers in its "Induction Through Mentoring Projects." The UNH Department of Education proposes to offer a graduate certificate program in mentoring teachers to help advance the preparation of professionals in the field. For more information please visit the Mentoring Teachers website (<http://cola.unh.edu/education/program/mentoring-teachers-certificate>).

This certificate is designed to serve:

- Experience teachers interested in the mentoring and the professional development of new teachers.
- Experience teachers interested in preparing for leadership positions that require mentoring skills.
- Experience teachers interested in exploring a graduate program in education by first earning a graduate certificate.

Applying

Please visit the Graduate School website (<http://www.gradschool.unh.edu>) for detailed instructions about applying to the certificate program.

Requirements

The program of study required for the certificate consists of four required courses and a total of 16 credit hours. The program focuses on the development of mentoring skills that draw upon:

1. models of adult development;
2. approaches to effective teaching;
3. an understanding of teacher supervision and assessment; and
4. strategies for problem solving, conflict resolution, and communication.

Code	Title	Credits
EDUC 957	Collaborative Models of Teaching, Learning, and Leading	4
or EDUC 965	Educational Supervision and Evaluation	
EDUC 958	Analysis of Teaching and Learning	4
EDUC #990	Developmental Perspectives on Adulthood	4

EDUC 897	Special Topics in Education (note: course number will change in 05-06) ¹	4
Total Credits		16

¹ Under special circumstances and with the approval of their adviser, students may substitute an elective for EDUC 897 Special Topics in Education.

Special Education Administration (Graduate Certificate)

<https://cola.unh.edu/education/program/certificate/special-education-administration>

Description

The Department of Education offers a Graduate Certificate in Special Education Administration. This program allows educators to administer and lead special education programs. Students who pursue this Graduate Certificate must concurrently pursue the certification for a New Hampshire Special Education Administrator. In other words, the Graduate Certificate is coterminous with the credential. When a student completes the Graduate Certificate he/she also completes the certification as a special education administrator. These two cannot be uncoupled.

The requirements for admission include:

- Master's Degree in special education, educational administration, or similar field.
- Possess a current credential in special education
- A minimum of three years of successful teaching experience in special education (must have five years experience for credential eligibility).

Requirements

In order to receive the Graduate Certificate for Special Education Administrator, the matriculated student **must pass a minimum of 16 credits**, including transfer credits, from the courses below, or electives if appropriate, taken after admission to the Graduate Certificate program, and must complete all requirements for state certification as a special education administrator.

Code	Title	Credits
Special Education Courses:		
EDUC 850	Introduction to Exceptionality	4
EDUC 938	Advanced Seminar in Special Education	4
EDUC 939	Assessment and Teaching of Children with Learning Difficulties	4
EDUC 856	Supporting Families of Individuals with Exceptionalities	4
EDUC 951	Laws and Regulations Affecting the Education of Students with Disabilities	4
EDUC 956	Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors	4
Administration Courses:		
EDUC #961	Public School Administration	4

or EDUC 977	Leadership: The District Level Administrator	
EDUC 962	Educational Finance and Business Management	4
EDUC 964	Human Resources in Education	4
EDUC 974	Educational Administrative Internship	4

Technology Integration (Graduate Certificate)

<https://cola.unh.edu/education/program/certificate/technology-integration>

Description

Today, K-12 classrooms are equipped with technologies that promise higher student engagement, greater access to content knowledge, and effective, efficient learning. However, technology alone cannot transform student learning. Teachers today require the knowledge and skills to effectively integrate technology into their teaching practice. The imperatives of equal access, equal opportunity, and pedagogical congruence compel a mindful and efficacious integration of technology into the 21st century classroom. As technology has become enmeshed into our teaching and learning there is also an emerging need to engage students in the civic responsibilities and proper academic duties required within the digital medium.

Requirements

Code	Title	Credits
Required Courses		
EDUC 897	Special Topics in Education	4
EDUC 820	Integrating Technology into the Classroom	4
EDUC 897	Special Topics in Education	4
Electives		
Select one of the following:		3-4
EDUC 833	Teaching Writing in the 21st Century	
OT 893	Special Topics	
ENGL 889	Special Topics in English Teaching	
EDUC 845	Math with Technology in Early Education	
EDUC 897	Special Topics in Education	
Total Credits		15-16

Electrical and Computer Engineering (ECE)

Degrees Offered: Ph.D., M.Eng., M.S., Certificate

This program is offered in Durham.

The Department of Electrical and Computer Engineering offers a doctor of philosophy (Ph.D.) degree, a master of science degree (M.S.) and a master of engineering degree (M.Eng.). The department also offers graduate certificates in Ubiquitous Computing and Wireless Communication Systems.

Opportunities

Advanced degrees in electrical and computer engineering open the door to a wider variety of job opportunities, particularly with regard to consulting, research and development, and positions in academia. Within the department, opportunities for formal study, research, and individual or team projects are available in the following areas: biomedical engineering; communication systems; digital signal processing; computer engineering, computer networks, digital systems, and logical synthesis; robotics and neural networks; image processing and pattern analysis; control systems; electromagnetics; pervasive computing; human-computer interaction; ocean engineering; cyber-physical security and systems; flexible and wearable electronics; bioelectronic sensors; and instrumentation.

Admission Requirements

An applicant should have completed a baccalaureate degree in electrical or computer engineering or have comparable training, which includes courses and laboratory experiences in mathematics and physical science as well as in topics such as network theory, digital systems, fields and waves, electronics, and electrical circuits. Students with a baccalaureate degree from a non-U.S. university must submit current (within five years) general scores from the Graduate Record Examination (GRE).

<https://ceps.unh.edu/ece>

Programs

- Electrical and Computer Engineering (Ph.D.) (p. 84)
- Electrical and Computer Engineering (M.Eng.) (p. 85)
- Electrical and Computer Engineering (M.S.) (p. 85)
- Ubiquitous Computing (Graduate Certificate) (p. 86)
- Wireless Communications Systems (Graduate Certificate) (p. 86)

Faculty

See <https://ceps.unh.edu/electrical-computer-engineering/faculty-staff-directory> for faculty.

Electrical and Computer Engineering (Ph.D.)

<https://ceps.unh.edu/ece/electrical-and-computer-engineering-phd>

Description

Our graduate programs are quite flexible allowing the student a wide choice of courses as well as research topics. Many students work in the UNH Interoperability Laboratory (<http://www.iol.unh.edu>) and study computer telecommunications. Others work in such diverse fields as ergonomics in the workplace, automation of medical equipment, designing and improving the reliability of advanced integrated circuits, wireless communication systems, image processing, alternative energy systems, improvement of manufacturing equipment and modeling antenna patterns at airports.

Requirements

The degree of doctor of philosophy (Ph.D.) in electrical and computer engineering is conferred on qualified candidates who have passed the qualifying examination and candidacy examination in their field of study, who have completed an original investigation in this field and have embodied the results in an acceptable dissertation, and who have passed an oral examination in defense of the dissertation. The degree of Ph.D. is a research degree. It is not given merely for the completion of course credits. Detailed information can be found on the ECE departmental website.

Electrical and Computer Engineering (M.Eng.)

<https://ceps.unh.edu/ece/electrical-and-computer-engineering-meng>

Description

Our graduate programs are quite flexible allowing the student a wide choice of courses as well as research topics. Many students work in the UNH Interoperability Laboratory (<http://www.iol.unh.edu>) and study computer telecommunications. Others work in such diverse fields as ergonomics in the workplace, automation of medical equipment, designing and improving the reliability of advanced integrated circuits, wireless communication systems, image processing, alternative energy systems, improvement of manufacturing equipment and modeling antenna patterns at airports.

Requirements

The graduation requirement for the ECE M.Eng. degree is based on course credits and concluding experiences. Specifically, students must complete at least **30 credit hours** of coursework, with at least 24 credits being earned in the ECE department or related technical disciplines (those disciplines will be determined by the student in conjunction with his/her adviser); of those 24 credit hours in the ECE department, at least 12 must be at the 900 level. Courses outside of the ECE department can be related to management and/or law (courses in financial management, organizational behavior, economics, accounting, intellectual property, etc.). The concluding experiences will be in the form of a technical paper suitable for conference publication and two technical presentations.

Students enrolled in the ECE M.Eng. program are not eligible to serve as teaching assistants (TAs) or research assistants (RAs) except by special permission from the ECE Graduate Committee. All transfers into the ECE M.Eng. program from any of the other two ECE graduate programs will require approval by the ECE Graduate Committee through the existing petition process. If a student holding a TA or RA position in the ECE Department transfers into the ECE M.Eng. program, they are required to relinquish that position.

Technical Presentation and Paper Requirement for the Master of Engineering (M.Eng.) Option

Students in the M.Eng. program are required to submit a technical paper and to deliver two technical presentations as part of their program. Many of the courses in the ECE graduate program require technical reports and

presentations, and some of these may be appropriate for satisfying the technical requirement for students in the M.Eng. option. However, there are other approaches for satisfying this requirement as indicated below.

The objective in requiring a technical paper is to ensure that the student has some facility in documenting technical information. The evaluation of that paper is to be performed by the ECE Graduate Committee, and the evaluation will result in either acceptance or rejection of the work submitted. The criterion for technical papers to be considered acceptable is that they describe a contemporary technical concept or development with a high degree of depth and clarity. The student must be the sole author on the technical paper, and it is to be submitted to the chair of the ECE Graduate Committee electronically before the last day of classes. As noted above, technical papers associated with regular ECE graduate courses or independent studies may be used to satisfy the requirement, as are papers prepared for technical conferences or publications. Papers accepted for presentation at refereed conferences or for publication in refereed journals will automatically satisfy the technical paper requirement. For these papers, students can petition to have the sole authorship requirement waived.

The objective in requiring the two technical presentations is primarily to ensure that students have the opportunity to present in front of a group. For the technical presentations requirement, presentations need to that fulfill one of the criteria below:

1. Presentation of a technical lecture (20 minutes or longer) as part of the requirements for a course in which the student is enrolled.
2. Presentation of a technical lecture in a course as a "stand in" for the faculty member in charge.
3. Presentation of a technical seminar at UNH (for example, presenting a seminar for ECE 900A Research and Development from Concept to Communication 1/ECE 900B Research and Development from Concept to Communication 2) or to a public group or industry.
4. Presentation of a technical paper as part of a professional job function.
5. Presentation of a paper at a professional technical conference.

It is the responsibility of the student to satisfy this requirement before graduation. Students must get approval from their adviser for any activity that is intended to be used as a technical presentation experience. The two presentations required must be different; giving the same seminar twice does not count as two presentations. If the activity does not fall into one of the five categories listed, prior approval of the ECE Graduate Committee must also be obtained.

The student should submit documentation for the two experiences using the forms found on the ECE website in electronic form to the chair of the ECE Graduate Committee. This should be completed by the last day of classes during the semester of graduation.

Electrical and Computer Engineering (M.S.)

<https://ceps.unh.edu/ece/electrical-and-computer-engineering-ms>

Description

Our graduate programs are quite flexible allowing the student a wide choice of courses as well as research topics. Many students work in the UNH Interoperability Laboratory (<http://www.iol.unh.edu>) and

study computer telecommunications. Others work in such diverse fields as ergonomics in the workplace, automation of medical equipment, designing and improving the reliability of advanced integrated circuits, wireless communication systems, image processing, alternative energy systems, improvement of manufacturing equipment and modeling antenna patterns at airports.

Requirements

Master of science in electrical and computer engineering (M.S. ECE) degree students must take a minimum of 30 graduate credits including:

- 20 credit hours of graduate coursework, with at least 12 of those credit hours earned in 900-level courses
- 4 credits of ECE 900A Research and Development from Concept to Communication I & ECE 900B Research and Development from Concept to Communication 2
- 6 credits of thesis work (ECE 899 Master's Thesis)

Up to 12 credits earned in non-ECE courses numbered 700-799 may be taken for graduate credit by ECE M.S. degree students provided the courses are petitioned and approved by the ECE Graduate Committee.

A student may petition that a maximum of 12 UNH graduate credits or a maximum of 8 non-UNH graduate credits taken prior to admission into the ECE master of science degree program be applied to fulfill the degree requirements.

Once the student has been admitted into the program, under certain circumstances it may be desirable to take courses outside the ECE department to attain the goals outlined in the student's program of study. In these cases, up to two non-ECE 800 or 900-level courses are allowed without petition, provided that they are approved by the student's academic adviser and that the student takes at least two 900-level courses (neither of which may be independent studies) within the department. A student wishing to take more than two courses (either 800 or 900 level) outside the department must petition the ECE Graduate Committee.

Ubiquitous Computing (Graduate Certificate)

<https://online.unh.edu/graduate-certificate-ubiquitous-computing>

Description

We live in the era of ubiquitous computing, in which we are surrounded by interconnected computing devices that have become parts of the fabric of our lives. This certificate program will prepare students to develop and deploy ubiquitous computing systems. The certificate program will benefit practitioners who work in the fields related to mobile applications, Internet of Things, pervasive computing, ubiquitous computing, and ambient intelligence.

Applicants must hold a baccalaureate degree from an accredited college or university. Applicants should have demonstrated aptitude in undergraduate coursework or similar work experience in Electrical Engineering, Computer Engineering, Computer Science or a related field.

For a full list of application requirements please visit the Graduate School website (<https://www.gradschool.unh.edu/php/posd.php?major=MF71>).

Requirements

The program of study required for the certificate consists of four courses for a total of 13-15 credit hours.

Code	Title	Credits
Required Courses		
ECE 824	Ubiquitous Computing Fundamentals	4
ECE 924	Ubiquitous Computing ¹	3
Electives		
Select two of the following		6-8
ECE 814	Introduction to Digital Signal Processing	4
ECE 941	Digital Signal Processing	3
ECE 960	Computer Architecture	3
ECE 920	Wireless Communication Systems	3
ECE 901	Electromagnetic Wave Theory I	3
ECE 900A & ECE 900B	Research and Development from Concept to Communication I and Research and Development from Concept to Communication 2 ²	4

¹ ECE 824 Ubiquitous Computing Fundamentals must be taken prior to ECE 924 Ubiquitous Computing

² 2 semester sequence, 2+2 credits

Wireless Communications Systems (Graduate Certificate)

<https://online.unh.edu/graduate-certificate-wireless-communication-systems>

Description

Wireless communication systems play a central role in today's technological ecosystem. They connect people and devices in diverse environments, from homes, to businesses, to roads, to battlefields. This certificate program will provide students with the fundamental concepts necessary to understand and work with various aspects of wireless communication systems, from antennas, to modeling electromagnetic propagation, to signal processing, to multiple-antenna communications.

Applicants must hold a baccalaureate degree from an accredited college or university. Degrees in Physics, Electrical Engineering, Computer Engineering, related engineering field preferred.

For a full list of application requirements please see the Graduate School website (<https://www.gradschool.unh.edu/php/posd.php?major=MF72>).

Requirements

The program of study required for the certificate consists of at least four courses totaling 12 credits.

Code	Title	Credits
Required Courses		
ECE 901	Electromagnetic Wave Theory I	3
ECE 920	Wireless Communication Systems	3
Electives		
Select two of the following		
ECE 814	Introduction to Digital Signal Processing	4
ECE 824	Ubiquitous Computing Fundamentals	4
ECE 924	Ubiquitous Computing	3
ECE 900A & ECE 900B	Research and Development from Concept to Communication I and Research and Development from Concept to Communication 2	4
ECE 941	Digital Signal Processing	3
ECE 960	Computer Architecture	3

English (ENGL)

Degrees Offered: Ph.D., M.A., M.F.A., M.S.T.

This program is offered in Durham.

The Department of English offers four advanced degrees: master of arts with options in English studies or English language and linguistics# master of science for teachers# master of fine arts in writing# and doctor of philosophy.

Admission Requirements

All applicants must submit writing samples in accordance with guidelines available from the English department graduate office. All applicants (except those for the M.F.A. and M.S.T.) must submit current scores (within five years) from the general test of the GRE. Applicants for the doctor of philosophy degree program in literature must also submit scores for the subject test of literature in English. Applicants for the degree of master of science for teachers (M.S.T.) must have completed education courses sufficient for certification, or have three years teaching experience, or currently hold a full-time teaching position. A student admitted to the Ph.D. program must hold an M.A. degree or be in the final stage of completing requirements for the degree.

All applicants who wish to be considered for teaching assistantships or tuition scholarships must complete an application form, available from the English department graduate office or from the website listed above, or from the graduate school forms page (see the Graduate Aid section).

<https://cola.unh.edu/english>

Programs

- English (Ph.D.) (p. 87)
- English: English Studies Option (M.A.) (p. 88)
- English: Language and Linguistics Option (M.A.) (p. 88)
- English (M.S.T.) (p. 88)
- Writing (M.F.A.) (p. 88)

Faculty

See <http://cola.unh.edu/faculty/english> for faculty.

English (Ph.D.)

<https://cola.unh.edu/english/program/phd/english>

Description

The English program offers a Ph.D. in English which allows students to specialize in one of two tracks: Literature or Composition Studies. The aim of the Ph.D. program is to train students to be teachers and scholars in the fields of literature and language. During their work in the program, Ph.D. candidates in Literature will develop both general competence in literary study and specific areas of mastery. Candidates in Composition Studies will develop a primary area of specialization in Composition Studies and a secondary area of specialization in an area such as literature, critical theory, or linguistics.

Requirements

The Ph.D. program combines the essential guidance and discipline of coursework with the equally essential freedom of independent study and research. To be admitted to the doctoral program, a student must hold an M.A. degree. Students choose between two areas: literature or composition studies. Students choosing either area must demonstrate basic proficiency in two languages or advanced proficiency in one. Basic proficiency may be demonstrated by passing a departmental examination or by receiving a grade of B or better in a fourth-semester college-level language course. Advanced proficiency is demonstrated by passing a rigorous departmental examination.

Literature

The doctoral program in literature is designed to train students to be teachers and scholars in the fields of literature and language. Students in this program will complete nine graduate courses of which four must be seminars. The other courses must be at the 800 or 900 levels and must include ENGL 910 Practicum in Teaching College Composition, ENGL 926 Seminar: Literary Theory, and the ungraded 2-credit course in Dissertation and Profession (ENGL 924 Professional Preparation). In addition, students must pass a general examination in English and American literature, a more specialized qualifying examination, and the final oral defense of their dissertation.

Composition Studies

The program in composition studies is designed to train experts who are qualified to teach general courses in literature or linguistics in the teaching of composition. Students in composition studies will complete 10 graduate-level courses of which four must be seminars. The other courses must be at the 800 or 900 levels and include ENGL 910 Practicum in Teaching College Composition and ENGL 918 Research Methods in Composition. Students will take a combined general and qualifying examination that focuses both on the theory of composition and rhetoric, and on a secondary area of specialization. Their dissertation work will be on a topic in composition.

Ph.D. students normally hold assistantships and teach under supervision; such teaching is considered a vital part of the student's professional training.

English: English Studies Option (M.A.)

<https://cola.unh.edu/english/program/ma/english-studies-option>

Description

Our M.A. program offers you the opportunity to explore the formal, historical, cultural, and theoretical dimensions of diverse forms of the written word.

Requirements

An M.A. candidate must complete 36 credit hours at the 800 or 900 level, including three seminar courses and a fourth seminar in literature or ENGL 998 Master's Paper.

At least six courses must be literature courses offered by the English department (as distinct from courses in critical theory, linguistics, writing, or teaching methods). If a student chooses the Master's Paper option, the six-course requirement is reduced to five literature courses.

Each M.A. candidate must also pass ENGL 925 Graduate Study of Literature and one course in literary theory. The literary theory requirement would normally be met by successful completion of ENGL 814 Literary Theory, or ENGL 926 Seminar: Literary Theory.

As a general rule, all courses counting toward the M.A. degree should be taken in the English department, but two courses may be taken in other departments with approval. No more than two literature courses should be taken in a combined 700/800 (split) level course.

M.A. candidates must pass a reading examination in a foreign language or demonstrate that they have passed a fourth-semester college-level language course with a grade of B or better. Students whose native language is not English may be exempt from this requirement.

English: Language and Linguistics Option (M.A.)

<https://cola.unh.edu/english/program/ma/english-language-linguistics-option>

Description

Students who wish to specialize in any of the various areas of English language and linguistics may design an M.A. program to meet their interests. Specialties include applied linguistics and the teaching of English as a second language as well as the traditional subfields of linguistics. Psycholinguistics courses are offered through the psychology department.

Requirements

To earn the M.A. degree, students must complete at least 32 credit hours at the 800 or 900 levels, including one seminar course, and 4 credits of ENGL 998 Master's Paper, in which they are to produce a substantial scholarly paper. Unless the student already has a strong background in linguistic theory, the program of study must include one course in phonetics and phonology (ENGL 893 Phonetics and Phonology) and one in syntax and semantics (ENGL 894 Syntax).

Reading knowledge of one foreign language is required. This may be demonstrated by passing a departmental examination or by receiving a grade of B or better in a fourth-semester college-level language course. Students whose native language is not English may be exempt from this requirement.

The student's course of study must be approved by the program adviser

English (M.S.T.)

<https://cola.unh.edu/english/program/mst/english>

Description

The Master of Science for Teachers is a degree designed specifically for practicing English teachers who want to deepen their knowledge of literature and develop their own skills in reading and writing. This program is based on the belief that pedagogy emerges out of firsthand experience in the processes of reading and writing.

The master of science for teachers is designed for practicing elementary, middle, and high school teachers. It is not appropriate for individuals seeking state certification. No foreign language is required, and the GRE is not required in the application.

Requirements

The M.S.T program requires the completion of 32 credit hours at the 800 or 900 level. At least 24 of these credits must be in the Department of English. Courses taken outside the department must be approved by the student's adviser. Students must complete a capstone experience (creative writing option, teacher inquiry option, or curricular option).

The department offers special summer programs, which can be taken to fulfill some or all of the course requirements for the M.S.T. degree. The New Hampshire Literacy Institutes offer summer courses that focus on the teaching of writing and reading in grades K-12. Summer institutes emphasize writing workshops in fiction, nonfiction, and poetry and may include courses in literature and composition theory and research.

Writing (M.F.A.)

<https://cola.unh.edu/english/program/mfa/writing>

Description

The MFA Program in Writing at the University of New Hampshire has a clear and abiding focus: to help you shape your gifts and passion for the art, and to prepare you for the opportunities and demands that all writers will experience in a long professional career. Over the years, the graduate

writing program has launched the careers of hundreds of poets, novelists, storywriters, essayists and memoirists. This is a small, highly-ranked, and selective program. We emphasize one-on-one contact between a nationally recognized faculty and talented students. Students typically complete the program in two to three years.

We are most proud of the supportive community we have created here, one in which cross-genre exploration is strongly encouraged. Six out of ten of our MFA students receive direct financial aid (<http://cola.unh.edu/english/financial-aid>), with most funding taking the form of teaching assistantships, tuition scholarships, and grant awards. Other opportunities (<http://cola.unh.edu/english/program/writing-mfa/opportunities>) include paid internships in local arts organizations, and editorial positions at our on-line journal *Barnstorm*.

We also run an exciting visiting writers' series (<http://cola.unh.edu/english/writers-series>), so that students have a chance to connect with some of the finest contemporary poets, novelists and essayists currently at work. Add to all this the fact that we're located in a stunningly beautiful spot, close to mountains and sea coast, but within an hour of Boston and other cosmopolitan areas. We can't imagine that there is a more energizing and congenial place to pursue your talents and dreams anywhere in the country.

Fiction

The fiction program centers on your fiction. The one goal of our two years together is to make your fiction stronger, more aesthetically powerful, and yes, more publishable. The small 10-person workshop, intense conferencing with multiple award winning faculty such as Ann Williams and Tom Paine, craft seminars that range from Joyce and Chekhov to novellas and contemporary short story collections, 'special topics' classes on Screenwriting and Children's Book Writing, an esteemed reading series that brings authors such as Dan Chaon and Elissa Schappell to class and campus, our nationally known literary magazine *Barnstorm*: all of this is here simply to advance your fiction. Maybe it is because we are in the Granite State, but what is notable in our program is not just how hard students work on their own fiction, but how much effort goes into their response to the work of their peers. Writers here care deeply about each other as people, and the production of honest work that captures life on the page.

Nonfiction

Our narrative nonfiction program embraces a wide variety of forms, from memoir to travel writing, literary journalism to the personal essay and all of its permutations. Our focus, however, is not on labels but on nurturing your talent and developing your skills with the goal of helping you craft rich, compelling and publishable essays, stories and books. In short, we toil together to make facts dance. In our workshops and seminars we ask our students to read broadly and push themselves beyond their comfort zone, to experiment and exercise an array of literary muscles, to employ the imagery of a poet, the drama of a novelist and the content drive of a journalist. Our classes are small (average size is ten) and students meet frequently with instructors in individual conferences. As practical as the state of New Hampshire, our program emphasizes not only the art of writing narrative nonfiction, but also how to sell it. In one course students will learn how to write a book proposal and in others how to pitch travel stories and personal essays. The UNH nonfiction faculty is diverse in its expertise but united in its passion for reading and writing the literature of fact, and for sharing that passion.

Poetry

We offer poetry workshops limited to 10 students and small seminars in craft and poetics in a dynamic, individual-oriented system that emphasizes intensive conferencing. Students have the chance to work with master teachers like the award-winning poets Mekeel McBride, David Rivard, and Charles Simic (a Pulitzer Prize winner and the former Poet Laureate of the United States). We believe in grounding our students in the widest possible range of poetic technique and approach—with seminars offered in areas such as translation, 20th century poetic movements, and ecstatic poetry—and no preconceived notions as to how anyone should write (other than well!). The poetic tradition of New England—one of the richest and most expansive in the world—serves as a backdrop for all our efforts. This is an area teeming with great poets, with numerous weekly opportunities for students to attend readings and lectures in the art.

Requirements

Students are required to take four workshops in their major genre. In addition, students take one form and theory course in their major genre, five elective courses that may include additional writing courses or courses from the English department's offerings in other fields (such as literature, linguistics, or composition studies), and **8 credit hours** of the M.F.A. thesis (ENGL 899 Master of Fine Arts in Writing Thesis). Teaching assistants are required to take ENGL 910 Practicum in Teaching College Composition as one of their electives. There is no foreign language requirement.

The M.F.A. thesis is a book-length, publishable manuscript. For fiction writers, the thesis could be a collection of short stories, a story cycle (linked stories), or a novel. For nonfiction writers, the thesis could be a collection of themed essays and/or magazine articles or a book of creative nonfiction. For poets, the thesis would be a book-length collection of poems. The minimum length of the thesis is 150 pages for fiction and nonfiction writers and 45 pages for poets. Students will work closely with a thesis adviser as they write and pass an oral defense of the thesis, a defense conducted by a three-member thesis committee of writing faculty. Students will also conduct a public reading of their thesis in an event organized by the writing faculty.

In addition, the M.F.A. program offers students opportunities to publish in an online journal called *Barnstorm*, as well as intern at arts/cultural organizations and the university research department, as well as teach in community schools. A select number of students are chosen to teach UNH undergraduate writing courses and to work in the University's Writing Center.

The program admits an average of 15 new students a year, which creates a writing community of 45 student writers.

Genetics (GEN)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Department of Molecular, Cellular, and Biomedical Sciences offers an accelerated master's program (B.S./M.S.), a master's of science, and a doctor of philosophy degree in genetics, providing outstanding and diverse research opportunities in genetics and genomics. Graduate students in genetics are typically supported by teaching or research assistantships, as well as by competitive internal and external fellowship

programs. For more information about the program, including admission and degree requirements, please contact the Department of Molecular, Cellular, and Biomedical Sciences at mcbs.dept@unh.edu.

Distinctive Features of the Program

As an interdisciplinary program made up of faculty from multiple departments, and from the Hubbard Center for Genome Studies (<http://scholars.unh.edu/hubbard>), the genetics program integrates disciplines ranging from molecular and cellular biology to environmental and evolutionary genetics and genomics. These faculty conduct research on living systems spanning microbial, plant, and animal systems. Incoming students have the opportunity for laboratory rotations to explore the various areas of genetics and genomics in those cases where a thesis advisor has not been identified or where exposure to a variety of experimental approaches is advantageous.

The Graduate Program in Genetics offers:

- Outstanding research training in many cutting-edge research areas in molecular and evolutionary genetics, genomics, and bioinformatics.
- Weekly seminar series that includes both distinguished invited speakers and graduate student research presentations.
- Opportunities to gain teaching and mentoring experiences with undergraduate students in the biological sciences.
- Strong track record for graduates attaining successful careers in academia, biomedical research institutes, biotechnology and pharmaceutical companies, and state and federal governmental agencies.

Admission Requirements

An applicant is expected to have completed basic courses in chemistry, biological sciences, mathematics, and physics. Otherwise well-qualified applicants will be permitted to correct deficiencies in undergraduate education by enrollment in the appropriate courses or by independent study during the first year. Applicants must submit a personal statement, current scores (within five years) from the general GRE test, and three letters of recommendation. If possible, the personal statement should specify the applicant's research interests and potential faculty mentors. International applicants living outside the U.S. should initially complete a free online pre-application (<http://www.gradschool.unh.edu/international.php>). If approved for a full application, applicants must submit current TOEFL scores in addition to the items listed above.

5 Year Accelerated Master's Degree Requirements

This accelerated five-year program leading to a combined bachelor and master's degree in genetics is designed for highly motivated and qualified students seeking additional training to further their career goals as a researcher in the life sciences.

Admission to the combined degree program is highly competitive. Students wishing to pursue this option must have a grade point average greater than 3.2 at the time of application. A thesis advisor must be identified during the junior year, and the approval of the advisor must be obtained. Prior to the first semester of the senior year, the student must formally apply through the Graduate School and receive early admission to the Genetics Graduate Program. The requirement for the Graduate Record Examination is waived for combined degree applicants.

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences>

Programs

- Genetics (Ph.D.) (p. 90)
- Genetics (M.S.) (p. 91)

Faculty

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/people>

Genetics (Ph.D.)

<https://colsa.unh.edu/mcbs/genetics-graduate-programs/genetics-phd>

Description

The Ph.D. in Genetics is an interdisciplinary program made up of faculty from multiple departments and from the Hubbard Center for Genome Studies. The Genetics doctoral program integrates disciplines ranging from molecular and cellular biology to environmental and evolutionary genetics and genomics in microbial, plant, and animal systems. Graduates of the program are equipped for leadership positions in biotechnology and pharmaceutical companies, academic and government research laboratories, and successful careers in teaching and research at the college and university level.

Distinctive Features of the Program

- Outstanding research training in many cutting-edge research areas in molecular and evolutionary genetics, genomics, and bioinformatics
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant

Research Opportunities

- Genomics and bioinformatics
- Evolutionary genomics
- Microbial ecology
- Plant genomics
- Signal transduction pathways
- Biodiversity and molecular ecology
- Cancer genetics
- Transcriptional and translational regulation

Financial Support

- Students admitted to the Ph.D. Program are typically supported by Research Assistantships or Teaching Assistantships

- Internal summer and academic year fellowships are available to students on a competitive basis.

Career Prospects

- Research Directors in biotechnology and pharmaceutical industries
- Principle investigators in academic research labs and research institutes, state and federal government agencies
- Academic preparation for future teaching and research roles in a college or university environment

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
 - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online application (<http://gradschool.unh.edu/php/preapp.php>)
- Three letters of recommendation
- Personal statement, including research interests and two or three potential Genetics faculty thesis advisors.

Requirements

Ph.D. Degree Requirements

The coordinator of the genetics graduate program, with the concurrence of the student's thesis adviser, nominates the student's guidance and doctoral committees, which administer the qualifying and final examinations, respectively. Doctoral students are expected to have a broad exposure to genetics courses, exceeding that required of master's degree students. Specific course requirements are developed by the student and the guidance committee. Students must attend MCBS 997 Seminar, each semester and present one seminar per year.

Upon completion of coursework, the student must pass written and oral qualifying examinations conducted by the guidance committee in order to advance to candidacy. Doctoral students must complete a dissertation on original research in genetics, give a public seminar, and orally defend their dissertation before the doctoral committee.

Genetics (M.S.)

<https://colsa.unh.edu/mcbs/genetics-graduate-programs/genetics-ms>

Description

The M.S. in Genetics is an interdisciplinary program made up of faculty from multiple departments and from the Hubbard Center for Genome Studies. The Genetics Program integrates disciplines ranging from molecular and cellular biology to environmental and evolutionary genetics and genomics in microbial, plant, and animal systems. Graduates of the program are equipped for successful careers

in biotechnology and pharmaceutical companies, academic and government research laboratories, and prepared for doctoral programs, medical school, and health-related professional programs.

Distinctive Features of the Program

- Outstanding research training in many cutting-edge research areas in molecular and evolutionary genetics, genomics, and bioinformatics
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant
- Accelerated M.S. program available to UNH students enrolled in the B.S. program in Genetics

Research Opportunities

- Genomics and bioinformatics
- Evolutionary genomics
- Microbial ecology
- Plant genomics
- Biodiversity and molecular ecology
- Cancer genetics
- Transcriptional and translational regulation

Financial Support

- Students admitted to the M.S. Program are typically supported by Research Assistantships or Teaching Assistantships
- Internal summer and academic year fellowships are available to students on a competitive basis.
- Teaching Assistantships are not available for students enrolled in the Accelerated M.S. program

Career Prospects

- Research scientists in biotechnology and pharmaceutical industries
- Lab managers in academic research labs and research institutes, state and federal government agencies
- Academic preparation for doctoral programs and professional health programs (e.g., medical school)

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
 - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)

- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online application (<http://gradschool.unh.edu/php/preapp.php>)
- Three letters of recommendation
- Personal statement, including research interests and two or three potential Biochemistry faculty thesis advisors.

Requirements

M.S. Degree Requirements

The coursework for the Master of Science degree is formulated with input from the student's guidance committee. Students admitted to the M.S. program are required to conduct a research project under the guidance of a faculty adviser, write and submit a thesis based on this research, and pass an oral examination covering graduate courses and thesis.

Students must take a minimum of 30 credits, including at least three genetics courses (minimum of 10 credits), preferably covering breadth in genetics, attend MCBS 997 Seminar each semester, present one seminar per year, and write and defend a 6–10 credit thesis (MCBS 899 Master's Thesis) before their guidance committee.

5 Year Accelerated Master's Degree Requirements

- Current junior standing in the B.S. in Genetics program at the time of application
- GPA of 3.2 or greater
- Thesis advisor identified who supports entry into the program
- Three letters of recommendation (one of which is from the thesis advisor)
- Personal statement of research interests and career aspirations
- GRE is waived

This accelerated five-year program leading to a combined bachelor and master's degree in genetics is designed for highly motivated and qualified students seeking additional training to further their career goals as a researcher in the life sciences.

Admission to the combined degree program is highly competitive. Students wishing to pursue this option must have a grade point average greater than 3.2 at the time of application. A thesis advisor must be identified during the junior year, and the approval of the advisor must be obtained. Prior to the first semester of the senior year, the student must formally apply through the Graduate School and receive early admission to the Genetics Graduate Program. The requirement for the Graduate Record Examination is waived for combined degree applicants.

Thirty credits of graduate level (800-999) course work (including dual credit courses) must be completed. All requirements for the M.S. degree (including taking three courses with a GEN designation) must be completed. Up to 12 credits taken during the senior year can be applied to both the B.S. and M.S. requirements (dual credit courses); this designation is obtained at the time of registration. Honors senior thesis (GEN 799H) or Honors Investigation (GEN 795H) courses cannot be counted towards the M.S. degree, although GEN 795 can be counted if the student is enrolled concurrently in MCBS 895.

Geospatial Science (GSS)

Degree Offered: Graduate Certificate

This program is offered in Durham.

The Graduate Certificate in Geospatial Science (GSS) at the University of New Hampshire is a multidisciplinary program designed to provide graduate level education in the applied and theoretical technology and applications of geospatial science. Students within the program are afforded the opportunity to build their five course certificate from a variety of required and elective classes from different disciplines to best fit their academic, research, or professional interests. The flexibility of this program makes it ideal for a student looking to complement their degree or a professional looking to build knowledge, skill and credentials within the Geospatial Sciences.

Admission Requirements

Students must hold a baccalaureate degree from an accredited college or university. Five courses as chosen from the categories listed below are required. Courses taken at other institutions are not eligible to be transferred into the program.

Applying

Please visit the UNH Graduate School site (<http://www.gradschool.unh.edu>) for detailed instructions about applying to the certificate program.

<http://gss.unh.edu/>

Programs

- Geospatial Science (Graduate Certificate) (p. 92)

Geospatial Science (Graduate Certificate)

<http://gss.unh.edu/>

Description

The Graduate Certificate in Geospatial Science (GSS) at the University of New Hampshire is a multidisciplinary program designed to provide graduate level education in the applied and theoretical technology and applications of geospatial science. Students within the program are afforded the opportunity to build their five course requirement certificate from a variety of required and elective classes from different disciplines to best fit their academic, research, or professional interests. The flexibility of this program makes the program ideal for a student looking to complement their degree or a professional looking to build knowledge, skill and credentials within the Geospatial Sciences.

Requirements

Certificate Requirements

The program of study required for the certificate consists of five courses and a total of 16 credit hours.

Course offerings and requirements are as follows:

Code	Title	Credits
Elements of Geospatial Science (Core requirement)		
GSS 800	Elements of Geospatial Science	4
Geographic Information Systems		
Select one of the following:		
GSS 805	Applied Geographic Information Systems for Research	4
GSS 807/ ESCI 895	GIS for Earth and Environmental Science	4
GSS 809/CEE 896	GIS for Water Resources	4
NR 860	Geographic Information Systems in Natural Resources ¹	4
Data Analysis		
Select one of the following:		
BIOL 811	Applied Biostatistics II	4
ESCI 896	Topics (Time Series Analysis)	1-4
MATH 836	Advanced Statistical Methods for Research	3
MATH 839	Applied Regression Analysis	3
MATH 944	Spatial Statistics ²	3
SOC 901	Sociological Methods I: Intermediate Social Statistics	4
Electives		
Select two of the following:		
GSS 817/ ESCI 896	Remote Sensing for Earth and Environmental Science	4
GSS 896	Special Topics (Crowd Source Mapping)	4
MATH 831	Mathematics for Geodesy	3
NR 857	Remote Sensing of the Environment	4
NR 859	Digital Image Processing for Natural Resources ¹	4
NR 882	Forest Health	4
NR 912	Sampling Techniques	2-4
OE/ESCI 871	Geodesy and Positioning for Ocean Mapping	4
SOC 897	Special Topics (Sociological Methods -Survey Research)	4

¹ Prerequisite needed.

² MATH 944 Spatial Statistics may be taken as an elective if not used to fulfill the Data Analysis Core requirement.

History (HIST)

Degrees Offered: Ph.D., M.A.

This program is offered in Durham.

Welcome to the History Department Graduate Program at the University of New Hampshire. We offer comprehensive programs for graduate students and a faculty who have won numerous prizes for teaching and scholarship. Our courses cover a wide range of times, places, and subjects, with a particular strength in cultural history, women's history, the history of religion, Atlantic history, and African American history. In addition, M.A. students can focus on Museum Studies.

The Department of History offers the master of arts and doctor of philosophy degrees. The master of arts is offered in many subfields. A formal option in museum studies is also available. Doctoral dissertations

may be written on the history of the United States or on topics comparing the United States with other societies or areas.

Admission Requirements

The department usually requires evidence of substantial preparation in history at the undergraduate level, together with some preparation in other areas of humanities and social sciences.

Applicants for admission to any graduate program in history should have a minimum of a B average in history, allied humanities, and social sciences. In addition, applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). The department assesses the student's entire application, including letters of recommendation and writing sample, in making its decision on admission. Deficiencies in an undergraduate program may be rectified by coursework as a special student, but such coursework cannot be used to satisfy requirements for an advanced degree. The department also recommends that a beginning graduate student have some training in a foreign language. Students in seminar or reading courses in other than American history may be required to have a reading knowledge of at least one foreign language appropriate to the particular course. Applicants should include with their applications a personal statement indicating their reason for undertaking graduate study at the University of New Hampshire. Normally, an entering student intending to be a candidate for the doctorate will complete an M.A. program as a prerequisite. However, students with the M.A. from another institution, or with exceptionally strong preparation at the undergraduate level, can begin the doctoral program immediately. In addition, a student in residence can, with the consent of the department, omit the M.A. and proceed directly toward the Ph.D.

<https://cola.unh.edu/history>

Programs

- History (Ph.D.) (p. 93)
- History (M.A.) (p. 94)
- History: Museum Studies (M.A.) (p. 94)

Faculty

See <https://cola.unh.edu/history/faculty-staff-directory> for faculty.

History (Ph.D.)

<https://cola.unh.edu/history/program/phd/history>

Description

The Ph.D. is intended to prepare students for professional careers in historical research. In this department, all Ph.D. students specialize in U.S. history. Students with a particularly strong secondary field outside of U.S. history may write dissertations that involve comparative studies of U.S. history.

Before writing any dissertation, Ph.D. students must demonstrate competence in reading a foreign language, then pass a set of written and oral comprehensive examinations.

Requirements

Ph.D. Degree Requirements

A doctoral student's program, which must be approved by the graduate committee of the department, shall include each of the following requirements: two research seminars, one in early U.S. history and one in modern U.S. history; two reading seminars, one in early U.S. history and one in modern U.S. history; a course in historical methods; correction of any deficiencies in the student's previous program; proficiency in one foreign language; HIST 970 Graduate Seminar in Teaching History (applies to all doctoral candidates awarded teaching assistantships); preparation through reading and coursework in the entirety of U.S. history, with emphasis upon either early or modern U.S.; preparation through reading and coursework of two subfields outside of U.S. history, one of which may be a cognate field outside of history entirely; qualifying exams; dissertation proposal; and dissertation and successful defense.

Candidacy is reached after successful completion of the following:

1. complete research seminars in early and modern U.S. history, reading seminars in early and modern U.S. history, a course in Historical Methods, History 970 (teaching assistants only), and courses to prepare fields or correct any deficiencies in the student's previous preparation;
2. demonstrate proficiency in a foreign language;
3. pass written and oral qualifying exams.

Note: In the definition of fields above, United States and U.S. are understood to mean the United States and its colonial antecedents.

Apprenticeship and Degree Regulations

The department considers that graduate work in history, and particularly doctoral work, is professional training. The department recognizes the dual concerns of the historian's life: teaching and research. When feasible, all doctoral students are expected to undertake teaching in the department during a part of their residence. Participation in proseminar and in teaching constitutes an apprenticeship in conjunction with formal study. Doctoral students may choose to pursue the Cognate in College Teaching offered through the Graduate School. All graduate students are reviewed annually by the faculty of the department. A student accumulating two course failures is automatically barred from continuing in any degree program in history, but the department reserves the right to exclude others whose overall performance does not give reasonable assurance of a successful program completion. Students are allowed no more than three attempts to meet any language requirement.

History (M.A.)

<https://cola.unh.edu/history/program/ma/history>

Description

Our Master of Arts degree programs are highly flexible, so students can design programs tailored to individual needs. All MA students will work with a three-member faculty committee for their final capstone experience. The three-member faculty committee will take the form either of a thesis committee, an oral exam committee, or (for museum studies students) a project committee.

Requirements

M.A. Degree Requirements

A master's student designs a specific program to meet one of three plans. Plan A allows substantial training and research in a single subfield of history but within a foundation of broader coursework. Plan B allows substantial breadth over at least two subfields. The subfields in history include the following: the ancient world, medieval Europe, early modern Europe, modern Europe, European intellectual history, medieval England, early modern England, modern England, early modern France, modern France, early modern Germany, modern Germany, Iberia, Russia, early U.S., modern U.S., colonial Latin America, modern Latin America, the Far East, the Near East, sub-Saharan Africa, and the history of science. Plan C allows students who enter the doctoral program without an M.A. to pursue the M.A. and Ph.D. degrees simultaneously.

Plan A requires at least eight courses in history numbered 800 or above, including at least one research seminar, and a 6-credit thesis (HIST 899 Master's Thesis) in a single subfield (equivalent to two courses).

Plan B requires at least 10 courses in history numbered 800 or above, including at least one research seminar, and an oral examination demonstrating competence in two subfields of history.

Plan C requires at least 30 credits of coursework during preparation for the Ph.D. qualifying examinations, as described below; submission of a seminar or other research paper as a demonstration of competence in basic research techniques; and passing Ph.D. qualifying examinations.

History: Museum Studies (M.A.)

<https://cola.unh.edu/history/program/ma/history-museum-studies>

Description

The Department of History at the University of New Hampshire offers an option in Museum Studies for students pursuing the Master of Arts degree in history. The Museum Studies program combines practical museum experience with solid academic training to prepare students for a variety of positions in museums and other forums for public history. Located near the seacoast of New Hampshire and southern Maine, within easy driving distance of Boston as well as much of central and northern New England, the University of New Hampshire is ideally situated to take advantage of its close proximity to numerous historical sites and museums.

Requirements

Requirements

Students pursuing the option in museum studies will be required to take ten courses in the History Department, including HIST 871 Museum Studies, HIST 872 Studies in Regional Material Culture, and two internships at museums or other historic sites.

The final requirement is a one-hour oral examination demonstrating competence in museum studies and another field of history (e.g. Early American History, the Atlantic World, Women's History, etc.) chosen by the student in consultation with the Graduate Director. In developing

academic concentrations, students work with a nationally recognized faculty with a broad range of expertise.

Internships

As part of the Museum Studies program, students enhance their academic training through internships offered at local historical sites. In the past, interns have worked side by side with museum staff on a variety of singular projects as well as regular museum work, including:

- researching and designing exhibits
- cataloging and interpreting collections
- developing and implementing education programs for elementary and secondary school students
- conducting oral histories
- public programming

The internships allow students to put their academic knowledge to work in specific settings while introducing them to the network of museum professionals.

Professional Opportunities

Many of our students earning masters and doctorate degrees have gone on to careers in museums and other public history venues. In recent years, one student completing his doctorate took a position as assistant director of the Margaret Chase Smith Library; several graduates of the masters program work in local museums, including the American Independence Museum, Canterbury Shaker Village, the Currier Museum of Art, Strawberry Banke Museum, and the Wright Museum. One doctoral student has been hired as a Program Officer with the New Hampshire Humanities Council, and several others have participated in public lecture series. Given the past success in placement and the continued interest in public history, the Museum Studies option provides exciting professional opportunities for graduate students at the University of New Hampshire.

Human Development and Family Studies (HDFS)

Degrees Offered: M.S., Graduate Certificate

This program is offered in Durham.

The Department of Human Development and Family Studies offers two programs of study leading to a master of science degree in human development and family studies: Core Areas of Study Program (Human Development and Family Studies M.S.) and the Marriage and Family Therapy M.S. Program.

The goal of both programs is to provide students with an understanding of theory and methods relevant to human development and family studies and to prepare them to work with individuals and families in therapeutic, educational, community or corporate settings. The Core Areas of Study program has two foci: Adolescent Development and Child Development, and students may elect to complete a thesis or comprehensive exam. The Marriage and Family Therapy Program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education and requires a minimum of two years of full-time study, including two summers.

The Department of Human Development and Family Studies also offers a one-year, 14- to 15-credit, multidisciplinary program of study leading to a graduate certificate in Adolescent Development. The certificate program is intended for individuals who are working in the field but who

lack specific knowledge about adolescence, as well as those who are changing careers or who are already working in related fields and need to meet continuing education requirements or desire additional academic preparation.

GRADE POLICY

A graduate student who fails a course must immediately attend a mandatory meeting with the instructor of the course, the Human Development and Family Studies Graduate Coordinator, and, if desired, the student's adviser. If a graduate student receives grades below "B-" in **two or more courses**, the Human Development and Family Studies Graduate Coordinator will make a recommendation to the Graduate School that the student be dismissed from the human development and family studies graduate program.

Admission Requirements

Students in good standing with undergraduate degrees in any field and a specific interest in working with individuals and families are encouraged to apply. Candidates for the master's degree program must have completed an introductory statistics course or the equivalent as part of their undergraduate program. If their undergraduate program did not include such a course, students who are accepted into the M.S. program must successfully complete an introductory statistics course before they graduate.

Applicants in the Core Area of Study program must also complete a graduate statistics course, see "Program Requirements" for the Core Area of Study. Individuals applying to the Core Areas of Study and Certificate programs must submit a standard personal statement with their applications.

Applicants to the MFT program must answer the 5 questions listed on the department's MFT admissions website (<https://chhs.unh.edu/human-development-family-studies/academics/how-apply-human>). Responses to the MFT questions should be submitted in numbered format, and must address each question separately and explicitly. Individuals applying to the MFT program must submit their five answers with their applications.

<https://chhs.unh.edu/human-development-family-studies>

Programs

- Human Development and Family Studies (M.S.) (p. 95)
- Human Development and Family Studies: Marriage and Family Therapy (M.S.) (p. 97)
- Adolescent Development (Graduate Certificate) (p. 97)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Human Development and Family Studies (M.S.)

<https://chhs.unh.edu/hdfs/core-areas-study>

Description

M.S. Degree: Core Areas of Study Program

The Core Areas of Study program has two foci: Child Development and Adolescent Development. Students in the Core Areas of Study Program may elect one of two options to complete their master's degree: Thesis or Comprehensive Examination. Both programs prepare students to work in a variety of human service positions and enter doctoral programs.

Please visit the Career Opportunities section of our website for more information.

Adolescent Development: This core area of study is designed to develop general competence in understanding and applying theory and research regarding adolescence through early adulthood within the context of their families and communities. Students are expected to complete a practicum in a program that serves adolescents.

Child Development: This core area of study is designed to develop an understanding of theory and research regarding children from infancy through the early school years and to prepare students to work in a variety of social science positions focused on children's family and school experiences. Students are expected to complete a practicum in a child-focused setting.

Accelerated Master's for the Core Area Program

UNH Juniors and Seniors with a 3.2 GPA or higher can apply for early admission to the Core Area program in either Child Development or Adolescence by the deadlines noted on the Graduate School website. Accepted students will begin the accelerated program in either the fall or spring of their senior year. Students will be permitted to take up to 12 credits for dual credit.

Requirements

Program requirements for the Core Areas of Study include

Code	Title	Credits
Successful completion of a 12-credit core curriculum		
HDFS 991	Professional Issues for Family Specialists	4
HDFS 993	Theoretical Approaches to Human Development and Family Studies	4
HDFS 994	Research Seminar	4
Successful completion of 22 additional credits		
Students will design a program of study from HDFS and other department's graduate courses		
One 800 - 900 Level Statistics Class		4
HDFS 895	Advanced Independent Study	1-6
HDFS 930	Child Development in Context	4
or HDFS 950	Contemporary Issues in Adolescent Development	
HDFS 911	Graduate Internship	4 - 8
HDFS 857	Race, Class, Gender, and Families	4
HDFS 846	Human Sexuality	4

HDFS 860	Family Programs and Policies	4
HDFS 876	Children, Adolescents and the Law	4
HDFS 894	Families and the Law	4
SW 814	Introduction to Addiction: Assessment and Intervention	3
SOC 897	Special Topics	4

Thesis Option

Students electing to complete a research thesis must write and defend a thesis based on original research. Students must earn a minimum of 6 credits of HDFS 899 Master's Thesis.

HDFS 899	Master's Thesis (Successful completion of 6 - 10 credits)	6-10
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OR

Comprehensive Examination

Students electing to complete a comprehensive examination must take an additional 8 credits of approved electives in place of thesis credits. The comprehensive examination consists of a timed, three-hour close-book portion and a one-week take-home exam.

Comprehensive Examination, plus additional 8 credits of approved electives		8
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Grade Policy

A graduate student who fails a course must immediately attend a mandatory meeting with the instructor of the course, the Human Development and Family Studies Graduate Coordinator, and, if desired, the student's adviser. If a graduate student receives grades below "B-" in two or more courses, the Human Development and Family Studies Graduate Coordinator will make a recommendation to the Graduate School that the student be dismissed from the human development and family studies graduate program.

M.S. Degree: Core Areas of Study Courses

Code	Title	Credits
HDFS 807	Practicum	1-6
HDFS 809	Child Study and Development Center Internship	1-6
HDFS 834	Curriculum for Young Children	4
HDFS 843	Families, Schools, and Community	4
HDFS 846	Human Sexuality	4
HDFS 857	Race, Class, Gender, and Families	4
HDFS 860	Family Programs and Policies	4
HDFS 871	Observation and Assessment of Young Children	4
HDFS 873	International Perspectives on Children and Families	4
HDFS 876	Children, Adolescents and the Law	4
HDFS 894	Families and the Law	4
HDFS 897	Special Topics	1-4
HDFS 899	Master's Thesis	1 - 6
HDFS 911	Graduate Internship	2-8
HDFS 930	Child Development in Context	4
HDFS 950	Contemporary Issues in Adolescent Development	4
HDFS 991	Professional Issues for Family Specialists	4
HDFS 993	Theoretical Approaches to Human Development and Family Studies	4
HDFS 994	Research Seminar	4

Human Development and Family Studies: Marriage and Family Therapy (M.S.)

<https://chhs.unh.edu/hdfs/marriage-and-family-therapy-ms>

Description

The Marriage and Family Therapy Program prepares students to work in mental health, family service, medical, and human service settings. The program is fully accredited by the Commission on Accreditation for Marriage and Family Therapy Education (<http://coamfte.org/iMIS15/coamfte>) and meets the academic requirements for clinical membership in the AAMFT. The Program generally takes two years and two summers and requires five hundred (500) hours of clinical practice in order to graduate. Additional hours of clinical practice under supervision are required after graduation to meet state licensure standards and qualify for [clinical membership](http://www.aamft.org) in AAMFT (<http://www.aamft.org>). (<http://www.aamft.org>)

1. satisfactorily complete an established array of courses
2. accrue 500 hours of client contact through teaming, the Marriage and Family Therapy Center, and (for the majority of students) through an external internship
3. satisfactorily complete an integrative paper and presentation

Clinical training emphasizes treating individuals, couples, and families in relationship to larger systems that influence them. Supervised practica continue throughout the program.

MFT program graduates function as competent and ethical marriage and family therapy professionals and have a solid knowledge base of marriage and family therapy theory and research as well as clinical practice principles. The MFT Program successfully prepares graduates for employment as marriage and family therapists in community agencies and private practice.

Requirements

M.S. Degree Requirements: Marriage and Family Therapy Program

Program requirements include

Code	Title	Credits
Successful completion of a 12-credit core curriculum		
HDFS 991	Professional Issues for Family Specialists	4
HDFS 993	Theoretical Approaches to Human Development and Family Studies	4
HDFS 994	Research Seminar	4
Successful completion of approved coursework (35-36 credits)		
HDFS 841	Marital and Family Therapy	4
HDFS 930	Child Development in Context	4
HDFS 942	Advanced Systems of Marital and Family Therapy	4
HDFS 945	Family Therapy Practice I	4
HDFS 946	Critical Problems in Family Life	4
HDFS 947	Family Therapy Practice II	4

HDFS 952	Clinical Interventions in Couples Therapy	4
HDFS 954	Sex Therapy	4
Elective		3-4
Successful completion of 24 practicum credits (500 hours)		
HDFS 898	Marriage and Family Therapy Practicum	1 - 8

Successful completion and presentation of an integrative paper and video representing student's theory of change.

Grade Policy

A graduate student who fails a course must immediately attend a mandatory meeting with the instructor of the course, the Human Development and Family Studies Graduate Coordinator, and, if desired, the student's adviser. If a graduate student receives grades below "B-" in two or more courses, the Human Development and Family Studies Graduate Coordinator will make a recommendation to the Graduate School that the student be dismissed from the Human Development and Family Studies Graduate program.

M.S. Degree: MFT Program Courses

Code	Title	Credits
HDFS 897	Special Topics	1-4
HDFS 930	Child Development in Context	4
HDFS 841	Marital and Family Therapy	4
HDFS 942	Advanced Systems of Marital and Family Therapy	4
HDFS 945	Family Therapy Practice I	4
HDFS 946	Critical Problems in Family Life	4
HDFS 947	Family Therapy Practice II	4
HDFS 952	Clinical Interventions in Couples Therapy	4
HDFS 954	Sex Therapy	4
HDFS 991	Professional Issues for Family Specialists	4
HDFS 993	Theoretical Approaches to Human Development and Family Studies	4
HDFS 994	Research Seminar	4
HDFS 898	Marriage and Family Therapy Practicum	1 - 8

Adolescent Development (Graduate Certificate)

<https://chhs.unh.edu/hdfs/graduate-certificate-program-adolescent-dev>

Description

The certificate in adolescent development builds general competence in understanding and applying theory and research regarding adolescent development, with particular emphasis on the influences of families and communities. The program is grounded in an ecological approach that focuses on supporting the health and well-being of all adolescents, with special attention to using a developmental perspective to develop programs, policies, and other interventions that address contemporary risk and protective factors.

Requirements

A certificate in adolescent development is awarded upon successful completion of 14-15 credits.

Code	Title	Credits
Required Core Curriculum Courses		
HDFS 950	Contemporary Issues in Adolescent Development	4
HDFS 995	Seminar and Special Problems	4
Electives ¹		
Select two courses from the following:		
HDFS 846	Human Sexuality	
HDFS 860	Family Programs and Policies	
HDFS 857	Race, Class, Gender, and Families	
HDFS 876	Children, Adolescents and the Law	
HDFS 897	Special Topics	
HDFS 991	Professional Issues for Family Specialists	
HDFS 993	Theoretical Approaches to Human Development and Family Studies	
Multidisciplinary Electives		
EDUC 817	Growing up Male in America	
RMP 805	Management and Policy in Therapeutic Recreation	
RMP 830	Camp Administration and Leadership	
SOC 815	Criminological Theory	
SOC 820	Sociology of Drug Use	
SOC 840	Sociology of Mental Health	
SOC 876	Family Violence Research Seminar	
SOC 975	Sociology of the Family	
SW 805	Child and Adolescent Risks and Resiliency: Program, Policy and Practice	
SW 815	Practice with Gay, Lesbian, Bisexual, and Transgender People	

¹ One elective must be fulfilled with a Human Development and Family Studies course.

Other human development and family studies or multidisciplinary electives may be selected with advisor approval.

Grade Policy

A graduate student who fails a course must immediately attend a mandatory meeting with the instructor of the course, the Human Development and Family Studies Graduate Coordinator, and, if desired, the student's adviser. If a graduate student receives grades below "B-" in two or more courses, the Human Development and Family Studies Graduate Coordinator will make a recommendation to the Graduate School that the student be dismissed from the Human Development and Family Studies Graduate program.

Information Technology (IT)

Degree Offered: M.S.

This program is offered in Manchester.

The Department of Applied Engineering and Sciences at UNH Manchester offers a master of science in information technology (M.S. IT). The

program prepares students for a professional IT or computing-related career and for advanced studies in a computing discipline.

The program is designed for a broad and diverse audience of computing professionals determined to advance their careers, working adults seeking a career change, and qualified candidates with strong interest in the IT field. The learning environment of the M.S. IT program combines in-class and online learning activities, emphasizes collaboration and communication among peers, and integrates practice with computing technologies and authentic project experiences.

Courses are offered year around in fall, spring, and summer terms. Classes are scheduled during the day and in the evening to meet the needs of both full-time and part-time students. If enrolled part-time and taking, on average, two courses per term, students can complete the program in two years.

Upon graduation students will be able to:

1. Apply core and advanced information technologies to help organizations achieve their goals.
2. Develop, apply, integrate, operate, and manage secure IT systems and services.
3. Identify, analyze, and develop plans to meet the IT needs of a large spectrum of users, from end users of computing systems to managers of enterprise applications and developers of IT solutions.

Admission Requirements

Applicants must meet the admission standards of the UNH Graduate School and have a bachelor's degree in a computing discipline: computer science, information technology, computer information systems, information sciences, computer engineering, or software engineering. Students with undergraduate degrees in other fields are also welcome. The minimal formal coursework required of students without a bachelor's degree in computing includes: programming and data structures, machine and network architecture, networking, and database design and development.

Students are able to satisfy the program's prerequisites at by taking the following undergraduate courses at UNH Manchester:

Code	Title	Credits
COMP 520	Database Design and Development	4
COMP 525	Data Structures Fundamentals	4
COMP 530	Machine and Network Architecture	4
COMP 550	Networking Concepts	4

The selection of prerequisite courses depends on the student academic and professional experience.

<https://manchester.unh.edu/academics/degree-programs/information-technology>

Programs

- Information Technology (M.S.) (p. 99)

Faculty

See <https://manchester.unh.edu/academics/degree-programs/information-technology#unhstyleCollapsePane73> for faculty.

Information Technology (M.S.)

<https://manchester.unh.edu/academics/degree-programs/information-technology>

Description

The MS IT program is a professional graduate program in the applied and fast-changing field of Information Technology. The program prepares students for a professional IT or computing-related career and for advanced studies in a computing discipline. Offered at the University's urban campus in Manchester, a city that embraces cultural diversity, the program welcomes students from all over the world. With classes scheduled during the day and in the evening in fall, spring, and summer terms, the program gives students the flexibility to enroll full- or part-time. For diligent undergraduate students, this program is also available as an Accelerated Master's Program.

Tools, platforms, and programming languages used in IT industry evolve rapidly. Capitalizing on the campus location in New Hampshire's largest city and the state's corporate and financial center, the program requires an internship experience. With support from many business, technology and non-profit organizations who sponsor internships, students integrate authentic professional experiences in their academic coursework early in the program. The internship course may be repeated for a maximum of six credits.

Requirements

Degree Requirements

The M.S. IT program is 33 credits and has two options for completion:

- Master's Project Option: 10 courses (30 credits) and Master's Project course (3 credits)
- Master's Thesis Option: 9 courses (27 credits) and Master's Thesis (6 credits)

Both options require completion of:

- Five core IT courses (15 credits)
- Two IT integration courses, including a Internship course (6 credits)

The remaining coursework (9 credits in the Master's Project Option and 6 credits in the Master's Thesis Option) are elective courses. These courses can be graduate computing courses (COMP 800-level courses) or can be selected from other graduate programs at UNH.

Code	Title	Credits
Core IT Courses		15
COMP 805	Web Application Development	3
COMP 815	Information Security	3
COMP 820	Database Systems and Technologies	3
COMP 830	Object-Oriented Software Development	3
COMP 835	Networking Technologies	3

IT Integration Courses		6
COMP 851	System Integration and Architecture	3
COMP 890	Internship ¹	3
Elective Courses ²		6
		or
		9
Elective courses can be in various disciplines, including computer science (CS), computing (COMP), business and administration (ADMN), analytics and data science (DATA), and more		
Culminating Experience		3
		or
		6
Complete the thesis or project option		
COMP 898	Master's Project ³	3
COMP 899	Master's Thesis	6

¹ Students are required to enroll in at least one credit of the COMP 890 Internship course upon successful completion of nine credits in their program of study. The Internship course may be repeated for a maximum of 6 credits.

² Depending on the culminating experience option (project or thesis), there are two or three elective courses required in the program.

³ The project is integrative in nature and requires IT research.

Justice Studies (JUST)

Degree Offered: M.A.

This program is offered in Durham.

The goal of the master of arts degree program in justice studies is to produce graduates who have a high level of knowledge about law and justice in American society and worldwide. Upon completion, graduates will be able to enhance their careers in the justice system, enter new careers in the justice system, or continue their graduate training in law, social sciences, or humanities.

The program addresses issues of justice that are not necessarily criminal in nature. It will familiarize students with legal and justice ideas, legal institutions, and the legal process. It will provide tools for a reasoned appraisal of how the law works and of the policies that underlie it. The courses address a wide variety of subjects, including philosophy of law, American legal history, psychological aspects of the law, social control, criminology, juvenile delinquency, law and literature, and family law. Courses are taught by faculty with backgrounds in both the social sciences and humanities.

Special Note on Tuition

The justice studies masters of arts degree program has a different pricing structure. You can find the most current pricing for this program on the business services website (<http://www.unh.edu/business-services/tuitmajs>).

Admission Requirements

In addition to meeting the general Graduate School requirements, applicants must submit current scores (within five years) from the general test of the GRE or the LSAT.

Students are admitted for the summer term. Classes for this program begin during the last week in July.

<http://cola.unh.edu/justice-studies/graduate-programs>

Programs

- Justice Studies (M.A.) (p. 100)

Faculty

See <https://cola.unh.edu/justice-studies-program/faculty-staff-directory> for faculty.

Justice Studies (M.A.)

<https://cola.unh.edu/justice-studies/program/ma/justice-studies>

Description

The Master of Arts degree program in Justice Studies (MAJS) provides a broad understanding of justice, crime, and law. It provides tools for reasoned appraisal of how the justice system works and what policies underlie it. The program familiarizes students with legal and justice ideas, justice institutions, and legal processes. It draws on a variety of disciplines, subjects, and research methodologies for its core knowledge. Our students work closely with faculty with established reputations as scholars, teachers, and practitioners.

Requirements

Degree Requirements

The master of arts in justice studies requires that students complete a minimum of nine courses (36 credit hours) in justice studies from the following list:

Code	Title	Credits
Required Courses		
JUST 830	Theories of Justice	4
JUST 901	Pro-seminar: Introduction to Justice Studies	4
JUST 905	Quantitative Research Methods	4
JUST 907	Applied Research Methods	4
Select one of the following:		4
SOC 815	Criminological Theory	
	or JUST 865 Special Topics	
SOC 880	Social Conflict	
SOC 921	Crime and Conflict	
	or JUST 865 Special Topics	
Concluding Experience		
Select Option A or B from the below:		8
Option A:		
JUST 897	Culminating Project	
JUST 950	Internship	
Option B:		
JUST 899	Masters Thesis	

Electives

Select two courses if taking JUST 899 or two courses plus JUST 950 if taking JUST 897

Total Credits 36

Electives

Code	Title	Credits
EDUC 867	Students, Teachers, and the Law	4
EDUC 897	Special Topics in Education	1-4
EDUC 951	Laws and Regulations Affecting the Education of Students with Disabilities	4
EDUC 967	School Law	4
EDUC 968	Collective Bargaining in Public Education	4
HDFS 872	International Approaches to Child Advocacy	4
HDFS 876	Children, Adolescents and the Law	4
HDFS 894	Families and the Law	4
HIST 809	United States Legal History Special Topics	4
HIST #845	19th Century European Great Powers - Diplomacy and International Law	4
HIST 949	Colloquium in United States History	3
JUST 950	Internship	4
JUST 965	Special Topics	4
JUST 995	Reading and Research	1-4
POLT 801	Courts and Public Policy	3
POLT 803	Performance Management in Public and Non-Profit Organizations	3
POLT 808	Administrative Law	3
POLT 897C	Seminar in Comparative Politics	3
POLT 897F	Seminar in Public Administration	3
POLT 898B	Seminar in American Politics	3
PSYC 954	Advanced Seminar in Social Psychology	4
SW 897	Special Topics in Social Work and Social Welfare	2
		or
		3
SW 979	Social Work and the Law	3
SOC 815	Criminological Theory	4
SOC 820	Sociology of Drug Use	4
SOC 876	Family Violence Research Seminar	4
SOC 880	Social Conflict	4
SOC 921	Crime and Conflict	4

Kinesiology (KIN)

Degree Offered: M.S., M.S./M.S.W., Graduate Certificate

This program is offered in Durham.

The Department of Kinesiology offers a master of science degree with the following areas of concentration: exercise science, outdoor education, and sport studies. In addition, the Departments of Kinesiology and Social Work offer a dual degree program, which consists of a master of science in kinesiology with a concentration in outdoor education, as well as a master in social work (M.S.W.).

Additionally, a graduate certificate in adapted physical education is offered.

Admission Requirements

Admission is based on undergraduate preparation, academic record, Graduate Record Examination general test scores (current scores, within the last five years), and letters of recommendation. Applicants must be above-average students and show adequate preparation in the basic support courses of the selected concentration area. Applicants who have not met specific course prerequisites should expect to take additional undergraduate work without receiving graduate credit.

Students applying for the dual degree program must meet both the admission requirements for kinesiology and for social work and be admitted to both programs (applications to each program required). See social work for their admission requirements.

<https://chhs.unh.edu/kin>

Programs

- Kinesiology (M.S.) (p. 101)
- Kinesiology and Social Work Dual Degree (M.S./M.S.W.) (p. 103)
- Adapted Physical Education (Graduate Certificate) (p. 103)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Kinesiology (M.S.)

Description

The Department of Kinesiology offers a degree with the following areas of concentration: exercise science, outdoor education, and sport studies. In addition, the Departments of Kinesiology and Social Work offer a dual degree program, which consists of a master of science in kinesiology with a concentration in outdoor education, as well as a master in social work (M.S.W.).

Exercise Science Concentration:

The MS in Kinesiology: Exercise Science prepares individuals for advanced careers in health and fitness promotion and education programs in hospitals, sports medicine centers, wellness clinics, universities, and rehabilitation facilities. Students are also prepared for terminal degree programs in the health professions, basic biology fields, medicine, or other health-related fields. Students must earn a grade of B- or better in every required course and must complete a capstone requirement to finish the degree. Interested students should consult with the option coordinator, Dr. Summer Cook.

Outdoor Education Concentration:

The University of New Hampshire is a leader in graduate education in the field of outdoor experiential education. Our graduates have gone on to run collegiate outdoor programs, pursue Ph.D.'s and join college faculty, design executive leadership programs, direct outdoor education centers, work in non-profit management, administer state and federal projects,

lead international programs, and teach in K-12 schools in both the public and private sectors.

The goal of the Master of Science program is to prepare outdoor experiential educators with the skills necessary to become managers and directors of outdoor/experiential education programs, conduct advanced practice, and/or pursue a related degree at the Doctoral level. In addition to core courses, students focus on one of three areas: higher education outdoor programming, youth development outdoor programming, or adventure therapy (through the combined MS/MSW dual degree with Social Work).

Students focusing on higher education outdoor programming gain an understanding of college-level policies, practices, and program structures common to outdoor programs in institutions of higher education, particularly those with outdoor orientation programs (OOPs). Students focusing on youth development outdoor programs learn about contemporary perspectives on youth development, especially related to participation in non-formal educational programs in a variety of outdoor settings and activities. Students focusing on adventure therapy become eligible for licensure and clinical social work practice in wilderness, community-based, or other settings.

Sport Studies Concentration:

The Kinesiology Sport Studies graduate program focuses on preparing professionals in youth, interscholastic, intercollegiate programs and elite sport agencies to provide extraordinary sport experiences. Providing an understanding of the theoretical and practical knowledge and skills within the context of sport is essential in developing sport professionals at UNH. Our curriculum provides a framework of coursework, and the flexibility to focus preparation on careers in coaching or administration or additional graduate study in sport psychology. In addition, students have opportunities for applied experience and research with faculty. The graduate program in Kinesiology: Sport Studies engages students in learning experiences in the classroom, in applied settings, and in research. The focus on a theory-to-practice approach is infused throughout the curriculum with the goal that our students will be well prepared professionals as they enter the workforce or further graduate study.

Integrated M.S.W./M.S. Dual Degree Program

The use of adventure experiences as a therapeutic or socio-educational intervention for clients with mental health needs is well documented. The UNH Departments of Social Work and Kinesiology offer an Integrated M.S.W./M.S. Dual Graduate Degree Program. This program is the first of its kind in the nation. It organizes a significant number of existing resources and assets at UNH in a way that empowers participating students for a career in adventure therapy.

Prospective graduate students in the SW/KIN Integrated Dual-Degree program apply and need to be accepted into each separate graduate program. Upon acceptance in both programs, students progress through the integrated curriculum, graduating from both programs at the end of their third year. The exception to this would be an Advanced Standing student in social work, who could graduate from both programs in two years.

Dual degree students take classes simultaneously over the course of three years in both Kinesiology: Outdoor Education and Social Work and complete a minimum of 77 credits for graduation. This includes two

internships, one during their first year of study and a second specialized internship during the third year, which concentrates on the utilization and application of adventure therapy in an agency setting. In order to graduate with the dual degrees, the student completes a 24-hour per week social work/adventure therapy-related field internship in their third year as well as a KIN Thesis or Advanced Studies Project in their last semester. Contact Dr. Michael Gass for additional information.

Requirements

Degree Requirements

All degree candidates will be required to complete courses listed in the Masters Degree Core, the designated concentration core, and electives as required in order to meet the 30-credit minimum necessary for graduation. In addition to coursework, students follow either the thesis, the non-thesis, or the advanced research plan as described below.

MASTERS DEGREE CORE

Code	Title	Credits
Select one of the following graduate statistics courses or equivalent:		
EDUC 881	Introduction to Statistics: Inquiry, Analysis, and Decision Making	4
SW 962	Data Analysis and Statistics	3

Exercise Science Concentration

Code	Title	Credits
KIN 896	Advanced Research in Exercise Science	6
KIN 901	Analysis of Professional Literature	4
KIN 902	Colloquium (two semesters)	2-4

Additional elective courses are selected in consultation with academic advisor to meet the 30-credit minimum necessary for graduation¹

Sport Studies Concentration

Code	Title	Credits
KIN 880	Psychological Factors in Sport	4
KIN 843	Sport Marketing	4
or KIN 840	Athletic Administration	

Select one advisor-approved KIN elective at the 800 or 900 levels 3-4

KIN 901	Analysis of Professional Literature	4
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Additional elective courses are selected in consultation with academic advisor to meet the 30-credit minimum necessary for graduation

Outdoor Education Concentration

Code	Title	Credits
KIN 883	Psych Factors of Adventure Ed	4
KIN 884	Historical Foundations of Outdoor Experiential Education	4
KIN 885	Program Models and Evaluation in Outdoor Education	4
KIN 886	Organization and Administration of Outdoor Education Programs	4
KIN 897	Advanced Topics in Outdoor Education	2-6

Students pursuing the Higher Education Outdoor Programming focus also must take the following:

KIN 950	Internship	2-4
and		
RMP 872	Law and Public Policy in Leisure Services	3
or EDUC 897	Special Topics in Education	
One Approved Elective ²		3-4

Students pursuing the Youth Development Outdoor Programming focus must take the following:

HDFS 950	Contemporary Issues in Adolescent Development	4
One Approved Elective ³		3-4

Students pursuing the Adventure Therapy focus must be dually enrolled in the MSW program and also take the following:

KIN 882	Therapeutic Applications of Adventure Programming	4
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For additional information on the dual MS/MSW degree, see Program Description above.

Thesis Plan

A minimum of 30 approved graduate credits, including a thesis (24 graduate course credits plus 6 thesis credits), as well as an oral defense of the thesis, are required in the thesis plan.

Non-Thesis Plan

A minimum of eight approved graduate courses (with a minimum of 30 credits) are required in the non-thesis plan. Four credits of KIN 895 Advanced Studies are required. A student may begin taking KIN 895 Advanced Studies only after completing at least three approved graduate courses.

Advanced Research Plan

Exercise science students who elect this plan must take a total of 6 credits of KIN 896 Advanced Research in Exercise Science. Outdoor education students who elect this plan must take a total of 6 credits of KIN 897 Advanced Topics in Outdoor Education. In addition, exercise science and outdoor education students must orally present their research to faculty and peers.

¹ KIN 804 Electrocardiography
 KIN 805 Topics in Applied Physiology
 KIN 806 Neurology
 KIN 820 Science and Practice of Strength Training
 KIN 822 Applied Biomechanics
 KIN 824 Exercise Metabolism: Acute and Chronic Adaptations
 KIN 836 Fitness and Graded Exercise Test and Prescription
 KIN 837 Exercise Prescription and Leadership in Healthy and Special Populations
 KIN 894 Cardiopulmonary Pathologies

² Higher Education Outdoor Programming Electives:
 EDUC 976 Policy and Governance in Higher Education
 RMP 870 Management and Design of Recreation and Park Facilities
 RMP 924 Fund Development and Grantwriting
 POLT 802 Grant-writing for Public and Non-profit Sectors
 GRAD #940 Foundations in College Teaching
 GRAD 950 Issues in College Teaching
 GRAD #963 College Students and the Undergraduate Culture

- ³ Youth Development Outdoor Programming Electives:
 HDFS 846 Human Sexuality
 HDFS 876 Children, Adolescents and the Law
 HDFS 995 Seminar and Special Problems
 EDUC 801 Human Development and Learning: Educational Psychology
 EDUC 805 Contemporary Educational Perspectives
 SW 805 Child and Adolescent Risks and Resiliency: Program, Policy and Practice
 SW 815 Practice with Gay, Lesbian, Bisexual, and Transgender People
 RMP 830 Camp Administration and Leadership
 RMP #868 Theories of Youth Development

Kinesiology and Social Work Dual Degree (M.S./M.S.W.)

<https://chhs.unh.edu/sw/master-social-work-and-adventure-therapy-ms>

Description

Social Work and Kinesiology

Dual-degree Social Work and Kinesiology students take classes simultaneously over the course of two-and-a-half years in both Social Work and Kinesiology: Outdoor Education and complete a minimum of 77 credits for graduation. This includes two internships, one during their first year of study, and a second specialized block placement internship over the summer following the second year of study, which concentrates on the utilization and application of adventure therapy in an agency setting. This block placement internship may occur in New England or in other appropriate settings across the U.S. Students are required to also complete an advanced studies project during their last year of study, which is supervised by faculty in Kinesiology: Outdoor Education and Social Work

Admission Requirements

Dual degree applicants in Social Work and Kinesiology: Outdoor Education must meet the requirements for both Social Work and Kinesiology: Outdoor Education. Applicants should check each program for their requirements which may be different. GREs are required.

Dual degree applications are **due by February 1st**.

For additional information regarding the Social Work/KIN dual degree admission requirements, contact Anita Tucker at Anita.Tucker@unh.edu.

Requirements

Social Work and Kinesiology Dual Degree Program MSW/MS Courses

Code	Title	Credits
SW 820	Social Welfare Policy I	3
SW 830	Social Work Practice I	3
SW 840	Implications of Race, Culture, and Oppression for Social Work Practice	3
SW 850	Human Behavior and the Social Environment I (HBSE I)	3

SW 880	Field Internship I (seminar and concurrent twoday/ week internship/academic year)	3
KIN 882	Therapeutic Applications of Adventure Programming	4
SW 860	Research Methods in Social Work	3
SW 831	Social Work Practice II: Practice in Small Groups and Community Organizations	3
SW 851	Human Behavior and the Social Environment II (HBSE II)	3
SW 881	Field Internship II	3
KIN 883	Psych Factors of Adventure Ed	4
SW 930	Advanced General Practice III: Clinical Assessment and Intervention	3
SW 962	Data Analysis and Statistics	3
SW 952	Human Behavior and the Social Environment III	3
KIN 897	Advanced Topics in Outdoor Education	2-6
SW 931	Advanced Generalist Practice IV: Community and Administrative Practice	3
KIN 886	Organization and Administration of Outdoor Education Programs	4
SW 865	Adventure Therapy: Facilitation and Processing of the Experience	3
SW 926	Social Welfare Policy II	3
SW 982	Field Internship III	4
SW 983	Field Internship IV	4
KIN 884	Historical Foundations of Outdoor Experiential Education	4
Total Credits		71-75

Adapted Physical Education (Graduate Certificate)

https://chhs.unh.edu/kin_pe/adapted-physical-education-graduate-certificate

Description

The Department of Kinesiology at the University of New Hampshire now offers a graduate certificate in adapted physical education. The intent of this certificate is to better prepare teachers to enhance their overall knowledge of students with disabilities in general and/or adapted physical education or physical activity settings. For more information, please contact Michelle Grenier at (603) 862-1835 or email michelle.grenier@unh.edu.

Applying

Please visit the Graduate School website (<http://www.gradschool.unh.edu>) for information about applying to the certificate program.

Requirements

Certificate Requirements

Students must hold a baccalaureate degree from an accredited college or university and have a valid New Hampshire physical education

teaching license or be enrolled in the master in education program at the University of New Hampshire and complete 15 credit hours of specified coursework to receive the certificate.

Code	Title	Credits
Required Courses		
KIN 831	Inclusive Teaching Through Sport	4
KIN 842	PE Practicum for Students with Disabilities	4
KIN 895	Advanced Studies	2-4
Elective Courses (select at least one)		
COMM 914	Augmentative and Alternative Communication	3-4
EDUC 850	Introduction to Exceptionality	4
EDUC #854	Contemporary Issues of Developmental Disabilities	4
EDUC 956	Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors	4
KIN 881	Inclusion in Physical Education ¹	4

¹ With consent of their advisor, Kinesiology Health and Physical Education students who have taken KIN 781 Inclusion in Physical Education can satisfy the four course requirement through another 800-level elective relevant to the certificate program.

Liberal Studies (LS)

Degree Offered: M.A.L.S.

This program is offered in Durham.

The Master of Arts in Liberal Studies program will no longer be accepting new students. Current M.A.L.S. students will continue to have access to the same high-quality education and resources until they graduate.

The program offers a master of arts in liberal studies (M.A.L.S.) degree. The master of arts in liberal studies is an innovative, interdisciplinary graduate program. Housed within the College of Liberal Arts but drawing its courses and instructors from across the University, the program makes available a diverse spectrum of offerings and a wealth of faculty expertise and resources.

The liberal studies curriculum is intended to promote broad intellectual comprehension and enrichment rather than vocational or professional training within a single field or discipline. Designed to address the particular interests of students who seek to deepen their knowledge, the program offers a challenging but flexible program of cross-disciplinary learning.

<https://cola.unh.edu/liberal-studies>

Programs

- Liberal Studies (M.A.L.S.) (p. 104)

Faculty

See <https://cola.unh.edu/liberal-studies/people> for faculty.

Liberal Studies (M.A.L.S.)

<https://cola.unh.edu/liberal-studies/program/mals/liberal-studies>

Description

The Master of Arts in Liberal Studies program will no longer be accepting new students. Current M.A.L.S. students will continue to have access to the same high-quality education and resources until they graduate.

Admission Requirements

Admission to the master of arts in liberal studies is selective. A bachelor's degree is required for admission. Students will be asked to provide relevant transcripts of their educational experience, a resume, and letters of recommendation. They will also be asked to submit a brief essay describing why they are particularly interested in this program and indicating the sort of interdisciplinary focus or area of learning in which they might like to concentrate their study. The Graduate Record Exam (GRE) is not required but is helpful.

Requirements

Degree Requirements

The program consists of 30 credits divided into three parts: a core seminar specifically designed for and required of every student, to be taken within one year of entrance to the program# a concentration made up of at least five elective courses chosen from various disciplines across the liberal arts that centers on an interdisciplinary theme or topic# and a 6 credit master's thesis LS 899 or a 6 credit project LS 898, which is intended to act as an integrating capstone experience for liberal studies students.

Code	Title	Credits
LS 800	Core Seminar ¹	4
Select a concentration ²		20
LS 898	Master's Project ³	6
or LS 899	Master's Thesis	
Total Credits		30

¹ Each liberal studies student is required to take one core seminar as an introduction to the program as a whole. The seminar must be taken within the first year of a student's matriculation in the program, preferably in the first semester. Although all core seminars focus on interdisciplinary issues and themes, each is meant to introduce students to different topics and divergent disciplines from across the liberal arts such as literature, the arts, philosophy, history, women's studies, political science, and sociology.

² Students will work with the director of the program and a concentration and thesis adviser to develop an interdisciplinary concentration program of study, which focuses on a significant topic, issue, perspective, or cultural development, and is made up of at least five graduate-level elective courses offered in various departments throughout the college and University. A concentration should constitute a sustained thematic exploration and may be selected from a menu of suggested concentrations or may be self-designed by each student with the help of his or her adviser. The five courses are to be selected from 700-900-level courses regularly offered within departments and colleges across the University, including up to three independent study courses carried out as a tutorial with particular faculty members (with permission). It is expected that a student's concentration will culminate in a concluding final project or thesis. The following are typical examples of cross-disciplinary concentration programs of study: American studies, the humanities, ecology and values, justice studies, labor studies, religious studies, urban studies, and women's studies.

³ With the support of their concentration and thesis adviser, students prepare a final project consistent with their concentration and interests. A capstone experience, the project can be a scholarly thesis or equivalent creative endeavor, which integrates the student's learning in a particular concentration. The director of the program will meet periodically with those students enrolled for thesis credit in order to provide a forum for discussing their research and writing.

Materials Science (MS)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The materials science program offers the master of science degree in materials science and doctor of philosophy degree in materials science and engineering. The program offers research opportunities over a broad range of areas including synthesis and characterization of thin films, fullerenes and nanotubes, molecular templates, self-organizing nanostructures, polymers and polymer nanoparticles, using scanning probe microscopy, physical and chemical vapor deposition methods, micromechanics, molecular beam mass spectrometry, and computational methods.

Admission Requirements

Admission to the Master of Science and Doctor of Philosophy degree programs is based upon a strong undergraduate record. A minimum GPA of 3.0 is required, but undergraduate students with exceptional experience or other mitigating factors will also be considered. Except under special circumstances, applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). Since materials science is an interdisciplinary field, students from mechanical engineering, chemical engineering, electrical engineering, chemistry, mathematics, physics, and other engineering- and science-related disciplines will be considered, however, at least one undergraduate introductory course in materials science should be completed before entering the program. The applicant's undergraduate program should also include, as a minimum, two semesters of calculus and preferably an additional course in differential equations. Members of the faculty are available to evaluate each student's undergraduate curriculum. A series of appropriate courses will be required for those students with deficiencies in their undergraduate program.

Qualified physics students at the University of New Hampshire may be admitted to an accelerated program leading to a combined Bachelor of Science degree in physics and a Master of Science in Materials Science within a total of five years. Please consult the materials science website for details.

<https://ceps.unh.edu/materials-science>

Programs

- Materials Science and Engineering (Ph.D.) (p. 105)
- Materials Science (M.S.) (p. 106)

Faculty

See <https://ceps.unh.edu/directory/all> for faculty.

Materials Science and Engineering (Ph.D.)

<https://ceps.unh.edu/materials-science/materials-science-phd>

Description

We offer degrees to qualified students interested in interdisciplinary research with an emphasis on the synthesis, characterization and utilization of nanoscale materials. All MSP students learn about the interplay of structure, processing, characterization, and properties of materials with useful applications. Our seventeen faculty members are active collaborators with research and development groups located around the world, and are experienced in managing research projects with practical results. Graduates of our program work in research, engineering and process development positions in a variety of fields.

Requirements

Ph.D. Degree Requirements

The Ph.D. in Materials Science requires 39 course credits beyond a baccalaureate degree, as well as a significant amount of research.

Code	Title	Credits
MS 960	Thermodynamics and Kinetics of Materials I	3
MS 961	Thermodynamics and Kinetics of Materials II	3
Select one course each satisfying the following areas		9-12
Synthesis and processing		
Characterization		
Structure-property relationships		
MS 900	Seminar (two semesters)	2
Select five additional courses with at least 12 total credits at the 900 5-20 level (including those courses taken at the master's level)		

Other courses that may count as electives in the Materials Science Program are taught by faculty in chemistry, mechanical engineering, physics, and other departments. For a complete list of these courses, please see the Graduate Student Handbook on the materials science website.

Students who have done graduate work at other schools that included courses similar to those in the Materials Science Program may petition for waivers of UNH degree requirements.

The student will be advanced to candidacy after he or she has completed an M.S. degree or 24 credits of graduate coursework with at least 6 credits at the 900 level and the qualifying examination. The qualifying exam shall consist of two parts. The student must present a written proposal adhering to NSF guidelines, followed by an oral defense of that proposal. In addition, the student must submit a substantive review paper and an oral presentation on that paper. A materials science program faculty committee will determine the subject of the paper. A substantive record of publication in conjunction with an oral presentation at a conference may substitute for the review paper. A materials science program faculty committee will decide whether the previous publication record is substantive. The committee will evaluate the paper, the proposal, and the two oral presentations to determine whether the student is suitably prepared for graduate research at the Ph.D. level. The proposal and paper for the qualifying exam should normally be completed within six months of completing 24 credits of coursework.

Upon the successful completion of the qualifying examination, the student is advanced to candidacy and, upon the recommendation of the graduate coordinator, a doctoral committee is appointed by the dean of the Graduate School. The doctoral committee conducts an annual review of the student's progress, supervises and approves the doctoral dissertation, and administers the final dissertation defense.

Materials Science (M.S.)

<https://ceps.unh.edu/materials-science/materials-science-ms>

Description

We offer degrees to qualified students interested in interdisciplinary research with an emphasis on the synthesis, characterization and utilization of nanoscale materials. All MSP students learn about the interplay of structure, processing, characterization, and properties of materials with useful applications. Our seventeen faculty members are active collaborators with research and development groups located around the world, and are experienced in managing research projects with practical results. Graduates of our program work in research, engineering and process development positions in a variety of fields.

Requirements

M.S. Degree Requirements

The Master's Thesis Option requires a total of **30 credits**, which include 24 course credits and 6 thesis credits (MS 899 Master's Thesis). At least 6 credits must be at the 900 level.

The Master's Project Option also requires a total of **30 credits**, which includes 27 course credits and 3 project credits (MS 898 Master's Project). The project may be theoretically or experimentally based but will be significantly less intensive than a thesis. The project will be defined and evaluated by the student's advisor. At least 6 credits of coursework must be at the 900 level. The remaining course requirements are the same as that of the Master's Thesis Option.

Code	Title	Credits
MS 960	Thermodynamics and Kinetics of Materials I	3
MS 961	Thermodynamics and Kinetics of Materials II	3
Select one course each satisfying the following areas:		9-12
Synthesis and processing		
Characterization		
Structure-property relationships		
MS 900	Seminar (two semesters)	2
Select one of the following:		
Thesis Option:		
MS 899	Master's Thesis (6 credits)	6
Select one additional elective		3-4
Project Option:		
MS 898	Master's Project (3 credits)	3
Select two additional electives		6-8

All students are expected to take at least 6 course credits at the 900 level. Students who have done graduate work at other schools that included courses similar to those in the Materials Science Program may petition for waivers of UNH degree requirements. Other courses that may count as electives in the Materials Science Program are taught by faculty in chemistry, mechanical engineering, physics, and other departments. For a complete list of these courses, please see the Graduate Student Handbook on the materials science website.

Mathematics and Statistics (MATH)

Degrees Offered: Ph.D., M.S., M.S.T., Graduate Certificate

This program is offered in Durham.

The mission of the Mathematics and Statistics program is twofold: to prepare students for a variety of exciting and rewarding career opportunities in business, industry, government and the teaching professions; and to advance forefront knowledge in the areas of pure mathematics, applied mathematics, statistics, and mathematics education through world-class cutting-edge research.

The Department of Mathematics and Statistics offers programs leading to a master of science for teachers (M.S.T.) in mathematics, master of science in mathematics, master of science in mathematics with an option in applied mathematics, and a master of science in mathematics with an option in statistics. Students in the master of science in applied mathematics may choose approved courses in the doctoral program in Integrated Applied Mathematics as part of their MS program.

The department also offers doctor of philosophy programs in mathematics, integrated applied mathematics, statistics, and mathematics education.

In general, the master's degree programs offer the student a high level of preparation for professional employment as well as appropriate preparation for programs leading to the Ph.D. The Ph.D. programs prepare the student primarily for a career in university teaching and research.

The graduate programs have limited enrollment, allowing students to work closely with faculty members in their areas of expertise. Research within the department is currently being conducted in many areas of the mathematical sciences, including: operator theory, Hilbert spaces,

geometric function theory, complex analysis, ring theory, commutative algebra, homological algebra, quantum groups, tensor categories, combinatorics, topology, algebraic topology, category theory, nonlinear dynamics and chaos, data compression, chaotic prediction and control, spectral analysis, asymptotic analysis, mathematical control theory, environmental statistics, spatial and spatio-temporal statistics, Bayesian and computational statistics, wavelets in statistics, teaching and learning of K-12 mathematics and statistics, teaching and learning of undergraduate mathematics and statistics, mathematical curriculum and teacher education, and calculus learning.

Additionally, a graduate certificate in industrial statistics is offered.

Admission Requirements

Applicants for the M.S. and Ph.D. degrees must have completed significant undergraduate coursework in mathematics, preferably in algebra, analysis, and topology.

Applicants for the M.S. with applied mathematics option must have completed significant coursework in analysis or applied analysis.

Applicants for the M.S. with statistics option will typically have an undergraduate degree in the mathematical, physical, biological, or social sciences or in engineering. Applicants must have completed mathematical coursework at least through multivariate calculus, and must have knowledge of basic statistics and basic linear algebra at the undergraduate level.

Applicants for the degree of master of science for teachers (M.S.T.) usually possess a background equivalent to at least a minor in mathematics and must have completed education courses sufficient for certification, or have three years teaching experience, or currently hold a full-time teaching position.

<https://ceps.unh.edu/mathematics-statistics>

Programs

- Applied Mathematics (Ph.D.) (p. 107)
- Mathematics (Ph.D.) (p. 108)
- Mathematics Education (Ph.D.) (p. 108)
- Statistics (Ph.D.) (p. 109)
- Mathematics (M.S.) (p. 109)
- Mathematics: Applied Mathematics (M.S.) (p. 110)
- Mathematics: Statistics (M.S.) (p. 110)
- Mathematics (M.S.T.) (p. 111)
- Industrial Statistics (Graduate Certificate) (p. 111)

Faculty

See <https://ceps.unh.edu/directory/all> for faculty.

Applied Mathematics (Ph.D.)

<https://ceps.unh.edu/integrated-applied-mathematics>

Description

The IAM Ph.D. is a unique Applied Mathematics program designed to facilitate interdisciplinary research among graduate students and participating faculty. This interdisciplinary program gives students the opportunity to explore the frontier where the sciences meet cutting-edge mathematical analysis and high performance computing. Science topics include Fluid Dynamics, Plasma Physics, Space Physics, Geoscience, and Dynamical Systems.

Admission Requirement

Applicants to the Integrated Applied Mathematics Ph.D. program are expected to have a bachelor's degree in mathematics or an appropriate science or engineering field.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the program.

Requirements

Code	Title	Credits
Required Courses		
PHYS 931	Mathematical Physics	3
IAM 830	Graduate Ordinary Differential Equations	3
IAM 851	Introduction to High-Performance Computing	3
IAM 932	Graduate Partial Differential Equations	3
IAM 933	Applied Functional Analysis	3
IAM 961	Numerical Analysis I: Numerical Linear Algebra	3
IAM 962	Numerical Partial Differential Equations	3
Select a 2-course specialization sequence, for example, one of the following:		6-7
MATH 847 & IAM 950	Introduction to Nonlinear Dynamics and Chaos and Spatiotemporal and Turbulent Dynamics	
ME 807 & ME 909	Analytical Fluid Dynamics and Viscous Flow	
PHYS 953 & PHYS 951	Magnetohydrodynamics of the Heliosphere and Plasma Physics	
Select a minimum of three technical electives:		9
IAM 940	Asymptotic and Perturbation Methods	
ME 812	Waves in Fluids	
Additional elective as approved by your adviser and program		
Total Credits		36-37

Candidacy Requirements

Students must pass a three part Ph.D. qualifying exam.

- Comprehensive exam in mathematical methods
- Comprehensive exam in numerical analysis and high-performance computing
- Oral or written exam in specialization area

Students must select a research adviser and have a selected research topic.

Dissertation

Students must present a seminar presentation of thesis proposal to dissertation committee.

Upon completion of research, students must present a seminar on the research.

Students must submit a dissertation that includes original research in integrated applied mathematics.

Mathematics (Ph.D.)

<https://ceps.unh.edu/mathematics-statistics/mathematics-phd>

Description

The Mathematics Ph.D. program provides research opportunities in core mathematics, including operator algebras, algebra, algebraic topology, analysis and complex analysis.

Admission Requirement

Applicants for the M.S. and Ph.D. degrees must have completed significant undergraduate coursework in mathematics, preferably in algebra, analysis, and topology.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the program.

Requirements

Students are advanced to candidacy after meeting the following requirements:

Code	Title	Credits
Required Courses		
MATH 951	Algebra I	3
MATH 952	Algebra II	3
MATH 953	Analysis I	3
MATH 954	Analysis II	3
MATH 955	Topology I	3
Total Credits		15

Mathematics Ph.D. students must pass written comprehensive examinations in algebra, analysis, topology and an elective subject. Elective subjects include functional analysis, algebraic topology, applied mathematics, statistics, advanced algebra, advanced complex analysis, advanced mathematics education, et al.

Advanced coursework in a minor field (usually within mathematics, but possibly in another area of the mathematical sciences), and a major field (that of the student's intended dissertation work) followed by successful completion of oral examinations in their minor and major areas.

Experience in teaching equivalent to at least half-time for one year

Dissertation

Doctor of Philosophy in Mathematics: A dissertation that includes original results in mathematics.

Mathematics Education (Ph.D.)

<https://ceps.unh.edu/mathematics-statistics/mathematics-education-phd-1>

Description

The program is designed to provide students with depth and breadth in the fields of both mathematics education and mathematics and prepare students for educational and research leadership. The program is designed to advance forefront knowledge in mathematics education through world-class cutting-edge research.

Admission Requirement

Applicants to the Ph.D. in Mathematics Education degree must have BA or BS from an accredited college or university. Successful candidates typically have a bachelor's degree in mathematics or mathematics education and/or advanced coursework in mathematics.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the program.

Requirements

Students are advanced to candidacy after meeting the following requirements:

Code	Title	Credits
Required Courses		
MATH 951	Algebra I	3
MATH 952	Algebra II	3
MATH 953	Analysis I	3
MATH 954	Analysis II	3
MATH 955	Topology I	3
Advanced Coursework in the Major Field (Mathematics Education)		
MATH 958	Foundations of Math Education	3
MATH 968	Topics in Mathematics Education I (A)	3
MATH 968	Topics in Mathematics Education I (B)	3
MATH 978	Topics in Mathematics Education II (at least two semesters)	6
Total Credits		30

Successful completion of written comprehensive examinations in algebra, analysis, mathematics education and an elective subject.

Successful completion of a minor program of study (usually a related one, such as educational psychology or research methodology, but possibly in an area of mathematics) followed by qualifying examinations in each.

Successful completion of a dissertation proposal defense in the major field of mathematics education and a presentation in the minor program of study.

Experience in teaching equivalent to at least halftime for one year typically through assistantship assignments.

Dissertation

Doctor of Philosophy in Mathematics Education: A dissertation that involves original research in mathematics education.

Statistics (Ph.D.)

<https://ceps.unh.edu/mathematics-statistics/statistics-phd>

Description

The Ph.D. in statistics is a flexible program of coursework and research that meshes the faculty's expertise with the students' interests. Current faculty expertise are in Design of Experiments, Nonparametric Function Estimation, Model Selection, Time Series Analysis, Spatial Statistics, Bayesian Statistics, Data Mining and Large Data. Doctoral dissertations range from theoretical to applied. Interdisciplinary research is encouraged. Ph.D. students frequently work as research assistants in interdisciplinary studies, and also engage in statistical consulting.

Admission Requirement

Applicants must have completed significant undergraduate coursework in mathematics and Statistics, including basic Statistics (for example, design of experiments), the standard Calculus sequence, and Linear Algebra.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the doctoral program.

Requirements

Students are advanced to candidacy after meeting the following requirements:

Code	Title	Credits
Required Courses		
MATH 836	Advanced Statistical Methods for Research	3
MATH 839	Applied Regression Analysis	3
MATH 840	Design of Experiments I	3
MATH 855	Probability with Applications	3
MATH 856	Principles of Statistical Inference	3
Advanced Coursework in Statistics		
MATH 941	Bayesian and Computational Statistics	3
MATH 945	Advanced Theory of Statistics I	3
MATH 946	Advanced Theory of Statistics II	3
Select three of the following:		9
MATH 837	Statistical Methods for Quality Improvement and Design	
MATH 841	Survival Analysis	

MATH 843	Time Series Analysis	
MATH #844	Design of Experiments II	
MATH 944	Spatial Statistics	
MATH 969	Topics in Probability and Statistics I ¹	
MATH 979	Research Topics in Statistics ¹	
Minor Coursework		
Select one of the following analysis courses:		3
MATH 867	One-Dimensional Real Analysis	
MATH 953	Analysis I	
Select two courses in a focused minor area ²		6
Total Credits		42

¹ MATH 969 Topics in Probability and Statistics I and MATH 979 Research Topics in Statistics are topics courses and may be taken more than once.

² To be selected in consultation with the program advisor.

Successful completion of written qualifying examinations in theory of statistics and in applied statistics.

Successful completion of a comprehensive exam in advanced theory of statistics and an elective comprehensive exam.

Participation in the one-credit statistics seminar during at least three semesters.

Successful completion of a dissertation proposal defense in the major field of statistics.

Dissertation

Doctor of Philosophy in Statistics: A dissertation that includes original research in statistics.

Mathematics (M.S.)

<https://ceps.unh.edu/mathematics-statistics/master-science-mathematics>

Description

The mission of the Mathematics and Statistics program is twofold: to prepare students for a variety of exciting and rewarding career opportunities in business, industry, government and the teaching professions; and to advance forefront knowledge in the areas of pure mathematics, applied mathematics, statistics, and mathematics education through world-class cutting-edge research.

Admission Requirement

Applicants for the M.S. and Ph.D. degrees must have completed significant undergraduate coursework in mathematics, preferably in algebra, analysis, and topology.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the program.

Requirements

M.S. Degree Requirements

This program requires 30 credit hours, consisting of at least 10 semester courses approved by the department and chosen from MATH courses numbered MATH 801- MATH 899, MATH 931-MATH 978 and IAM courses IAM 830-IAM 962. The following stipulations apply:

- At least five of the 10 courses must be chosen from MATH 931-MATH 978 or from 900-level IAM courses.
- At least three courses must be chosen from MATH 931-MATH 956.
- Courses in MATH 900 through MATH 929 may not be used to satisfy course requirements.
- With approval of the graduate committee, two non-MATH graduate-level courses taken at UNH may be used to satisfy course requirements.

As a concluding experience, the student will take an oral exam before a committee of three faculty members. The committee membership is suggested by the student and is approved by the graduate program committee.

Mathematics: Applied Mathematics (M.S.)

<https://ceps.unh.edu/mathematics-statistics/masters-science-applied-mathematics>

Description

The MS in Applied Mathematics provides a broad introduction to modern applied mathematics and the opportunity to apply the curriculum in a wide range of application areas.

Admission Requirements

Applicants must have completed significant coursework in pure or applied mathematics, preferably including numerical analysis, differential equations, real analysis, and complex analysis.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the master's program.

Requirements

APPLIED MATHEMATICS OPTION

This program requires 30 credit hours.

Code	Title	Credits
MATH 931	Mathematical Physics	3
IAM 933	Applied Functional Analysis	3

Select an approved two-course sequence in applied mathematics, such as:

IAM 961 & IAM 962	Numerical Analysis I: Numerical Linear Algebra and Numerical Partial Differential Equations	6
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Select one of the following:

18

Thesis Option:

MATH 899 Master's Thesis (6 credits)

Four elective courses, selected with your adviser

Project Option:

MATH 898 Master's Project (3 credits)

Five elective courses, selected with your adviser

Total Credits

30

The elective courses need not be in mathematics, but must be at the 800 level or higher, and at least one must be a technical course in statistics or some other department. The broad elective flexibility allows the student's application interests to have a substantial role in the content of the program.

The student's full program plan must be proposed in writing to the applied mathematics faculty and approved prior to the student's second semester of study. There is no comprehensive examination in this option.

Mathematics: Statistics (M.S.)

<https://ceps.unh.edu/mathematics-statistics/master-science-statistics>

Description

The mission of the Mathematics and Statistics program is twofold: to prepare students for a variety of exciting and rewarding career opportunities in business, industry, government and the teaching professions; and to advance forefront knowledge in the areas of pure mathematics, applied mathematics, statistics, and mathematics education through world-class cutting-edge research.

Visit our website for more details please visit the mathematics and statistics website. (<http://ceps.unh.edu/mathematics-statistics/master-science-statistics>)

Admission Requirement

Applicants for the M.S. with statistics option will typically have an undergraduate degree in the mathematical, physical, biological, or social sciences or in engineering# must have completed mathematical coursework at least through multivariate calculus# and must have knowledge of basic statistics and basic linear algebra at the undergraduate level.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the master's program.

Requirements

STATISTICS OPTION

This program requires 30 credit hours, consisting of at least ten semester courses approved by the department, which includes completion of a project (MATH 898) consisting of a substantial application of statistical methodology to a real problem. Most of the courses will be taken from the department's statistics courses in the range MATH 837-MATH 979 and must include all of the following unless

some of these or equivalent courses were taken prior to enrollment in the program:

Code	Title	Credits
MATH 839	Applied Regression Analysis	3
MATH 840	Design of Experiments I	3
MATH 855	Probability with Applications	3
MATH 856	Principles of Statistical Inference	3

At most, three of the required ten courses may also be taken from the department's approved non-statistics courses and/or approved courses offered in other departments.

MATH 898, is conducted under the supervision of a faculty adviser and concludes with a written report and a public oral presentation.

MATH 898 may be taken for 3 to 6 credits, depending on the level of substantial research and methodological development required for project completion# the appropriate number of credits is determined by the statistics faculty. A master's committee of at least two statistics faculty members oversees the student's progress and determines credit for the project. There is no comprehensive examination in this option.

Mathematics (M.S.T.)

<https://ceps.unh.edu/mathematics-statistics/master-science-teachers-mst>

Description

The Master of Science for Teachers program in Mathematics is designed to enable teachers to:

- deepen and broaden their mathematics background in core areas of geometry, algebra, and analysis
- explore new content areas of mathematics
- interact with supportive faculty and students in small classes
- share ideas and teaching approaches with teachers from different areas of the country and of the world
- consider perspectives which allow them to help their own students learn mathematics more effectively
- participate in workshops and seminars to extend their knowledge of mathematics and to promote innovative teaching

The program features a strong emphasis on mathematics content, while also providing opportunities for teachers to consider alternative approaches to pedagogy. The program is typically completed in three summers and is designed primarily for experienced teachers of secondary school mathematics.

Admission Requirement

Applicants for the degree of master of science for teachers (M.S.T.) in mathematics usually possess a background equivalent to at least a minor in mathematics and must have completed education courses sufficient for certification, or have three years teaching experience, or currently hold a full-time teaching position.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the MST program.

Requirements

M.S.T. Degree Requirements

The program requires 30 credit hours of coursework, as outlined below:

Code	Title	Credits
MATH 900	Bridges from the Classroom to Mathematics	1
MATH 905	Euclidean and non-Euclidean Geometries from a Synthetic Perspective	3
MATH 906	Analytic and Transformational Geometry	3
MATH 909	Probability and Statistics for Teachers	3
MATH 913	Graph Theory and Topics in Discrete Mathematics	3
MATH 915	Algebraic Structures	3
MATH 918	Analysis of Real Numbers	3
MATH 925	Problem Solving Seminar	3
Select at least eight additional credit hours from courses numbered MATH 900- MATH 929		8
Total Credits		30

In addition, a concluding experience consisting of a mathematics portfolio and a comprehensive problem set is required.

Industrial Statistics (Graduate Certificate)

<https://ceps.unh.edu/mathematics-statistics/graduate-certificate-industrial-statistics>

Description

The Department of Mathematics and Statistics offers a graduate certificate in the area of industrial statistics. This program is primarily designed to help professionals in manufacturing and service industries to improve their expertise in statistical design of studies, and statistical and analytical methodology for decision making, planning, and quality improvement.

Admissions Requirement

Individuals holding a bachelor's degree are eligible to apply for admission to a graduate certificate program.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the certificate program.

Requirements

Certificate Requirements

A graduate certificate in industrial statistics is awarded for completion of four courses as follows:

Code	Title	Credits
Required Courses		
Select three of the following:		9
MATH 836	Advanced Statistical Methods for Research	
MATH 837	Statistical Methods for Quality Improvement and Design	
MATH 839	Applied Regression Analysis	
MATH 840	Design of Experiments I	
Electives		
Select one of the following:		3
MATH 841	Survival Analysis	
MATH 843	Time Series Analysis	
MATH #844	Design of Experiments II	
MATH 855	Probability with Applications	
MATH 941	Bayesian and Computational Statistics	
MATH 944	Spatial Statistics	
Any other special topics course in the area of industrial statistics. Other special topics courses are occasionally offered and may be added to the list of elective courses		
Total Credits		12

Note that all of these have as a prerequisite an introductory statistics course, such as MATH 835 Statistical Methods for Research.

Mechanical Engineering (ME) Degrees Offered: Ph.D., M.Eng., M.S.

This program is offered in Durham.

The Department of Mechanical Engineering offers degree programs at both the master's and doctoral levels.

The department of Mechanical Engineering offers studies leading to specialization in the following six concentrations:

- Fluid and thermal science
- Solid Mechanics
- Materials Science
- Design and Manufacturing
- Dynamic Systems and Control
- Ocean Engineering

Admission Requirements

A bachelor of science degree in mechanical engineering is normally required for admission to the graduate program in mechanical engineering. Students from other disciplines may also be admitted to the program. However, in order to be properly prepared for graduate-level coursework, these students must have taken the equivalent of the UNH mechanical engineering undergraduate core courses listed below. Students who are deficient in three or fewer courses may be admitted to

the department on a provisional basis. Students who are deficient in more than three courses must apply and enroll as an undergraduate student until they meet the core course requirement. It is department policy that engineering courses taken as part of an engineering technology program are generally not considered equivalent to any of the courses listed below. The decision on equivalence for any courses taken at an institution other than UNH is at the discretion of the Graduate Committee of the Mechanical Engineering Department.

Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

Core courses required for admission to the M.S. in mechanical engineering degree program:

Code	Title	Credits
Mathematics and Physics Courses		
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 527	Differential Equations with Linear Algebra	4
MATH 528	Multidimensional Calculus	4
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4
Mechanics Courses		
ME 525	Statics	3
ME 526	Mechanics of Materials	3
ME 627	Dynamics	3
ME 643	Machine Design	3
Thermal Sciences Courses		
ME 503	Thermodynamics	3
ME 608	Fluid Dynamics	3
ME 603	Heat Transfer	3
Other Courses		
ME 561	Introduction to Materials Science	4
ME 670	Systems Modeling, Simulation, and Control	4
ECE 537	Introduction to Electrical Engineering	4

<https://ceps.unh.edu/mechanical-engineering>

Programs

- Mechanical Engineering (Ph.D.) (p. 112)
- Mechanical Engineering (M.Eng.) (p. 113)
- Mechanical Engineering (M.S.) (p. 113)

Faculty

See <https://ceps.unh.edu/directory/all> for department faculty list.

Mechanical Engineering (Ph.D.)

<https://ceps.unh.edu/mechanical-engineering/mechanical-engineering-phd>

Description

The department of Mechanical Engineering offers studies leading to specialization in the following six concentrations:

- *Fluid and thermal science*
- *Solid Mechanics*
- *Materials Science*
- *Design and Manufacturing*
- *Dynamic Systems and Control*
- *Ocean Engineering*

Requirements

Following admission into the program, a temporary research advisor and a guidance committee consisting of three professors including the research advisor are appointed for the student by the graduate coordinator. The student's research advisor assists in outlining the student's course of study and may specify individual coursework requirements.

A student entering with a B.S. degree must successfully complete at least twelve 3- or 4-credit courses with five at the 900 level. Students entering with an M.S. degree in engineering are required to take a minimum of five 3- or 4-credit courses with three at the 900 level. This course requirement represents the department's minimum for any Ph.D. student. Students normally take more than the required number. A "B" average (3.00 GPA) with no grade below "B-" is required in all the coursework. No more than 12 credit hours from UNH graduate courses (8 credit hours from non-UNH graduate courses) taken prior to admission to the Graduate School may be applied to the doctoral degree. Further course requirements are identified by the student's area of concentration and by the guidance committee. The guidance committee also administers the qualifying examination. Upon successful completion of required coursework and the qualifying examination, the student may advance to candidacy. A doctoral committee may be appointed once candidacy has been attained. The committee needs to be composed of a minimum of five members, usually three from a student's major department and two from related departments.

Each Ph.D. candidate must conduct research of sufficient originality and significance to warrant the awarding of the Ph.D. degree. The final examination (oral defense) is the defense of the student's dissertation. This will be scheduled in accordance with the Graduate School rules. The candidate will be informed of the results of the defense by the dissertation chair.

All full-time graduate students are required to attend a weekly Mechanical Engineering Graduate Seminar and make one presentation per year.

Mechanical Engineering (M.Eng.)

<https://ceps.unh.edu/mechanical-engineering/mechanical-engineering-msmeng>

Description

The department of Mechanical Engineering offers a master of engineering degree. The department offers studies leading to specialization in the following six concentrations:

- fluid and thermal science
- mechanics
- materials science
- design and manufacturing
- dynamic systems and control
- ocean engineering

Requirements

Code	Title	Credits
Degree Requirements		
Select 28 credit hours of course work ¹		28
ME 992	Master's Project ²	4
Total Credits		32

¹ Two 900-level courses of at least 3 credits each must be taken in addition to ME 992 Master's Project.

² Individuals who can demonstrate accomplishments from professional engineering experience comparable to that expected from a master's project may petition the department to substitute an additional 900-level course for the ME 992 Master's Project requirement.

A "B" average (3.00 GPA) with no grade below "B-" is required in all the coursework. No more than 12 credit hours from UNH graduate courses (8 credit hours from non-UNH graduate courses) taken prior to admission to the Graduate School may be applied to the master's degree. A written report and an oral presentation of the project are required. The format of the project report is determined by the candidate's research adviser. Master of Engineering students are usually not eligible for a research or teaching assistantship.

All full-time graduate students are required to attend a weekly Mechanical Engineering Graduate Seminar and make one presentation per year.

Mechanical Engineering (M.S.)

<https://ceps.unh.edu/mechanical-engineering/mechanical-engineering-msmeng>

Description

The department of Mechanical Engineering offers a master of science degree. The department offers studies leading to specialization in the following six concentrations:

- fluid and thermal science
- mechanics
- materials science
- design and manufacturing

- dynamic systems and control
- ocean engineering

Requirements

Code	Title	Credits
Degree Requirements		
Select 24 credit hours of course work ¹		24
ME 899	Master's Thesis	8
Total Credits		32

¹ The coursework must include at least two 900-level courses (3 or more credits each).

A "B" average (3.00 GPA) with no grade below "B-" is required in all the coursework. No more than 12 credit hours from UNH graduate courses (8 credit hours from non-UNH graduate courses) taken prior to admission to the Graduate School may be applied to the master's degree. Note: an oral examination (thesis defense) covering the candidate's graduate work is conducted and a thesis is prepared in accordance with the Graduate School rules (<http://www.unh.edu/grad-catalog>).

All full-time graduate students are required to attend a weekly Mechanical Engineering Graduate Seminar and make one presentation per year.

Microbiology (MICR)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Department of Molecular, Cellular, and Biomedical Science offers a master's of science and a doctor of philosophy degrees in microbiology. Graduate students in microbiology are typically supported by teaching or research assistantships, as well as by competitive internal and external fellowship programs. For more information about the program, including admission and degree requirements, please contact the Department of Molecular, Cellular, and Biomedical Sciences at mcbs.dept@unh.edu.

Distinctive Features of the Program

Research opportunities are available in many cutting-edge microbiology research areas. Incoming students have the opportunity for laboratory rotations with Microbiology program faculty in those cases where a thesis advisor has not been identified or where exposure to a variety of experimental approaches is advantageous.

The Graduate Program in Microbiology offers:

- Outstanding research training in a broad range of areas, including: host-microbe interactions environmental microbiology, virology and immunology, signal transduction microbial ecology, evolution, genetics and genomics.
- Weekly seminar series that includes both distinguished invited speakers and graduate student research presentations.
- Opportunities to gain teaching and mentoring experiences with undergraduate students in the biological sciences.
- Strong track record for graduates attaining careers in academia, research institutes, biotechnology and pharmaceutical companies, and state and federal governmental agencies.

Admission Requirements

Applicants are expected to have had adequate preparation in the biological and physical sciences. This typically includes general and organic chemistry, physics, one semester of calculus, a year of general biology, a semester or more of biochemistry, and general microbiology. Formal courses in quantitative analysis and statistics are recommended. Applicants with deficiencies in these background courses who are admitted to the program may be required to complete appropriate coursework without graduate credit. Applicants must submit a personal statement, current scores (within five years) from the general GRE test, and three letters of recommendation. If possible, the personal statement should specify the applicant's research interests and potential faculty mentors. International applicants living outside the U.S. should initially complete a free online pre-application (<http://www.gradschool.unh.edu/international.php>). If approved for a full application, applicants must submit current TOEFL scores in addition to the items listed above. Each applicant to the graduate program must be sponsored by a Microbiology graduate program faculty. A mutual decision for assignment to a graduate research advisor is expected before the second semester of study.

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences>

Programs

- Microbiology (Ph.D.) (p. 114)
- Microbiology (M.S.) (p. 115)

Faculty

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/people>

Microbiology (Ph.D.)

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/phd/microbiology>

Description

The Ph.D. in Microbiology combines a rigorous curriculum in a broad range of areas with interdisciplinary research opportunities at the frontiers of microbiology, virology, host-microbe interactions and environmental microbiology. Graduates of the program are equipped for leadership positions in biotechnology and pharmaceutical companies, academic and government research laboratories, and successful careers in teaching and research at the college and university level.

Distinctive Features of the Program

- Research opportunities are available in many cutting-edge microbiology research areas
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers

- Opportunities to gain teaching experiences as a Graduate Teaching Assistant

Research Opportunities

- Host-microbe interactions
- Environmental microbiology
- Signal transduction pathways
- Molecular microbiology and biotechnology
- Genomics and bioinformatics
- Transcriptional and translational regulation
- Microbial ecology and evolution

Financial Support

- Students admitted to the Ph.D. Program are typically supported by Research Assistantships or Teaching Assistantships
- Internal summer and academic year fellowships are available to students on a competitive basis.
- Teaching Assistantships are not available for students enrolled in the Accelerated M.S. program

Career Prospects

- Research scientists in biotechnology and pharmaceutical industries
- Lab managers in academic research labs and research institutes, state and federal government agencies
- Academic preparation for future teaching and Research roles in a college or university environment

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
 - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online application (<http://gradschool.unh.edu/php/preapp.php>)
- Three letters of recommendation

Personal statement, including research interests and two or three potential Microbiology faculty thesis advisors.

Requirements

Ph.D. Degree Requirements

Students with appropriate academic training at the baccalaureate or master's level may be considered for admission to the doctoral program. Students admitted to the Ph.D. program are required to conduct an independent research project in conjunction with a Microbiology

graduate program faculty adviser. Specific coursework is determined in conjunction with the graduate committee. Advancement to candidacy requires the successful completion of the following:

1. All courses required by the graduate committee
2. A written qualifying exam administered by the graduate program coordinator and graduate faculty
3. An independent research proposal developed in conjunction with a faculty adviser
4. An oral defense of the research proposal

Students enrolled in the doctoral program are required to complete one semester of teaching and successfully complete and defend a dissertation based on their research proposal. The acceptance of the dissertation is contingent on its approval by the doctoral committee and evidence that at least two manuscripts based on the thesis research have been submitted to a peer-reviewed journal appropriate to the topic.

All graduate students are required to enroll in and attend MCBS 997 Seminar each semester and present one seminar each year.

Microbiology (M.S.)

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/ms/microbiology>

Description

The M.S. in Microbiology combines a rigorous curriculum in a broad range of areas with interdisciplinary research opportunities at the frontiers of microbiology, virology, host-microbe interactions and environmental microbiology. Graduates of the program are equipped for successful careers in biotechnology and pharmaceutical companies, academic and government research laboratories, and as preparation for doctoral programs, medical school, and health-related professional programs.

Distinctive Features of the Program

- Research opportunities are available in many cutting edge microbiology research areas
- Emphasis on interdisciplinary research training
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant
- Accelerated M.S. program available to UNH students enrolled in the B.S. program in Biomedical Science: Medical Microbiology

Research Opportunities

- Host-microbe interactions
- Environmental microbiology
- Signal transduction pathways
- Molecular microbiology and biotechnology

- Genomics and bioinformatics
- Transcriptional and translational regulation
- Microbial ecology and evolution

Financial Support

- Students admitted to the M.S. Program are typically supported by Research Assistantships or Teaching Assistantships
- Internal summer and academic year fellowships are available to students on a competitive basis.
- Teaching Assistantships are not available for students enrolled in the Accelerated M.S. program

Career Prospects

- Research scientists in biotechnology and pharmaceutical industries
- Lab managers in academic research labs and research institutes, state and federal government agencies
- Academic preparation for doctoral programs and professional health programs (e.g., medical school)

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
 - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online application (<http://gradschool.unh.edu/php/preapp.php>)
- Three letters of recommendation
- Personal statement, including research interests and two or three potential Microbiology faculty thesis advisors.

Requirements

M.S. Degree Requirements

The Department of Molecular, Cellular, and Biomedical Science (MCBS) offers a master of science in microbiology. Research opportunities are available in a broad range of areas, including plant-microbe interactions, signal transduction, microbial development, host-microbe interactions, environmental microbiology, environmental and molecular virology, microbial ecology, microbial evolution, microbial genetics and genomics, molecular microbiology, and biotechnology. Students admitted to the M.S. program are required to conduct an independent research project in conjunction with a faculty adviser and must submit a thesis based on this research to a graduate committee, which determines its acceptability. Specific coursework is determined in conjunction with the graduate committee.

A minimum of **30 credits**, including 6-10 thesis credits (MCBS 899 Master's Thesis), and a minimum of two other graduate level courses

at the 800 or 900-level in the area of microbiology, is required. All M.S. students are required to enroll in and attend seminar (MCBS 997) every semester and present one seminar each year. A thesis and a formal defense are also required. In addition, the student must submit at least one manuscript for publication to a peer-reviewed journal.

Molecular and Evolutionary Systems Biology (MESB)

Degree Offered: Ph.D.

This program is offered in Durham.

The Department of Molecular, Cellular, and Biomedical Sciences offers a doctor of philosophy degree in molecular and evolutionary systems biology. Graduate students in Molecular and Evolutionary Systems Biology are typically supported by teaching or research assistantships, as well as by competitive internal and external fellowship programs. For more information about the program, including admission and degree requirements, please contact the Department of Molecular, Cellular, and Biomedical Sciences at mcbs.dept@unh.edu.

Distinctive Features of the Program

The overarching goal of the Molecular and Evolutionary Systems Biology (MESB) graduate program is to train a new generation of interdisciplinary researchers with expertise that spans molecular to evolutionary biology.

The Graduate Program in Molecular and Evolutionary Systems Biology offers:

- Outstanding research training in many cutting-edge research areas in molecular and cellular biology, bioinformatics, genetics and genomics, molecular evolution and ecology, neurobiology, and more.
- Weekly seminar series that includes both distinguished invited speakers and graduate student research presentations.
- Opportunities to gain teaching and mentoring experiences with undergraduate students in the biological sciences.
- Strong track record for graduates attaining successful careers in academia, biomedical research institutes, biotechnology and pharmaceutical companies, and state and federal governmental agencies.

Admission Requirements

Students applying for this Ph.D. program will be expected to possess a background in basic sciences appropriate for advanced study in the proposed area of specialization (for example, courses in biology, chemistry, organic chemistry, biochemistry, genetics, microbiology and/or physics). The student's committee may require certain undergraduate courses as part of the graduate program if additional competencies would be beneficial to the student. Applicants must submit a personal statement, current scores (within five years) from the general GRE test, and three letters of recommendation. If possible, the personal statement should specify the applicant's research interests and potential faculty mentors. International applicants living outside the U.S. should initially complete a free online pre-application (<http://www.gradschool.unh.edu/international.php>). If approved for a full application, international applicants must submit current TOEFL scores in addition to the items listed above.

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences>

Programs

- Molecular and Evolutionary Systems Biology (Ph.D.) (p. 117)

Faculty

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/people>

Molecular and Evolutionary Systems Biology (Ph.D.)

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/phd/molecular-evolutionary-systems-biology>

Description

The Ph.D. in Molecular and Evolutionary Systems Biology (MESB) is a coherently designed doctoral program that promotes interdisciplinary research, deep knowledge in specific disciplines, and technical, professional, and personal skills needed by 21st century scientists and educators. Graduates of the program are equipped for leadership roles in biotechnology and pharmaceutical companies, academic and government research laboratories, and successful careers in teaching and research at the college and university level.

Distinctive Features of the Program

- Emphasis on interdisciplinary research training including co-mentorship across traditional disciplines
- An innovative graduate curriculum that emphasizes ethical, legal and social implications of bioscience research
- Well-equipped research laboratories and core facilities on the UNH campus
- Laboratory rotations upon entry to the program to become familiar with different research laboratories
- Weekly graduate student seminar presentations, as well as a departmental seminar series of outside speakers
- Opportunities to gain teaching experiences as a Graduate Teaching Assistant

Research Opportunities

- Molecular and Cellular Biology
- Protein structure, function, and regulation
- Signal transduction pathways
- Molecular evolutionary genomics
- Genomics and bioinformatics
- Transcriptional and translational regulation
- Microbial ecology and evolution

Financial Support

- Students admitted to the Ph.D. Program are typically supported by Research Assistantships or Teaching Assistantships

- Internal summer and academic year fellowships are available to students on a competitive basis.

Career Prospects

- Research directors in biotechnology and pharmaceutical industries
- Principle investigators in academic research labs and research institutes, state and federal government agencies
- Academic preparation for research and teaching roles in a college or university environment

Admission Requirements

- Completion of foundational courses in biology, chemistry (including organic chemistry), physics, and mathematics
 - Otherwise well-qualified applicants can correct academic deficiencies with enrollment in appropriate courses or independent study during the first year of graduate studies
- Graduate Record Examination (GRE) scores (taken within the past five years)
- Applicants from non-English speaking countries must provide Test of English as a Foreign Language (TOEFL) scores
- International applicants living outside the U.S.A. should first complete a free online application (<http://gradschool.unh.edu/php/preapp.php>)
- Three letters of recommendation

Personal statement, including research interests and two or three potential MESB faculty thesis advisors.

Requirements

Ph.D. Degree Requirements

Degree requirements for the MESB Ph.D. degree include a series of core courses in scientific communications, applied bioinformatics, and ethical, legal, and social implications of modern biotechnology, as well as a research proposal, qualifying examinations, and the completion of a dissertation.

Research Proposal and Oral Defense: No later than at the conclusion of the second full semester of dissertation research (typically the third semester if rotating) students prepare a succinct synopsis of their thesis project, with citations. The synopsis includes:

1. Background: a summary of problem and general knowledge in the field.
2. Hypotheses, Questions, and Relevance: articulates specific hypotheses, questions to be addressed, and importance of research.
3. Approach: a general description of approaches with caveats, possible problems, alternative approaches, and resources of expertise.
4. Timeline: a general timeline for completion of the work.
5. Communication: potential audiences for the work (meetings, publications).

Students submit this proposal to their guidance committee who will read it and provide input in a committee meeting, which should take place no later than the end of their third semester. Upon review by the guidance committee, students must defend their proposal in an oral examination.

Qualifying Examination: The inter-disciplinarity inherent in the MESB graduate program requires that students integrate their training and research objectives across different fields of inquiry. This integration across fields is intended to foster unique perspectives on persistent questions in biology. To demonstrate the significance of the new perspectives inculcated by their research proposals, students must also submit an additional written qualifying examination. Written qualifying examinations may take the form of a review or synthesis article that emphasizes the integration of the research disciplines of the primary and secondary mentors and the significance of doing so given the problem. The specific format and outline of the written examination is to be determined by the guidance committee. Once complete, the written qualifying examination will be submitted to, and assessed by, the guidance committee on a pass/fail basis.

Advancement to Candidacy: The student is advanced to candidacy after the qualifying examination has been successfully passed and other requirements have been fulfilled.

Music (MUSI)

Degree Offered: M.A.

This program is offered in Durham.

The Department of Music offers programs leading to the degree of master of arts with options in composition, conducting, and musicology. Each program emphasizes a specific core curriculum that is complemented by a range of supportive courses that foster a broad knowledge of music. There is also enough room for electives (nearly a third of the degree) so that each student may tailor coursework to fit his or her personal interests and needs. Graduates have established successful careers in performance, conducting, public school teaching, college teaching, and research. The program also serves as excellent preparation for doctoral study.

Admission Requirements

For each option, a bachelor's degree in music or its equivalent from an accredited institution is required for admission. Graduate Record Exams are not required. Additional requirements for all applicants include:

- An entrance exam in music theory and music history, taken upon completion of your on-line application with the Graduate School. You are required to take the exam on campus or arrange for an instructor at your current institution or similarly qualified person to proctor the exam for you. Please contact the Department of Music graduate coordinator for details.
- A sample of academic writing, preferably on a musical subject, should be submitted to the Department of Music graduate coordinator, either electronically (pdf file via email) or in hard copy. This might be a paper that has been submitted for a course.

Other admission requirements specific to the three degree areas include:

Composition

- Applicants should submit a portfolio of compositions and arrange for an interview with Professor Christopher Kies or Professor Michael Annicchiarico.

Conducting

- Applicants must perform a live conducting audition with one of the university ensembles. Please contact the director of bands or director of choral activities for details and to schedule an audition.

Musicology

- A reading knowledge of both German and French is strongly recommended for candidates who intend to continue on for a Ph.D. in musicology.

<https://cola.unh.edu/music>

Programs

- Music: Composition (M.A.) (p. 118)
- Music: Conducting (M.A.) (p. 119)
- Music: Musicology (M.A.) (p. 119)

Faculty

See <https://cola.unh.edu/music/faculty-staff-directory> for faculty.

Music: Composition (M.A.)

<https://cola.unh.edu/music/program/ma/music-composition>

Description

The master of arts¹ in composition option offers the opportunity for in-depth study of music composition. Some graduates of the program will go on to earn a doctoral degree in composition or music theory, while others will seek careers as film and theater composers, sound designers, teachers, and freelance writers. The program is responsive to the individual ambitions of its students to prepare them for their professional careers in the best way possible.

¹ Plan approval and accreditation for degree program pending from the National Association of Schools of Music.

Requirements

Completion of the program requires a final project in an area of interest. Projects can take several forms (for example, a composition, a composition recital, a lecture recital, a research paper, etc.) and are usually proposed and developed in concert with the graduate studies coordinator and a faculty member who serves as the project adviser. A final oral examination assesses the candidate's ability to apply compositional skills, and/or to describe advanced independent work of particular interest.

All of the Master of Arts in Music options require **30 credit hours** as well as a final project for completion of the degree.

Code	Title	Credits
Concentration		
MUSI 875 & MUSI 876	Composition and Composition	6
MUSI 877	Advanced Composition	3

MUSI 991	Research Seminar	3
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Supportive Courses in Music

MUSI 955	Introduction to Bibliography	3
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MUSI 994	Theory Seminar	3
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MUSI 959	Musicology Seminar	3
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Electives

Select nine credits of the following:	9
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Select 3-6 credits of MUSI 881-MUSI 882

Select 3-9 credits of MUSI 803-MUSI 811

Select 2-4 credits of MUSI 831-MUSI 832

Total Credits	30
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Concentration and Supportive Courses are required; other electives are possible.

Music: Conducting (M.A.)

<https://cola.unh.edu/music/program/ma/music-conducting>

Description

The master of arts in conducting option offers the opportunity for in-depth study of either instrumental or choral conducting. The program is intended for those who wish to improve their skills and knowledge for use in the school classroom or to prepare for doctoral programs in conducting.

Requirements

Completion of the program requires a conducting recital and/or significant performances with one of the major university ensembles. A comprehensive oral examination will include discussion of the recital music, appropriate score identification, and questions focused on music history, theory, or education, to be determined in consultation with the members of the candidate's oral examination committee.

All of the Master of Arts in Music options require 30 credit hours as well as a final project for completion of the degree.

Code	Title	Credits
Concentration		
MUSI 831	Advanced Instrumental Conducting (3 semesters of either)	6
or MUSI 832	Advanced Choral Conducting	
MUED 983	Instrumental Literature and Its Performance	3
or MUED 995	Special Projects	
MUSI 991	Research Seminar (conducting recital)	3
Supportive Courses in Music		
MUSI 955	Introduction to Bibliography	3
MUSI 994	Theory Seminar	3
MUSI 959	Musicology Seminar	3
Electives		
Select nine credits of the following:		9
Select 2-9 credits of MUED 841; MUED 845-MUED 851		
MUED 855	Vocal Pedagogy	
MUED 871	Marching Band Methods	

MUED 865	Instrumental Music Methods	
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MUED 895	Special Studies	
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MUED 996	Foundations and Perspectives of Music Education	
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Select 1-9 credits of MUSI 841-MUSI 864		
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Total Credits	30
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Concentration and Supportive Courses are required; other electives are possible.

Music: Musicology (M.A.)

<https://cola.unh.edu/music/program/ma/music-musicology>

Description

The master of arts in musicology offers the opportunity for in-depth study of music history, theory, and criticism. The option is valuable to students who wish to augment undergraduate degrees in performance and/or music education with more intensive academic studies. The Department of Music has maintained a long history of excellence in music historical study and performance.

Many graduates have gone on to pursue Ph.D.s and D.M.A.s in music. The M.A. in musicology offers enough electives so that students may also pursue advanced study in performance of an instrument or voice if qualified and accepted by an instructor upon a successful audition.

Requirements

Completion of the program requires a written research project of substantive nature on a topic of the candidate's special interest. An alternative for some students will be a lecture-recital and written essay. Students emphasizing performance are encouraged to present public recitals in addition to the above. A final oral examination assesses the ability to apply critical thinking to music literature and to describe personal advanced independent work of particular interest.

All of the Master of Arts in Music options require 30 credit hours as well as a final project for completion of the degree.

Code	Title	Credits
Concentration		
MUSI 959	Musicology Seminar ¹	9
MUSI 991	Research Seminar (capstone project)	3
Supportive Courses in Music		
MUSI 955	Introduction to Bibliography	3
MUSI 994	Theory Seminar	3
Select 3 credits of MUSI 803-MUSI 811		3
Electives		
Select nine credits of the following:		9
Select 3-9 credits of MUSI 803-MUSI 811		
Select 3 credits of MUSI 871-MUSI 872		
Select 3-6 credits of MUSI 881-MUSI 882		
Select 1-8 credits of MUSI 841-MUSI 864		
Total Credits		30

¹ Enroll in MUSI 959 Musicology Seminar three times, usually with three different instructors.

Concentration and Supportive Courses are required; other electives are possible.

Natural Resources (NR)

Degree Offered: M.S.

This program is offered in Durham.

The Department of Natural Resources and the Environment offers a master of science in natural resources in the following options.

Natural Resources: Environmental Conservation

Areas of interest include natural resource policy, conservation biology, sustainability, ecological ethics and values, international environmental affairs, and spatial data analysis (remote sensing and GIS).

Natural Resources: Environmental Economics

Areas of interest include agricultural economics, community and regional economics, land economics, water economics, and environmental economics.

Natural Resources: Forestry

Areas of interest include forest resource economics and management, biometrics, genetics, forest ecosystem dynamics, and spatial data analysis (remote sensing and GIS).

Natural Resources: General

Natural resources research is, by its nature, interdisciplinary. Students whose research spans two or more of the fields within the Natural Resources MS program – soil and water resources management, wildlife and conservation biology, forestry, environmental economics, and environmental conservation – may enroll under this option. For example, a student interested in assessing the consequences of forest fragmentation for the dollar value of ecosystem services may opt for the General option than for either forestry or environmental economics. Students can later choose to specify one of the five more specific options should their interests become focused on one subject area.

Natural Resources: Soil and Water Resource Management

Areas of interest include wetlands, land-water interactions, groundwater chemistry, and biogeochemistry.

Natural Resources: Wildlife and Conservation Biology

Areas of interest include field and laboratory aspects of wildlife energetics, wildlife use of managed and unmanaged forest systems, habitat management and fragmentation, conservation biology, wetland wildlife ecology, and population dynamics.

Admission Requirements

Applicants are expected to have completed either an undergraduate degree in the field in which they plan to specialize or show adequate preparation in the basic support courses of the field. Students with good undergraduate records who lack a background in a particular field may be admitted to a program, provided they are prepared to correct any deficiencies. All entering students must have taken at least one basic

statistics course. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

Students entering the forestry option may elect to develop concentrations within any of the above-listed areas. Applicants are expected to have backgrounds in forestry or related biological sciences. Students interested in soil and water resource management are required to have adequate preparation in chemistry and mathematics as well as biological or Earth sciences. Students interested in wildlife and conservation biology are expected to have adequate preparation in biological sciences, chemistry, and mathematics. Students interested in environmental conservation should have a background appropriate for their area of interest. Since environmental conservation covers such a broad area, applicants are always reviewed carefully on an individual basis.

Students interested in environmental economics should have a background in both economics and the environment. Four or more undergraduate courses in economics or environmental economics, including intermediate microeconomics and intermediate macroeconomics, are required as well as calculus and statistics.

Prior to submitting an application, applicants should contact one or more graduate faculty advisers to discuss programs and funding, and secure a commitment of a faculty member to serve as graduate adviser.

A Cooperative Doctoral Program

The Department of Natural Resources and the Environment participates in the Natural Resources and Earth System Science Ph.D. Program (NRESS), an interdepartmental degree offered at UNH. For further details on this program, please visit the NRESS program page.

<https://colsa.unh.edu/natural-resources-environment>

Programs

- Natural Resources (M.S.) (p. 120)
- Natural Resources: Environmental Conservation (M.S.) (p. 121)
- Natural Resources: Environmental Economics (M.S.) (p. 122)
- Natural Resources: Forestry (M.S.) (p. 123)
- Natural Resources: Soil and Water Resource Management (M.S.) (p. 124)
- Natural Resources: Wildlife and Conservation Biology (M.S.) (p. 124)

Faculty

<https://colsa.unh.edu/natural-resources-environment/people>

Natural Resources (M.S.)

<https://colsa.unh.edu/natural-resources-environment/program/ms/natural-resources>

Description

The Natural Resources master of science program provides advanced, research-based study in the ecology, biogeochemistry, economics, policy, and management of vital natural resources, including water, soil,

forests, wildlife, and agricultural crops. Students take an interdisciplinary approach to their research and use the tools of the natural and social sciences, including geospatial methods, to make fundamental and significant contributions toward local, regional, and global sustainability. Students are supported by a productive and internationally recognized faculty, outstanding laboratory facilities, and a diversity of accessible terrestrial, marine, and freshwater field sites.

Career possibilities include environmental and social science consulting; sustainability, environmental, and resource management leadership in the public or private sectors; or research in environmentally-oriented federal, state, and private agencies. Graduates may also choose to pursue advanced study at the doctoral level.

Students can later choose to specify one of the five options;

- **Environmental Conservation**
- **Environmental Economics**
- **Forestry**
- **Soil and Water Resource Management**
- **Wildlife and Conservation Biology**

Requirements

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for natural resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course Requirements or Equivalent

Code	Title	Credits
EDUC 904	Qualitative Inquiry in Education (Policy oriented)	4
Or		
NR 903	Approach to Research	2
And with NR 903, choose one of the following additional research methods classes for a total of 4 credits:		
NR 905	Grant Writing	
BIOL 902	Writing and Publishing Science	
BIOL 950	Scientific Communication	
Or an alternative with approval from the Graduate Coordinator		
NR 993	Natural and Environmental Resources Seminar	1-2
or NR 947	Current Issues in Ecosystem Ecology	
NR 996	Natural Resource Education (1 credit)	1 - 2
or LSA 900	College Teaching	
Select one of the following Quantitative methods courses:		
BIOL 811	Applied Biostatistics II	
BIOL 933	Design, Analysis, and Interpretation of Experiments	
DATA 800	Introduction to Applied Analytic Statistics	
ECON 926	Econometrics I	
ESCI 801	Quantitative Methods in Earth Sciences	
MATH 835	Statistical Methods for Research	
MATH 840	Design of Experiments I	
MATH 969	Topics in Probability and Statistics I	

NR 909	Analysis of Ecological Communities and Complex Data
NR 913	Quantitative Ecology
POLT 905	Introduction to Statistical Analysis
PSYC 905	Research Methodology and Statistics I
PSYC 907	Research Methods and Statistics III
SOC 901	Sociological Methods I: Intermediate Social Statistics
SOC 903	Sociological Methods III: Advanced Social Statistics
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods

Or an alternative with approval from the Graduate Coordinator

Select one of the following:

NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

¹ The thesis option will provide a research-based thesis that is the foundation for a peer-reviewed publication.

² The directed research option shall consist of a project, designed and conducted by the student, culminating in a scholarly paper or report that is suitable for publication in the respective field of scholarship.

An approved program of study plan is required during the first semester.

Natural Resources: Environmental Conservation (M.S.)

<https://colsa.unh.edu/natural-resources-environment/program/ms/natural-resources-environmental-conservation>

Description

NATURAL RESOURCES: ENVIRONMENTAL CONSERVATION

Students in the Environmental Conservation option typically have a BS/BA degree or strong background in environmental and natural resource sciences with a keen interest in combining the natural sciences with the social sciences. Those without this background may be accepted upon completion of some additional fundamental courses. Areas of interest include natural resource policy, conservation biology, sustainability, ecological ethics and values, international environmental affairs, and spatial data analysis (remote sensing and GIS). After successful completion of the MS degree, students have gone on to work for federal and state agencies, for private industry, and for non-governmental organizations.

Requirements

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for natural resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course Requirements or Equivalents

Code	Title	Credits
EDUC 904	Qualitative Inquiry in Education (Policy oriented)	4
Or		
NR 903	Approach to Research	2
And with NR 903, choose one of the following additional research methods classes for a total of 4 credits:		
NR 905	Grant Writing	
BIOL 902	Writing and Publishing Science	
BIOL 950	Scientific Communication	
Or an alternative with approval from the Graduate Coordinator		
NR 993	Natural and Environmental Resources Seminar	1-2
or NR 947 Current Issues in Ecosystem Ecology		
NR 996	Natural Resource Education (1 credit)	1 - 2
or LSA 900 College Teaching		
Select one of the following Quantitative methods courses:		
3-4		
BIOL 811	Applied Biostatistics II	
BIOL 933	Design, Analysis, and Interpretation of Experiments	
DATA 800	Introduction to Applied Analytic Statistics	
ECON 926	Econometrics I	
ESCI 801	Quantitative Methods in Earth Sciences	
MATH 835	Statistical Methods for Research	
MATH 840	Design of Experiments I	
MATH 969	Topics in Probability and Statistics I	
NR 909	Analysis of Ecological Communities and Complex Data	
NR 913	Quantitative Ecology	
POLT 905	Introduction to Statistical Analysis	
PSYC 905	Research Methodology and Statistics I	
PSYC 907	Research Methods and Statistics III	
SOC 901	Sociological Methods I: Intermediate Social Statistics	
SOC 903	Sociological Methods III: Advanced Social Statistics	
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods	
Or an alternative with approval from the Graduate Coordinator		
Select one of the following:		
NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

¹ The thesis option will provide a research-based thesis that is the foundation for a peer-reviewed publication.

² The directed research option shall consist of a project, designed and conducted by the student, culminating in a scholarly paper or report that is suitable for publication in the respective field of scholarship.

An approved program of study plan is required during the first semester.

Environmental Conservation Option Requirements

Code	Title	Credits
Select one of the following Ecology courses:		
NR 806	Soil Ecology	4

NR 811	Wetland Ecology and Management
NR 830	Terrestrial Ecosystems
NR 834	Tropical Ecology
NR 851	Aquatic Ecosystems
NR 857	Remote Sensing of the Environment
NR 965	Community Ecology
MEFB 825	Marine Ecology

Natural Resources: Environmental Economics (M.S.)

<https://colsa.unh.edu/nren/natural-resources/natural-resources-ms>

Description

NATURAL RESOURCES: ENVIRONMENTAL ECONOMICS

Areas of interest include agricultural economics, community and regional economics, land economics, water economics, and environmental economics.

Requirements

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for natural resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course Requirements or Equivalents

Code	Title	Credits
EDUC 904	Qualitative Inquiry in Education (Policy oriented)	4
Or		
NR 903	Approach to Research	2
And with NR 903, choose one of the following additional research methods classes for a total of 4 credits:		
NR 905	Grant Writing	
BIOL 902	Writing and Publishing Science	
BIOL 950	Scientific Communication	
Or an alternative with approval from the Graduate Coordinator		
NR 993	Natural and Environmental Resources Seminar	1-2
or NR 947 Current Issues in Ecosystem Ecology		
NR 996	Natural Resource Education (1 credit)	1 - 2
or LSA 900 College Teaching		
Select one of the following Quantitative methods courses:		
3-4		
BIOL 811	Applied Biostatistics II	
BIOL 933	Design, Analysis, and Interpretation of Experiments	
DATA 800	Introduction to Applied Analytic Statistics	
ECON 926	Econometrics I	
ESCI 801	Quantitative Methods in Earth Sciences	
MATH 835	Statistical Methods for Research	
MATH 840	Design of Experiments I	
MATH 969	Topics in Probability and Statistics I	

NR 909	Analysis of Ecological Communities and Complex Data
NR 913	Quantitative Ecology
POLT 905	Introduction to Statistical Analysis
PSYC 905	Research Methodology and Statistics I
PSYC 907	Research Methods and Statistics III
SOC 901	Sociological Methods I: Intermediate Social Statistics
SOC 903	Sociological Methods III: Advanced Social Statistics
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods

Or an alternative with approval from the Graduate Coordinator

Select one of the following:

NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

¹ The thesis option will provide a research-based thesis that is the foundation for a peer-reviewed publication.

² The directed research option shall consist of a project, designed and conducted by the student, culminating in a scholarly paper or report that is suitable for publication in the respective field of scholarship.

An approved program of study plan is required during the first semester.

Environmental Economics Option Requirements

Code	Title	Credits
ECON 926	Econometrics I	3
ECON 976	Microeconomics I	3

Natural Resources: Forestry (M.S.)

<https://colsa.unh.edu/nren/natural-resources/natural-resources-ms>

Description

NATURAL RESOURCES: FORESTRY

Students in the Forestry option typically have an undergraduate degree in forestry or natural resource management. These degrees are specifically designed to meet the accreditation standards of a professional society.

Those without this background may need to complete some additional coursework as part of their MS program. Areas of interest include forest resource economics and management, biometrics/measurements, forest health, forest ecosystem dynamics, and spatial data analysis (remote sensing and GIS). After successful completion of the MS degree, students have gone on to work for federal and state agencies, for private industry, and for non-governmental organizations.

Requirements

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for natural resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course Requirements or Equivalents

Code	Title	Credits
EDUC 904	Qualitative Inquiry in Education (Policy oriented)	4
Or		
NR 903	Approach to Research	2
And with NR 903, choose one of the following additional research methods classes for a total of 4 credits:		
NR 905	Grant Writing	
BIOL 902	Writing and Publishing Science	
BIOL 950	Scientific Communication	
Or an alternative with approval from the Graduate Coordinator		
NR 993	Natural and Environmental Resources Seminar	1-2
or NR 947	Current Issues in Ecosystem Ecology	
NR 996	Natural Resource Education (1 credit)	1 - 2
or LSA 900	College Teaching	
Select one of the following Quantitative methods courses:		
BIOL 811	Applied Biostatistics II	3-4
BIOL 933	Design, Analysis, and Interpretation of Experiments	
DATA 800	Introduction to Applied Analytic Statistics	
ECON 926	Econometrics I	
ESCI 801	Quantitative Methods in Earth Sciences	
MATH 835	Statistical Methods for Research	
MATH 840	Design of Experiments I	
MATH 969	Topics in Probability and Statistics I	
NR 909	Analysis of Ecological Communities and Complex Data	
NR 913	Quantitative Ecology	
POLT 905	Introduction to Statistical Analysis	
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SOC 901	Sociological Methods I: Intermediate Social Statistics	
SOC 903	Sociological Methods III: Advanced Social Statistics	
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods	

Select one of the following Quantitative methods courses:

Or an alternative with approval from the Graduate Coordinator		
NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

Or an alternative with approval from the Graduate Coordinator

Select one of the following:

NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

¹ The thesis option will provide a research-based thesis that is the foundation for a peer-reviewed publication.

² The directed research option shall consist of a project, designed and conducted by the student, culminating in a scholarly paper or report that is suitable for publication in the respective field of scholarship.

An approved program of study plan is required during the first semester.

Natural Resources: Soil and Water Resource Management (M.S.)

<https://colsa.unh.edu/nren/natural-resources/natural-resources-ms>

Description

NATURAL RESOURCES: SOIL AND WATER RESOURCE MANAGEMENT

Areas of interest include the ecology, microbiology and biogeochemistry of soils, groundwaters, and surface waters, with an emphasis on how the different components of an ecosystem interact to produce system-level responses to management, global change, and other perturbations. Understanding controls on carbon storage, nutrient transformations, and greenhouse gas emissions is central to much of the research conducted by students in this option. Career trajectories of graduates include private sector environmental consulting, government agencies with a mandate for environmental protection or land management, and research scientist in both the academic and private sectors.

Requirements

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for natural resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course Requirements or Equivalent

Code	Title	Credits
EDUC 904	Qualitative Inquiry in Education (Policy oriented)	4
Or		
NR 903	Approach to Research	2
And with NR 903, choose one of the following additional research methods classes for a total of 4 credits:		
NR 905	Grant Writing	
BIOL 902	Writing and Publishing Science	
BIOL 950	Scientific Communication	
Or an alternative with approval from the Graduate Coordinator		
NR 993	Natural and Environmental Resources Seminar	1-2
or NR 947	Current Issues in Ecosystem Ecology	
NR 996	Natural Resource Education (1 credit)	1 - 2
or LSA 900	College Teaching	
Select one of the following Quantitative methods courses:		
BIOL 811	Applied Biostatistics II	3-4
BIOL 933	Design, Analysis, and Interpretation of Experiments	
DATA 800	Introduction to Applied Analytic Statistics	
ECON 926	Econometrics I	
ESCI 801	Quantitative Methods in Earth Sciences	
MATH 835	Statistical Methods for Research	
MATH 840	Design of Experiments I	
MATH 969	Topics in Probability and Statistics I	

NR 909	Analysis of Ecological Communities and Complex Data
NR 913	Quantitative Ecology
POLT 905	Introduction to Statistical Analysis
PSYC 905	Research Methodology and Statistics I
PSYC 907	Research Methods and Statistics III
SOC 901	Sociological Methods I: Intermediate Social Statistics
SOC 903	Sociological Methods III: Advanced Social Statistics
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods

Or an alternative with approval from the Graduate Coordinator

Select one of the following:

NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

¹ The thesis option will provide a research-based thesis that is the foundation for a peer-reviewed publication.

² The directed research option shall consist of a project, designed and conducted by the student, culminating in a scholarly paper or report that is suitable for publication in the respective field of scholarship.

An approved program of study plan is required during the first semester.

Natural Resources: Wildlife and Conservation Biology (M.S.)

<https://colsa.unh.edu/nren/natural-resources/natural-resources-ms>

Description

NATURAL RESOURCES: WILDLIFE AND CONSERVATION BIOLOGY

The MS option in Wildlife and Conservation Biology is typically pursued by those with a BS in Wildlife, Biology, Zoology, Environmental Studies, or related field. Research often takes an integrated field-laboratory approach to study population ecology and conservation, community and landscape ecology, conservation biology and genetics, and applied wildlife management issues. Graduates are employed by state and federal agencies, NGOs, and environmental consulting firms, with a number continuing for a PhD at other institutions.

Requirements

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for natural resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course Requirements or Equivalent

Code	Title	Credits
EDUC 904	Qualitative Inquiry in Education (Policy oriented)	4
Or		

NR 903	Approach to Research	2
And with NR 903, choose one of the following additional research methods classes for a total of 4 credits:		
NR 905	Grant Writing	
BIOL 902	Writing and Publishing Science	
BIOL 950	Scientific Communication	
Or an alternative with approval from the Graduate Coordinator		
NR 993	Natural and Environmental Resources Seminar	1-2
or NR 947	Current Issues in Ecosystem Ecology	
NR 996	Natural Resource Education (1 credit)	1-2
or LSA 900	College Teaching	
Select one of the following Quantitative methods courses:		
BIOL 811	Applied Biostatistics II	3-4
BIOL 933	Design, Analysis, and Interpretation of Experiments	
DATA 800	Introduction to Applied Analytic Statistics	
ECON 926	Econometrics I	
ESCI 801	Quantitative Methods in Earth Sciences	
MATH 835	Statistical Methods for Research	
MATH 840	Design of Experiments I	
MATH 969	Topics in Probability and Statistics I	
NR 909	Analysis of Ecological Communities and Complex Data	
NR 913	Quantitative Ecology	
POLT 905	Introduction to Statistical Analysis	
PSYC 905	Research Methodology and Statistics I	
PSYC 907	Research Methods and Statistics III	
SOC 901	Sociological Methods I: Intermediate Social Statistics	
SOC 903	Sociological Methods III: Advanced Social Statistics	
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods	
Or an alternative with approval from the Graduate Coordinator		
Select one of the following:		
NR 899	Master's Thesis (and a formal presentation of the thesis) ¹	6
NR 998	Directed Research (and directed research results) ²	4

¹ The thesis option will provide a research-based thesis that is the foundation for a peer-reviewed publication.

² The directed research option shall consist of a project, designed and conducted by the student, culminating in a scholarly paper or report that is suitable for publication in the respective field of scholarship.

An approved program of study plan is required during the first semester.

Natural Resources and Earth Systems Science (NRES)

Degree Offered: Ph.D.

This program is offered in Durham.

The graduate program in Natural Resources and Earth Systems Science (NRESS) is an interdepartmental program offering the Ph.D. degree

for interdisciplinary work in areas related to the understanding and management of the environment in the broadest context. Areas of study include, but are not limited to, ecosystem science, biogeochemical cycling, geochemical systems, atmospheric science, environmental philosophy, forestry, geologic science, hydrology, marine science, oceanography, social science, environmental policy and ethics, environmental education, and multidisciplinary natural resources management.

The NRESS Ph.D. program offers two degrees:

Ph.D. in Natural Resources and Environmental Studies (NRES)

Students in NRES focus on problems dealing with the allocation and distribution of natural resources, policies at the local to global scale, and ethical and societal factors that affect resource management. Students receiving the Ph.D. degree in NRES will typically have a bachelor's and/or master's degree in economics, environmental conservation, philosophy, political science, or sociology.

Ph.D. in Earth and Environmental Sciences (EES)

Students in EES focus on problems dealing with the physical, chemical, and/or biological processes that affect earth and environmental systems. Students receiving the Ph.D. degree in EES will typically have a bachelor's and/or master's degree in biology, ecology, environmental science, geology, hydrology, or microbiology.

Admission Requirements

Applicants to the NRESS Program come from a wide range of undergraduate majors and master's degree concentrations. Individuals are admitted based on the quality of their previous work and its relevance to the particular area of study they propose to pursue.

Students are expected to have completed a master's degree before entering the program, although this is not a requirement.

All applicants must identify an adviser before being admitted, and this faculty member must agree to serve as the applicant's adviser. Certain applicants may be admitted with deficiencies identified by their adviser and/or by the executive committee. These deficiencies normally must be corrected in the first year of the program. All applicants must submit GRE scores. Please see the program website (<http://www.unh.edu/nressphd>) for details on applying to the program.

Faculty

The NRESS Ph.D. Program has over 80 UNH faculty members who serve as advisors, mentors and guidance and doctoral committee members for the current 60+ NRESS students. NRESS faculty request appointment from across the University, representing a wide range of 23 units: all UNH colleges, multiple research groups, departments, schools, and the UNH Cooperative Extension.

Prospective students are strongly encouraged to contact NRESS faculty members directly when seeking a potential advisor for mentoring and possible funding of their doctoral studies. Applicants are required to secure a UNH NRESS advisor to be considered for admission.

<https://www.unh.edu/nressphd>

Programs

- Earth and Environmental Sciences (Ph.D.) (p. 126)
- Natural Resources and Environmental Studies (Ph.D.) (p. 127)

Faculty

See <https://www.unh.edu/nressphd/nress-faculty> for faculty.

Earth and Environmental Sciences (Ph.D.)

<https://www.unh.edu/nressphd/program-overview>

Description

The graduate program in Natural Resources and Earth Systems Science (NRESS) is an interdepartmental program offering the Ph.D. degree for interdisciplinary work in areas related to the understanding and management of the environment in the broadest context. Areas of study include, but are not limited to, ecosystem science, biogeochemical cycling, geochemical systems, atmospheric science, environmental philosophy, forestry, geologic science, hydrology, marine science, oceanography, social science, environmental policy and ethics, environmental education, and multidisciplinary natural resources management.

Earth and Environmental Sciences (EES)

The NRESS Ph.D. in Earth and Environmental Sciences (EES) focuses on problems dealing with the physical, chemical, and/or biological processes that affect earth and environmental systems. Students receiving the Ph.D. degree in EES will typically have a bachelor's and/or master's degree in biology, ecology, environmental science, geology, hydrology, or microbiology.

Requirements

Degree Requirements

The requirements of the doctoral program are flexible to accommodate the diverse interests and needs of students. All students in the NRESS program must meet the requirements listed below.

Committees and Coursework

The Ph.D. guidance and dissertation committees must consist of at least five members. The chair must be a member of the NRESS faculty. Three of the five members (including the chair) must be NRESS faculty, and committee members must be from more than one academic department. Students are strongly encouraged to include at least one off-campus member. Off-campus committee members must hold a doctoral degree and be approved by the student's adviser, the NRESS Program, and the Graduate School dean. Students should select the guidance committee in a timely manner, within one year for full-time students and two years for part-time students.

Core Area Course Requirements

All students will take one course in each of four core areas while enrolled in the program: natural sciences, ethics/policy/law, methods, and seminar. Students are also required to take NRES 997, Interdisciplinary Research in Natural Resources and Earth and Environmental Sciences, preferably within the first year of enrollment. Any course used to satisfy the natural sciences, ethics/policy/law, and methods core areas must be a classroom course of at least 3 credits. The seminar course must be interactive and must be at least 1 credit. Independent study courses may not be used to satisfy core requirements. Students must complete a Preliminary Coursework Approval Form, which lists the student's planned coursework, within one year for full-time students and two years for part-time students. A Final Course Approval Form, with signatures from the adviser, committee members, and the NRESS program chair is submitted once the coursework is completed.

Students Entering the Program without a Master's Degree

Students entering the program without a master's degree are expected to complete a minimum of 36 credit hours. There is not a specific credit requirement beyond the required four core courses and NRES 997 for students who have completed a M.S. or M.A. degree in a related field. Students enter the NRESS program with diverse backgrounds and preparation in their desired area of study. Therefore, final credit requirements are determined by the guidance committee and may include additional coursework necessary to enhance the student's selected field of study and/or correct any deficiencies in the student's previous program. Students may apply a maximum of 12 credits of independent study and/or seminar courses to their total course requirement.

Transfer Credits

Graduate-level courses taken prior to admission may be transferred into the program and applied to the total only if they were not taken while matriculated in another degree program, as per Graduate School policy. These courses may not be used to meet the core course requirements. Transfer of credits must be approved by the adviser, the guidance committee, and the Graduate School.

Language Proficiency

Language proficiency may be required at the discretion of the student's adviser/committee. If required, a student will need to show proficiency in one foreign language or one computer language.

Examinations

Each student is required to pass three examinations, each of which has both a written and oral component. Additional preliminary examinations may be administered before the three required exams as the committee deems necessary. Performance on such an exam will determine areas where the student needs additional coursework or could result in the student's removal from the program.

Comprehensive exam (sometimes referred to as the qualifying exam): The student must prepare an extensive written answer to one question from each committee member that covers the basic concepts and factual material deemed essential for the student's program. Three weeks are allowed for completion of the exam during which time students are expected to work solely on their answers. Answers are expected to be anywhere from 10 – 20 pages per question with extensive literature citations. Completed written answers are submitted to the advisor who

then distributes copies to the other committee members for review. Approximately 1 – 2 weeks are allowed for the committee to read the answers, after which time the student gives an oral presentation to the committee. Following the presentation, committee members will ask for clarification of the student's answers, if necessary. The committee may require a student to repeat part, or all, of the comprehensive exam if the student's performance is deemed unsatisfactory. This exam should be taken within three years of initiation of graduate study in the program.

Proposal exam: The student must present to the committee a written proposal on the dissertation research topic. Once the proposal is written, the student will complete a public oral presentation of the proposed research, followed by an oral examination by the committee.

Final exam: The student must complete a written Ph.D. dissertation prior to the final exam. Once written, the student is required to complete an oral defense of the dissertation, which will include both a public presentation and oral examination by the committee.

A student may be required to take additional courses following either the comprehensive or proposal exam, or may be removed from the program following failure of any of the required exams. Students are advanced to candidacy after successfully completing the comprehensive exam, proposal exam, and all coursework required by the guidance committee as summarized on the Coursework Approval Form.

Natural Resources and Environmental Studies (Ph.D.)

<https://www.unh.edu/nressphd/program-overview>

Description

The graduate program in Natural Resources and Earth Systems Science (NRESS) is an interdepartmental program offering the Ph.D. degree for interdisciplinary work in areas related to the understanding and management of the environment in the broadest context. Areas of study include, but are not limited to, ecosystem science, biogeochemical cycling, geochemical systems, atmospheric science, environmental philosophy, forestry, geologic science, hydrology, marine science, oceanography, social science, environmental policy and ethics, environmental education, and multidisciplinary natural resources management.

Natural Resources and Environmental Studies (NRES)

The NRESS Ph.D. in Natural Resources and Environmental Studies (NRES) focuses on problems dealing with the allocation and distribution of natural resources, policies at the local to global scale, and ethical and societal factors that affect resource management. Students typically enter the program with a bachelor's and/or master's degree in economics, environmental conservation, philosophy, political science, or sociology.

Requirements

Degree Requirements

The requirements of the doctoral program are flexible to accommodate the diverse interests and needs of students. All students in the NRESS program must meet the requirements listed below.

Committees and Coursework

The Ph.D. guidance and dissertation committees must consist of at least five members. The chair must be a member of the NRESS faculty. Three of the five members (including the chair) must be NRESS faculty, and committee members must be from more than one academic department. Students are strongly encouraged to include at least one off-campus member. Off-campus committee members must hold a doctoral degree and be approved by the student's adviser, the NRESS Program, and the Graduate School dean. Students should select the guidance committee in a timely manner, within one year for full-time students and two years for part-time students.

Core Area Course Requirements

All students will take one course in each of four core areas while enrolled in the program: natural sciences, ethics/policy/law, methods, and seminar. Students are also required to take NRES 997, Interdisciplinary Research in Natural Resources and Earth and Environmental Sciences, preferably within the first year of enrollment. Any course used to satisfy the natural sciences, ethics/policy/law, and methods core areas must be a classroom course of at least 3 credits. The seminar course must be interactive and must be at least 1 credit. Independent study courses may not be used to satisfy core requirements. Students must complete a Preliminary Coursework Approval Form, which lists the student's planned coursework, within one year for full-time students and two years for part-time students. A Final Course Approval Form, with signatures from the adviser, committee members, and the NRESS program chair is submitted once the coursework is completed.

Students Entering the Program without a Master's Degree

Students entering the program without a master's degree are expected to complete a minimum of 36 credit hours. There is not a specific credit requirement beyond the required four core courses and NRES 997 for students who have completed a M.S. or M.A. degree in a related field. Students enter the NRESS program with diverse backgrounds and preparation in their desired area of study. Therefore, final credit requirements are determined by the guidance committee and may include additional coursework necessary to enhance the student's selected field of study and/or correct any deficiencies in the student's previous program. Students may apply a maximum of 12 credits of independent study and/or seminar courses to their total course requirement.

Transfer Credits

Graduate-level courses taken prior to admission may be transferred into the program and applied to the total only if they were not taken while matriculated in another degree program, as per Graduate School policy. These courses may not be used to meet the core course requirements. Transfer of credits must be approved by the adviser, the guidance committee, and the Graduate School.

Language Proficiency

Language proficiency may be required at the discretion of the student's adviser/committee. If required, a student will need to show proficiency in one foreign language or one computer language.

Examinations

Each student is required to pass three examinations, each of which has both a written and oral component. Additional preliminary examinations may be administered before the three required exams as the committee deems necessary. Performance on such an exam will determine areas where the student needs additional coursework or could result in the student's removal from the program.

Comprehensive exam (sometimes referred to as the qualifying exam): The student must prepare an extensive written answer to one question from each committee member that covers the basic concepts and factual material deemed essential for the student's program. Three weeks are allowed for completion of the exam during which time students are expected to work solely on their answers. Answers are expected to be anywhere from 10 – 20 pages per question with extensive literature citations. Completed written answers are submitted to the advisor who then distributes copies to the other committee members for review. Approximately 1 – 2 weeks are allowed for the committee to read the answers, after which time the student gives an oral presentation to the committee. Following the presentation, committee members will ask for clarification of the student's answers, if necessary. The committee may require a student to repeat part, or all, of the comprehensive exam if the student's performance is deemed unsatisfactory. This exam should be taken within three years of initiation of graduate study in the program.

Proposal exam: The student must present to the committee a written proposal on the dissertation research topic. Once the proposal is written, the student will complete a public oral presentation of the proposed research, followed by an oral examination by the committee.

Final exam: The student must complete a written Ph.D. dissertation prior to the final exam. Once written, the student is required to complete an oral defense of the dissertation, which will include both a public presentation and oral examination by the committee.

A student may be required to take additional courses following either the comprehensive or proposal exam, or may be removed from the program following failure of any of the required exams. Students are advanced to candidacy after successfully completing the comprehensive exam, proposal exam, and all coursework required by the guidance committee as summarized on the Coursework Approval Form.

Nursing (NURS)

Degrees Offered: M.S., D.N.P., Graduate Certificate

This program is offered in Durham.

The Department of Nursing offers the master of science degree in nursing under two programs: Graduate Program in Nursing and Direct Entry Master's in Nursing. We also offer the Post-Master's Family Nurse Practitioner Certificate Program, the Post-Master's Psychiatric Mental Health Nurse Practitioner Certificate Program, and the Online Doctor of Nursing Practice degree program.

Graduate Program in Nursing

The Graduate Program in Nursing offers four clinical practice tracks: clinical nurse leader (CNLSM), evidence-based nursing (EBN), family nurse practitioner (FNP and Post-Master's FNP), and Post-Master's Psychiatric Mental Health Nurse Practitioner (PM-PMHNP). Depending on track, programs are designed to be completed in three to four semesters of full-time study including one summer. Individual plans of study are available for those wishing to pursue part-time study. Although no guarantees are given, the department will try to accommodate student requests to the fullest extent possible. All tracks prepare nurses for evidence-based practice through critical inquiry using a variety of instructional modalities.

Academic Standards

Graduate or post-master's students receiving failing grades in **six** or more credits will be recommended to the Graduate School for dismissal. Students on conditional or provisional status or admitted with stipulations must meet the conditions as stated in the letter of admission in order to remain in the Graduate School.

Research and Scholarly Activities

The graduate faculty of the university's nursing program believe learning is a creative process wherein students are active participants in their education, growth, and development. Faculty members are facilitators and mentors to students within a supportive scholarly environment. Students are prepared to be skilled, knowledgeable, and reflective leaders in health care who practice as nurse practitioners, clinical nurse leaders, or clinical educators.

The generation, dissemination, and application of evidenced-based nursing knowledge and practice are a central mission for the nursing department. Health care of vulnerable populations is the research focus among the faculty. Faculty engage in scholarly inquiry across diverse topics such as care-giving, acute symptom management, clinical decision-making, adolescent pregnancy, elder care-giving, and cultural diversity. Faculty publications, research, public policy initiatives, and other consultative/professional activities may be viewed at the department's website.

Academic Standards

Graduate or post-master's students receiving failing grades in **six** or more credits will be recommended for dismissal from the graduate or post-master's program in nursing to the Graduate School. Students on conditional or provisional status or admitted with stipulations must meet the conditions as stated in the letter of admission in order to remain in the Graduate School.

Admission Requirements

All applicants who are not native English speakers are required to demonstrate a sufficient level of proficiency in the English language to meet the admission requirement of the Graduate School. Proficiency can be demonstrated by the receipt of a bachelor's or advanced degree from an accredited institution of higher education in the United States or from a university in another country where English is the primary language of instruction. All other non-native speakers must achieve a minimum score of 550 (paper-based), 213 (computer-based), or 80 (Internet-based) on the Test of English as Foreign Language (TOEFL). The Graduate Record Exam (GRE) and Miller Analogies Test (MAT) are not required. Individuals apply to the University of New Hampshire Graduate School.

Graduate Program in Nursing Admission Requirements

Registered nurses (RNs) who have successfully passed the NCLEX–RN, currently hold an unencumbered, active RN license in the United States, and who hold a baccalaureate degree in either nursing or another field can be considered for admission. Applicants are required to have a good academic record and completion of coursework in statistics and research.

RNs whose baccalaureate degree is in a discipline other than nursing may apply to the master of science degree in nursing (M.S.) program and will be considered for the track that is commensurate with their clinical experience based on faculty discretion. If a Master of Science Degree in Nursing has been conferred, students may apply to the Post–Master’s Family Nurse Practitioner Certificate Program, if desired, with the following requirements.

1. Unencumbered, active RN license in the United States
2. Baccalaureate degree in another field
3. Cumulative GPA of 3.0 or higher in associate and baccalaureate programs
4. Nursing experience preferred but not required
5. Successful completion of undergraduate statistics course and undergraduate research course
6. Interview may be requested

Letters of recommendation should be substantial, with at least one academic reference from your nursing program and two references from current nursing professionals with graduate education background. Referee’s credentials should be included on reference form. Letters of recommendation from family or friends are not acceptable.

Faculty in the Department of Nursing review completed applications on a rolling basis.

Post-Master’s Family Nurse Practitioner Certificate Program Admission Requirements

In addition to the standard Graduate School requirements, the Nursing Department requires:

1. Unencumbered, active RN license in the United States;
2. Master’s degree in Nursing;
3. Two letters of reference. References should be substantial with one academic, if available, and one current professional with graduate education background. Letters of recommendation from family or friends are not acceptable;
4. Updated resume; and
5. Course description for any course you request waived, if taken outside UNH.

Post-Master’s Psychiatric Mental Health Nurse Practitioner Certificate Program Admission Requirements

In addition to the standard Graduate School requirements, the Nursing Department requires:

1. Unencumbered, active RN license in the United States;
2. Master’s Degree in Nursing;
3. Nurse practitioner certification with one year of practice experience in a primary care setting;

4. Two letters of reference. References should be substantial with one academic, if available, and one current professional with graduate education background. Letters of recommendation from family or friends are not acceptable; and
5. Updated resume.

Direct Entry Master’s in Nursing Admission Requirements

The Direct Entry Master’s in Nursing Program is for non-registered nurses with a BA/BS or higher degree in a field other than nursing. A grade point average of 3.0 or better is suggested. Previous course work and professional experience is taken into consideration. Pre-requisite courses must be completed at the time the application is reviewed. These include Human Anatomy & Physiology I and II with lab, Microbiology at the cellular level, and Statistics with a grade of B or better. Applicants who are in the process of completing a pre-requisite course spring semester must have instructor submit grade to date directly to the Department of Nursing by April 8.

Knowledge of the basic processes and methods of research is necessary for students entering the DEMN program. While many undergraduate programs include a research methods course, if a student does not have a background in research, he or she should enroll in an introductory research course or introductory nursing research textbooks may be used as self–study resources prior to matriculation in the DEMN program.

Letters of recommendation should be substantial with at least one academic reference and two references from current professionals with graduate education background. Letters of recommendation from family or friends are not acceptable.

Doctor of Nursing Practice Admission Requirements

- *Graduate School Application:* Applicants must complete the Graduate School application, which can be found at www.gradschool.unh.edu (<http://www.gradschool.unh.edu>).
- *Official Transcripts:* Applicants must submit one official transcript from each postsecondary institution attended. Applicants must hold a master’s degree. A minimum 3.25 cumulative GPA for graduate work is preferred.
- *Registered Nurse Licensure:* An unencumbered registered nurse license in the United States must be documented at the time of application.
- *Letters of Recommendation:* Three letters of reference pertaining to academic ability, professional competency, and personal character are required.
- *Curriculum Vitae or Resume:* Includes academic preparation, clinical experience and professional activities.
- *Professional Statement:* The professional statement must include a written essay responding to each of the following:
 - a. How will a doctor of nursing practice degree from the University of New Hampshire help you attain your professional goals?
 - b. Describe your current advanced nursing role, or if you are pursuing a new specialty, explain what you are planning to do with your nursing career in your specialty after you complete the doctor of nursing practice.
 - c. In addition to the information contained in your resume, what strengths do you possess that would contribute to your success in the doctor of nursing practice program and in a community of interprofessional scholars?

- d. Identify one scholarly inquiry from your practice you would like to explore as part of the DNP program (e.g., quality improvement initiative, evidence-based practice guidelines, new model of care, policy analysis).

- *Interview:* After initial review of the application, applicants may be contacted for an interview.

Accelerated Master's Program for Current UNH Senior Students

Graduate Program in Nursing Accelerated Master's

Qualified senior nursing students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.2 cumulative grade-point average is normally required to be considered for the accelerated master's program. Such seniors are normally admitted prior to the start of their last undergraduate semester. Seniors who have been admitted under accelerated master's program may register for a maximum of three courses for up to 12 graduate credits.

When seniors admitted to the accelerated master's program have registered for graduate courses, they must maintain a grade point average of 3.20, complete their undergraduate degree as planned, and pass graduate courses taken for credit with a grade of B- or better. If these conditions are not met, admission is withdrawn.

Students accepted under accelerated master's follow the clinical nurse leader or evidence-based nursing track. Undergraduate students accepted as graduate nursing students under accelerated master's guidelines, are admitted with the stipulation that their RN license must be obtained prior to beginning any clinical course. Stipulation is removed upon verification of the RN license provided to the department of nursing.

Admission is provisional: must have RN license before registering for NURS 952C, Clinical Nursing Leadership Clinical, or NURS 955, Practicum in Advanced Nursing Practice.

Direct Entry Master's in Nursing Accelerated Master's

The Direct Entry Master's in Nursing Program provides an opportunity for accelerated admission to the graduate program for full time undergraduate UNH students who meet admission criteria. To be considered, undergraduate students must have completed all major requirements by the fall of their senior year. A grade point average of 3.4 or better is suggested. Previous course work is taken into consideration. Pre-requisite courses must be complete at the time the application is reviewed. These include Human Anatomy and Physiology I and II with labs, Microbiology at the cellular level, and statistics with a grade of B or better.

The curriculum begins in January and includes two summer sessions. Students graduate as an advanced generalist with a master of science (M.S.) degree in nursing and upon passing certification examination, as a clinical nurse leader (CNL). Direct entry courses taken during the spring of the senior year of undergraduate program will fulfill elective credits to complete B.A./B.S. degree requirements at UNH. This accelerated, full-time program is a five-semester, 71-credit course of study.

Students are admitted with the stipulation that they must submit final transcript with degree conferred prior to enrolling in fall semester courses and pass NCLEX-RN prior to completing the program. The stipulation is met once the final transcript and RN license are received. Students are

eligible to take the NCLEX-RN after completing a total of 62 credits of accelerated study. Students take the CNL certification examination in their final semester.

Applicants are strongly encouraged to meet with the Graduate Program in Nursing coordinator and their discipline-specific adviser early on in their undergraduate program to plan this course of study.

Students may apply during the second semester of their junior year by the posted application deadline. Application review continues until all seats are filled.

<https://chhs.unh.edu/nursing/>

Programs

- Nursing (DNP) (p. 130)
- Nursing (M.S.) (p. 131)
- Nursing: Direct Entry (M.S.) (p. 132)
- Family Nurse Practitioner (Graduate Certificate) (p. 133)
- Psychiatric Mental Health (Graduate Certificate) (p. 134)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Nursing (DNP)

<https://online.unh.edu/doctor-of-nursing-practice>

Description

The Doctor of Nursing Practice (DNP) program prepares nurses for the highest level of specialized nursing practice. DNP graduates are prepared to translate evidence into practice, improve systems of care, and measure health outcomes in diverse settings. Graduates of the DNP program are prepared for culturally competent, evidence-based, system-based care, interprofessional collaboration and leadership. DNP graduates are distinguished by their abilities to:

- Affect practice
- Design and implement programs that improve health and healthcare delivery
- Apply data management and informatics skills to evaluate programs, outcomes, and care systems
- Influence health policy

Requirements for the Online Doctorate of Nursing Practice degree include:

- 8 core courses and 3 doctoral seminars completed at the level of B- or better;
- verification of 1,000 advanced practice clinical hours (includes up to 500 clinical hours earned in master's program);
- a publishable scholarly paper;
- successful oral defense of your DNP Project; and
- acceptance of the DNP Project Final Report by your DNP Team.

All courses are offered 100% online. Students are required to attend two on-campus residencies:

- the first 2-3 day residency is early in the program to meet with peers and nursing faculty, and identify ideas for the DNP project; and
- the second residency is at the end of the program, for the oral presentation and defense of the DNP Project.

Cohorts are admitted twice a year, with starts in January and August.

The DNP program builds upon the experience of master's-prepared nurses. Registered nurses who have obtained an MS in nursing (NP, CRNA, CNMW, CNL, CNS, Nurse Executive, Health Systems Management, Health Informatics) or equivalent degree (MBA, MHA, MPH) are welcome to apply.

Requirements

The online Doctor of Nursing Practice degree requires students complete **21-33 credits** via 11 courses. The online DNP program aims to produce graduates prepared to improve health and care outcomes through coursework in organizational and systems leadership, quality improvement processes, and translation of evidence into practice, to name a few.

Degree Requirements

Code	Title	Credits
ADMN 912	Managing Yourself & Leading Others	3
ADMN 952	Organizations, Leadership, and Environments	3
MATH 837	Statistical Methods for Quality Improvement and Design	3
NURS 963	Advanced Clinical Epidemiology	3
NURS 964	Technology and Health Care	3
NURS 967	Evidence Synthesis	3
NURS 969	Health Policy and Finance	3
NURS 973	Health Care Quality	3
NURS 980	Doctoral Scholarly Project I	3
NURS 981	Doctoral Scholarly Project II	3
NURS 982	Doctoral Scholarly Project III	3

Students are required to successfully complete DNP coursework, have 1,000 documented advanced practice clinical hours (includes up to 500 clinical hours earned in master's program), produce a publishable scholarly paper, and successfully defend their DNP Project.

If a student completed fewer than 500 clinical hours in their Master's program, the student must enroll in NURS 970 Clinical Practicum for Advanced Practice Nurse, under the supervision of the DNP director. NURS 970 is a 2-credit course and allows the student to complete up to 250 clinical practicum hours; this course may be repeated once.

Nursing (M.S.)

<https://chhs.unh.edu/nursing/graduate-program-nursing>

Description

Clinical Nurse Leader Track

Students graduate as an advanced generalist as a clinical nurse leader (CNL) with a master of science degree. Graduates are eligible to sit for the clinical nurse leader national certification examination. The CNL is a role in the field of nursing designed to provide master's-prepared, point-of-care nurse leaders with the ability to manage and solve complex patient problems within a systems framework.

Evidence-Based Nursing Track

The evidence-based nursing track focuses on developing advanced generalist nursing practice in a focused area of study, promoting interdisciplinary collaboration, fostering life-long learning, and preparing students for the leading edge of health care knowledge and delivery. Students strengthen knowledge and skills in clinical decision making, the application of nursing interventions, and their ability to critique and appropriately use evidence as a foundation for practice. In this graduate track, students study nursing as an applied discipline, advancing their knowledge of theoretical perspectives for clinical practice, with an emphasis on leadership; the cultural, social, and political context of health and illness; and quality improvement methodologies. Students are mentored in the enactment of leadership strategies to improve quality care in nursing practice through an intensive clinical practicum.

Family Nurse Practitioner Track

This program prepares family nurse practitioners (FNPs) with specialized knowledge and clinical competency to practice as licensed independent practitioners across the life span. FNPs practice in ambulatory and long-term care as primary providers to individuals, families, and groups. The UNH program prepares these advanced practice registered nurses (APRNs) to diagnose and manage acute episodic and chronic illnesses across the life span and simple-to-complex continuum. Health promotion, disease prevention, teaching, counseling, and coaching are emphasized. At the completion of the program, students are eligible to sit for national certification as a family nurse practitioner. Students are also prepared to enter doctoral study. Upon licensure, FNPs may practice autonomously as well as in collaboration with other health professionals.

Requirements

Clinical Nurse Leader Track Degree Requirements

Code	Title	Credits
NURS 901	Health Policy	3
NURS 902	Advanced Physical Assessment	2
NURS 908	Advanced Pathophysiology	3
NURS 925	Health Care Systems and Leadership	3
NURS 952	Clinical Nursing Leadership I	2
NURS 952C	Clinical Nursing Leadership Clinical	6
NURS 953	Promoting Quality Management	3
NURS 958	Clinical Nurse Leader Capstone	6
NURS 963	Advanced Clinical Epidemiology	3

NURS 968	Nursing Science and Evidence Based Practice	3
Total Credits		34

Evidence-Based Nursing Track Degree Requirements

Code	Title	Credits
NURS 901	Health Policy	3
NURS 908	Advanced Pathophysiology	3
NURS 909	Advanced Health Assessment and Diagnostic Reasoning	3
NURS 925	Health Care Systems and Leadership	3
NURS 944	Population Health Promotion and Risk Reduction	3
NURS 953	Promoting Quality Management	3
NURS 955	Practicum in Advanced Nursing Practice	3
NURS 956	Capstone Project Seminar	3
NURS 963	Advanced Clinical Epidemiology	3
NURS 968	Nursing Science and Evidence Based Practice	3
Total Credits		30

Family Nurse Practitioner Track Degree Requirements

Code	Title	Credits
NURS 810	Families in Health and Illness	3
NURS 901	Health Policy	3
NURS 907	Advanced Pharmacology	3
NURS 908	Advanced Pathophysiology	3
NURS 909	Advanced Health Assessment and Diagnostic Reasoning	3
NURS 925	Health Care Systems and Leadership	3
NURS 935	Primary Care of Families I	3
NURS 936	Practicum in the Primary Care Families I	3
NURS 937	Primary Care of Families II	3
NURS 938	Practicum in the Primary Care of Families II	3
NURS 939	Seminar and Practicum in the Primary Care of Families III	6
NURS 944	Population Health Promotion and Risk Reduction	3
NURS 963	Advanced Clinical Epidemiology	3
NURS 968	Nursing Science and Evidence Based Practice	3
Total Credits		45

Capstone Experience for All Master's and Post--Master's Nursing Tracks

For clinical nurse leader (CNL), the capstone course, NURS 958 Clinical Nurse Leader Capstone, requires students to complete 200 clinical hours plus a scholarly project, which synthesizes advanced practice knowledge and skills to address substantive nursing practice issues. For evidenced-based nursing (EBN), the capstone course, NURS 956 Capstone Project Seminar, requires students to complete a scholarly project.

CNL and FNP students may elect to complete NURS 899 Master's Thesis (6 credits). EBN students may elect to complete a thesis and register for 6 credits of NURS 899 Master's Thesis as the capstone in place of NURS 956 Capstone Project Seminar. If a student opts to do a

thesis, the student should discuss this option with a faculty adviser early in the program of study.

For family nurse practitioner (FNP and PM-FNP), the capstone course, NURS 939 Seminar and Practicum in the Primary Care of Families III, is the final integrated clinical practicum.

For post-master's psychiatric mental health nurse practitioner (PM-PMHNP), the capstone course, NURS 985 Psychiatric Mental Health Nurse Practitioner Practicum II, Psychiatric Mental Health Nurse Practitioner Practicum II, is the final integrated clinical practicum.

Nursing: Direct Entry (M.S.)

<https://chhs.unh.edu/nursing/direct-entry-masters-nursing>

Description

The Direct Entry Master's in Nursing Program is an accelerated, full-time, five-semester, 71-credit course of study designed for non-RN students who hold a B.S. or B.A. or higher degree in a field other than nursing. This program offers the Clinical Nurse Leader (CNL) track. The CNL is a role in the field of nursing designed to provide master's-prepared, point-of-care nurse leaders with the ability to manage and solve complex patient problems within a systems framework. Students are admitted with the stipulation that they must pass NCLEX-RN prior to completion of the program. The stipulation is met once the RN license is received. Students are eligible to take the NCLEX-RN after completing a total of 62 credits of accelerated study. The curriculum begins in January and includes two summer sessions.

Students graduate as an advanced generalist with a master of science (MS) degree in nursing and upon passing certification examination, as a clinical nurse leader (CNL). Students take the CNL certification examination in their final semester. Students complete a clinical immersion experience of approximately 300 clinical hours. Students conclude their CNL master's preparation in a clinical nurse leader capstone, NURS 958 Clinical Nurse Leader Capstone .

Requirements

Direct Entry Master's in Nursing Degree Requirements

Code	Title	Credits
NURS 806	Clinical Inquiry	4
NURS 807	Pathophysiology and Pharmacology	4
NURS 811	Clinical Reasoning Through Simulation	2
NURS 813	Health Assessment and Clinical Nursing Theory	4
NURS 813C	Health Assessment and Clinical Nursing	2
NURS 825	Collaborative Care I: Care of Older Adult	3
NURS 826	Caring for People with Severe and Persistent Mental Illness	2
NURS 826C	Caring for People with Severe and Persistent Mental Illness Clinical	2
NURS 827	Collaborative Care III: Managing Acute and Complex Care of Individuals	4
NURS 827C	Collaborative Care III: Managing Acute and Complex Care of Individuals Clinical	2

NURS 828	Public Health Nursing	3
NURS 830	Collaborative Care II: Childbearing and Childrearing Families	4
NURS 830C	Collaborative Care II: Childbearing and Childrearing Families Clinical	1
NURS 901	Health Policy	3
NURS 902	Advanced Physical Assessment	2
NURS 908	Advanced Pathophysiology	3
NURS 925	Health Care Systems and Leadership	3
NURS 952	Clinical Nursing Leadership I	2
NURS 952C	Clinical Nursing Leadership Clinical	6
NURS 953	Promoting Quality Management	3
NURS 958	Clinical Nurse Leader Capstone	6
NURS 963	Advanced Clinical Epidemiology	3
NURS 968	Nursing Science and Evidence Based Practice	3
Total Credits		71

NURS 953	Promoting Quality Management	3
Credits		15
Second Year		
Spring		
NURS 925	Health Care Systems and Leadership	3
NURS 952	Clinical Nursing Leadership I	2
NURS 952C	Clinical Nursing Leadership Clinical	6
NURS 968	Nursing Science and Evidence Based Practice	3
Eligible for NCLEX-RN		
Credits		14
Summer		
NURS 901	Health Policy	3
NURS 958	Clinical Nurse Leader Capstone	6
Credits		9
Total Credits		71

Degree Plan

Direct Entry Master's in Nursing Plan of Study

Course	Title	Credits
First Year		
Spring		
NURS 806	Clinical Inquiry	4
NURS 807	Pathophysiology and Pharmacology	4
NURS 813	Health Assessment and Clinical Nursing Theory ((plus lab))	4
NURS 813C	Health Assessment and Clinical Nursing	2
NURS 825	Collaborative Care I: Care of Older Adult	3
Credits		17
Summer		
NURS 811	Clinical Reasoning Through Simulation	2
NURS 826	Caring for People with Severe and Persistent Mental Illness	2
NURS 826C	Caring for People with Severe and Persistent Mental Illness Clinical	2
NURS 830	Collaborative Care II: Childbearing and Childrearing Families	4
NURS 830C	Collaborative Care II: Childbearing and Childrearing Families Clinical	1
NURS 902	Advanced Physical Assessment	2
NURS 963	Advanced Clinical Epidemiology	3
Credits		16
Fall		
NURS 827	Collaborative Care III: Managing Acute and Complex Care of Individuals	4
NURS 827C	Collaborative Care III: Managing Acute and Complex Care of Individuals Clinical	2
NURS 828	Public Health Nursing	3
NURS 908	Advanced Pathophysiology	3

Family Nurse Practitioner (Graduate Certificate)

<https://chhs.unh.edu/nursing/post-masters-fnp-certificate-program>

Description

The Department of Nursing offers the Post-Master's Family Nurse Practitioner Certificate Program for students who completed a master of science degree in nursing. The certificate of advanced practice is designed for those individuals with a master's degree in nursing who wish to expand their practice into the role of a family nurse practitioner. The PM-FNP specialty area prepares nurses to provide comprehensive care that includes health promotion, maintenance and restoration for persons across the life span.

Depending on educational background and previous coursework in master's program, students accepted into the PM-FNP certificate program are required to take as few as three and as many as 12 courses or **12-39 credits**. Successful completion of the required curriculum qualifies the RN to sit for the Family Nurse Practitioner Certification Examination.

Students enrolled in the Post-Master's Family Nurse Practitioner Certificate Program must maintain continuous enrollment by registering for course work or GRAD 800, Continuing Enrollment, to remain active through program completion.

Requirements

Certificate Requirements

Code	Title	Credits
NURS 810	Families in Health and Illness	3
NURS 907	Advanced Pharmacology	3
NURS 908	Advanced Pathophysiology	3
NURS 909	Advanced Health Assessment and Diagnostic Reasoning	3
NURS 925	Health Care Systems and Leadership	3

NURS 935	Primary Care of Families I	3
NURS 936	Practicum in the Primary Care Families I	3
NURS 937	Primary Care of Families II	3
NURS 938	Practicum in the Primary Care of Families II	3
NURS 939	Seminar and Practicum in the Primary Care of Families III	6
NURS 944	Population Health Promotion and Risk Reduction	3
NURS 963	Advanced Clinical Epidemiology	3

Applicant must submit course description for any course taken in previous graduate program they wish to have reviewed for equivalency.

Total Credits 39

Capstone Experience for All Master's and Post--Master's Nursing Tracks

For clinical nurse leader (CNL), the capstone course, NURS 958 Clinical Nurse Leader Capstone, requires students to complete 200 clinical hours plus a scholarly project, which synthesizes advanced practice knowledge and skills to address substantive nursing practice issues. For evidenced-based nursing (EBN), the capstone course, NURS 956 Capstone Project Seminar, requires students to complete a scholarly project.

CNL and FNP students may elect to complete NURS 899 Master's Thesis (6 credits). EBN students may elect to complete a thesis and register for 6 credits of NURS 899 Master's Thesis as the capstone in place of NURS 956 Capstone Project Seminar. If a student opts to do a thesis, the student should discuss this option with a faculty adviser early in the program of study.

For family nurse practitioner (FNP and PM-FNP), the capstone course, NURS 939 Seminar and Practicum in the Primary Care of Families III, is the final integrated clinical practicum.

For post--master's psychiatric mental health nurse practitioner (PM-PMHNP), the capstone course, NURS 985 Psychiatric Mental Health Nurse Practitioner Practicum II, Psychiatric Mental Health Nurse Practitioner Practicum II, is the final integrated clinical practicum.

Psychiatric Mental Health (Graduate Certificate)

<https://online.unh.edu/pmhnp>

Description

The purpose of this certificate program is to prepare the Nurse Practitioner to be a Psychiatric Mental Health Nurse Practitioner to increase access to mental health services in the region. With a background as an NP, graduates can apply their newly learned skills in their primary care setting offering psychiatric mental health care. Training in both primary care and mental health will afford graduates the ability to manage all aspects of patient care including assessing and managing psychiatric and mental health care needs to all ages in a variety of settings.

This Post-Master's Psychiatric Mental Health Certificate Program is designed for the nurse practitioner with a master's degree and one year of clinical practice experience who is looking to effectively care for patients with complex psychiatric and physical health needs. The

aim of the program is to prepare nurse practitioners to add advanced psychiatric skills of therapy, prescribing psychiatric medications and clinical management needed to treat patients with mental illness and chronic medical co-morbidities.

Courses will embrace a lifespan perspective in psychiatric mental health diagnostic reasoning, psychopharmacology, individual psychotherapies and management of complex psychiatric illnesses giving the student an evidence-based framework for comprehensive psychiatric-mental health care.

Students admitted to the PM-PMHNP certificate program must maintain continuous enrollment through program completion.

Requirements

Certificate Requirements

Code	Title	Credits
NURS 975	Psychotherapeutic Frameworks and Modalities	3
NURS 976	Psychiatric Mental Health Nurse Practitioner Practicum I	3
NURS 977	Neurobiology of Mental Disorders	2
NURS 978	Clinical Psychopharmacology	2
NURS 984	Differential Diagnosis of Mental Disorders	3
NURS 985	Psychiatric Mental Health Nurse Practitioner Practicum II	3
Total Credits		16

Nutritional Sciences (NUTR)

Degrees offered: Ph.D., M.S.

This program is offered in Durham.

The Department of Agriculture, Nutrition, and Food Systems offers advanced degrees in Nutritional Sciences including M.S., Accelerated M.S., M.S. plus Dietetic Internship, and Ph.D.

With the M.S. in Nutritional Sciences, students will become engaged in a research project related to the nutritional sciences and gain a comprehensive understanding of nutritional science through coursework. The option emphasizes active participation in original, hypothesis-driven research of publishable quality.

The Ph.D. in Nutritional Sciences trains students to gain advanced knowledge and develop research expertise in such areas as nutritional epidemiology, nutritional assessment, behavioral nutrition, and community nutrition as it pertains to chronic disease risk (e.g., cardiovascular disease, obesity, cognitive function) and food access, consumption, and policy.

<https://colsa.unh.edu/agriculture-nutrition-food-systems>

Programs

- Nutritional Sciences (Ph.D.) (p. 135)
- Nutritional Sciences (M.S.) (p. 135)
- Didactic Program in Dietetics (Graduate Certificate) (p. 137)

Faculty

<https://colsa.unh.edu/agriculture-nutrition-food-systems/faculty-staff-directory>

Nutritional Sciences (Ph.D.)

<https://colsa.unh.edu/agriculture-nutrition-food-systems/program/phd/nutritional-sciences>

Description

The Ph.D. in nutritional sciences trains students to gain advanced knowledge and develop research expertise in such areas as the nutritional physiology and biochemistry, cardiovascular disease, epidemiology, obesity and diabetes, human nutrition, and food systems. It prepares students for future careers in technical consulting, education, and research in academic, industrial, and government institutions.

Admission Requirements: Students applying for the program will be expected to present recent scores (within five years) from the general test of the Graduate Record Examination (GRE) and possess a background in basic sciences appropriate for advanced study in the proposed area of specialization (for example, courses in biology, chemistry, organic chemistry, biochemistry, and physics). Although not required for candidacy in the Ph.D. program, an M.S. degree is suggested for most students.

Requirements

Students with appropriate academic training at the baccalaureate or master's degree level will design a program of study in conjunction with a faculty guidance committee. The student will advance to candidacy after successful completion of all relevant graduate courses and passing a qualifying examination conducted by the guidance committee, which will contain oral and/or written components at the discretion of the committee members. The "guidance" committee for doctoral students will consist of a minimum of five members, three of whom must be from within the Agriculture, Nutrition, and Food Systems Program; at least one member must be from outside the program. After the student's advancement to candidacy for the Ph.D. degree, a doctoral committee (which can be different from the guidance committee) will be appointed to supervise and approve the dissertation.

The dissertation must be based on original hypothesis-driven research of publishable quality. A public presentation of the dissertation research findings will be followed by a final examination, which will be primarily an oral defense of the dissertation. The candidate will be required to serve as a teaching assistant for a minimum of two semesters or to teach a course for one semester. Skills in communicating scientific information will be fostered by presenting one seminar during each year of enrollment. This requirement could include the dissertation defense seminar.

Nutritional Sciences (M.S.)

<https://colsa.unh.edu/agriculture-nutrition-food-systems/program/ms/nutritional-sciences>

Description

Master of Science - Thesis Option

In this program students gain a comprehensive understanding of nutritional science through their coursework and engagement in research. Emphasis is placed on active participation in original hypothesis-driven research of publishable quality. The program is for students who anticipate a professional career involving research or discovery, with a strong background in the basic biology and chemistry of nutrition. This degree may be most appropriate for students who expect to pursue further advanced study, e.g., additional graduate studies or professional school, after graduation.

Admission Requirements: Students applying for the program will be expected to present recent scores (within five years) from the general test of the Graduate Record Examination (GRE) and a strong undergraduate background that includes a science foundation appropriate for advanced study in nutritional sciences.

Master of Science - Combined M.S. with Dietetic Internship Option

The *Master of Science with Dietetic Internship (MSDI)* option is designed as a 21-month program, with over 50 credits and 1,400 practicum-based hours of experiential learning. Practicum sites will build entry-level food system, research and nutrition care skills. Examples of affiliated sites include hospitals, public schools, food service, campus, and Cooperative Extension offices. The MSDI program is designed to meet over 45 practicum-based competencies specified by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), the accrediting agency of the Academy of Nutrition and Dietetics. Upon successful completion, students will be issued a Dietetic Internship (DI) verification statement. This verification statement allows graduates to take the national Registered Dietitian (RD) exam. The RD professional designation allows dietetics professionals to work in a variety of clinical and community settings.

Admission Requirements: Applicants must have a minimum of a 3.2 GPA which must be maintained throughout the first year of the program. Student will be expected to present recent scores (within five years) from the general test of the Graduate Record Examination (GRE).

In order to be considered for admission, students applying for the MSDI program will need to have been enrolled in an accredited undergraduate dietetics program that meets the requirements of the ACEND. Students may apply if they have already completed their undergraduate course work and have already been issued an ACEND Didactic Program in Dietetics (DPD) verification statement by their higher education institution, or they are in the process of completing. If an applicant is currently enrolled in an undergraduate dietetics program, they will submit a Declaration of Intent that identifies the required remaining courses. In this latter case, a conditional acceptance to the MSDI may be awarded with the understanding that students need to submit the completed ACEND DPD verification statement once issued.

In addition to the UNH Graduate School application, the MSDI requires applications to use the online Dietetic Internship Centralized Application Service (DICAS) (portal.dicas.org). The application must be completed for The University of New Hampshire program by the national due date (typically mid-February). Students also need to set up an account

with the national match service (i.e. D&D Digital Systems (<http://www.dnddigital.com>)) (<http://www.dnddigital.com>).

MSDI applicants and participants will be required to provide satisfactory and ongoing documentation of health insurance, liability coverage, criminal background checks, drug screens, vaccinations and medical records to meet site specific contractual agreements between UNH and our mentoring partners.

Master of Science - Accelerated B.S./M.S. Option

The accelerated BS/MS is designed for UNH undergraduates who have a demonstrated capacity to engage in upper-level course work and desire hands-on practice and research training for an advanced degree. The M.S. in Nutritional Sciences requires a minimum of 35 credits. Qualified students may complete up to 12 credits at the 800-level during their senior year, earning dual credit toward their B.S. and M.S. degrees. During the fifth year (Sept-May), enrolled students will complete a minimum of 23 additional credits toward the program requirements.

Graduates of the UNH Master of Science (M.S.) in Nutritional Sciences will be valued in the marketplace as they will have a demonstrated capacity to engage in critical and systems thinking, convey and apply nutrition concepts in clinical, research and community settings, work as individuals and in teams, and identify strategies for lifelong learning.

Admission Requirements: UNH students who apply to the BS/MS program must have a minimum 3.2 GPA. Students must maintain at least a 3.2 GPA.

Requirements

M.S. Thesis Option

The program of study must include a minimum of **30** graduate credits as well as completion of a 6 credit Master's Thesis NUTR 899 based on a research project. Students are required to take two department courses: ANFS 895 Special Topics Introduction to Agriculture, Nutrition and Food System Graduate Studies (to be taken at the earliest opportunity, typically in the initial fall semester of the graduate program); and ANFS 997 Agriculture, Nutrition, and Food Systems Seminar (1 cr per semester, to be taken at least twice by MS students). No more than 4 credits of NUTR 995 Non-thesis Investigations can apply toward the total credit count. In consultation with the student's graduate committee and the area of research specialization, other courses will be taken as appropriate. Further, courses will be taken to fulfill expected competency requirements in experimental design and analysis and in scientific writing and communication.

Each candidate must present at least two seminars (exclusive of the thesis defense) and must serve as a teaching assistant for at least one semester. A thesis committee will be appointed early in the program and will consist of at least three members of the graduate faculty; one of these will be the primary mentor. Students will design a program of study in close consultation with their thesis committee, including their academic courses and scientific research project. The student's committee may require certain undergraduate courses as part of the graduate program if additional competencies would be beneficial to the student. Candidates will be required to pass an oral examination based on their graduate courses and completed thesis. Skills in communicating

scientific information will be fostered by presenting one seminar during each year of enrollment.

M.S. Combined with Dietetic Internship Option

The MSDI requires that students earn a minimum of **50** credits, reflecting practicum-based learning and related course work in food service, community and clinical experiences. The majority of competencies integrated into the MSDI reflect those established by the Accreditation Council for Educators of Nutrition and Dietetics (ACEND). Students will be required to earn a B- or better in graduate courses to earn credits toward their degree.

The first year of the MSDI curriculum is comprised primarily of academic course work, including a year-long mentored group research project (NUTR 960 Research Methods in Nutritional Science I & NUTR 961 Research Methods in Nutritional Science II), in which each student experiences the complete research process. Students in the MSDI will focus on *Applied Food Systems Research*. The second year of the program includes over 1,400 hours of practicum based learning in a variety of clinical, community and food service operations integrated with curriculum related coursework.

Code	Title	Credits
Curriculum and Practicum Sequence		
NUTR 809	Nutritional Epidemiology	4
NUTR 830	From Seed to Sea: Examining Sustainable Food Systems	4
NUTR 855	Treatment of Adult Obesity	4
NUTR 895	Investigations	1-4
NUTR 929		4
NUTR 931	Dietetics: Clinical Theory and Practice	6
NUTR 960	Research Methods in Nutritional Science I	4
NUTR 961	Research Methods in Nutritional Science II	4
ANFS 997	Agriculture, Nutrition, and Food Systems Seminar	1

M.S. Accelerated B.S./M.S. Option

The BS/MS option requires successful completion of a minimum of **35** graduate credits. There are five core courses that include a year-long research experience (NUTR 960 Research Methods in Nutritional Science I and NUTR 961 Research Methods in Nutritional Science II) during the last year of the student's program. Students will be required to earn a B- or better in graduate courses to earn credits toward their degree.

Code	Title	Credits
Required Courses		
NUTR 809	Nutritional Epidemiology	4
NUTR 850	Nutritional Biochemistry	4
NUTR 851	Nutritional Biochemistry of Micronutrients	4
NUTR 855	Treatment of Adult Obesity	4
NUTR 880	Critical Issues in Nutrition	4
NUTR 960	Research Methods in Nutritional Science I	4
NUTR 961	Research Methods in Nutritional Science II	4
ANFS 997	Agriculture, Nutrition, and Food Systems Seminar	1

Didactic Program in Dietetics (Graduate Certificate)

Description

<https://colsa.unh.edu/anfs/nutritional-sciences-graduate-program>

The Didactic Program in Dietetics Certificate is a two semester, 21-credit program that prepares students to enter a dietetic internship. This certificate program is designed for students who previously received a bachelor's degree and are seeking a Verification Statement, which is the documentation required to enter a dietetic internship. Eligibility criteria include a previous bachelor's degree (in any field) and successful completion of the prerequisite courses. Please refer to our website for details.

The path to becoming a registered dietitian includes earning a bachelor's degree (in any field), completing an accredited Didactic Program in Dietetics (this may be completed at the undergraduate or graduate level), completing an accredited Dietetic Internship, and passing the National Registered Dietitian Exam. The University of New Hampshire's DPD curriculum is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). Coursework includes a variety of science and professional courses that meet the ACEND required knowledge. Course instructors incorporate a variety of educational techniques including in-class learning and hands on clinical and simulation experiences. Approximately 70-80% of our graduating students who apply for dietetic internships are matched to an internship during their final semester.

Application Requirements:

1. Bachelor's degree with GPA \geq 3.0
2. Completion of prerequisite courses within the past 10 years with a combined GPA \geq 3.2
3. Earned \geq B in the introductory nutrition course (NUTR 400 or equivalent)
4. Earned \geq C+ in the Anatomy and Physiology I or Chemistry I course (BMS 507 or Chem 403 or approved equivalent)

Prerequisite Courses at UNH (or approved equivalent from outside institution):

Code	Title	Credits
DPD Professional Courses		
ABM 508 or ACFI 501	Managerial Accounting Survey of Accounting	4
ENGL 401	First-Year Writing	4
HMGD 403	Introduction to Food Management	4
HMP 401	United States Health Care Systems	4
NUTR 400	Nutrition in Health and Well Being	4
NUTR 476	Nutritional Assessment	4
NUTR 504	Managerial Skills in Dietetics	4
NUTR 550	Food Science: Principle and Practice	4
NUTR 610	Nutrition Education and Counseling	4
NUTR 650	Life Cycle Nutrition	4
PSYC 402 or SOC 502	Statistics in Psychology Statistics	4

SOC 400 or PSYC 401	Introductory Sociology Introduction to Psychology	4
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DPD Science Courses

BMCB 658	General Biochemistry	3
BMS 501	Microbes in Human Disease	4
BMS 507	Human Anatomy and Physiology I	4
BMS 508	Human Anatomy and Physiology II	4
CHEM 403	General Chemistry I	4
CHEM 404	General Chemistry II	4
CHEM 545	Organic Chemistry	3
CHEM 546	Organic Chemistry Laboratory	2

Prerequisite Courses at UNH (or approved equivalent from outside institution): DPD Science Courses

All prerequisite courses must have been completed within the past 10 years at a regionally accredited U.S. college or university.

Requirements

Certificate Program Coursework:

Code	Title	Credits
NUTR 800	Career Development in Dietetics	1
NUTR 820	Community Nutrition (May be taken fall or spring)	4
NUTR 850	Nutritional Biochemistry	4
NUTR 875	Practical Applications in Medical Nutrition Therapy	4
NUTR 873	Clinical Nutrition	4
NUTR 880	Critical Issues in Nutrition	4
Total Credits		21

Occupational Therapy (OT)

Degrees Offered: M.S., Graduate Certificate

These programs are offered in Durham.

The Department of Occupational Therapy offers the master of science degree in occupational therapy and an online graduate certificate in assistive technology.

Occupational therapy enables people to participate successfully in their choice of daily life activities including leisure, play, work, self care, and home management. The master's degree prepares students for entry level occupational therapy practice. Students gain the knowledge and skills to work with people of all ages to enable their participation within their natural environments.

The Occupational Therapy Program at the University of New Hampshire is accredited by the:

Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA),
4720 Montgomery Lane, Suite 200
Bethesda, MD 20824-3449

ACOTE's telephone number is (301) 652-AOTA and its website is www.acoteonline.org (<http://www.acoteonline.org>).

Graduates of the program are eligible to sit for the Certification Examination for the Occupational Therapist, administered by the National Board for Certification in Occupational Therapy, Inc. (NBCOT). After successful completion of this exam, the individual will be an occupational therapist, registered (OTR). In addition, most states require licensure in order to practice. State licenses are based on the successful results of the NBCOT Certification Examination. A felony conviction may affect a graduate's ability to sit for the NBCOT Certification Examination or attain state licensure.

Admission Requirements

Professional Master's Program in Occupational Therapy

(This admissions process applies to candidates with completed undergraduate degree(s) and UNH seniors who are not in the B.S./M.S. Occupational Science/Occupational Therapy program.)

Applicants need a minimum overall grade point of 3.0 in undergraduate coursework and the following prerequisite courses:

- Human anatomy and physiology (two courses with labs)
- Neuroanatomy
- Clinical Kinesiology
- Research Methods
- Human development (one lifespan development course that covers from birth to old age, or two courses, a child and an adult development course)
- Statistics

Applicants must complete and submit the Prerequisite Verification Form (http://gradschool.unh.edu/pdf/frm_ot_crse_verify_nofil.pdf). Priority for admission will be given to applicants with all prerequisite courses completed. Prerequisites must be completed prior to entry into the professional master's program.

Three letters of reference must accompany the application. Two of these must address the applicant's educational abilities/performance. One letter must address the applicant's interpersonal/communication skills as observed in a volunteer or paid-employment setting.

Applications are accepted beginning in the fall of the year before a candidate will begin the program. Candidates are encouraged to submit their applications to the Graduate School by the end of December to ensure that all applications are complete in time for review. Once submitted, applicants should periodically review their application status on the Graduate School website and contact the Graduate School about missing items. Admission to the occupational therapy program is a competitive process and not all qualified students are admitted. Applicants will be notified of admission mid-March.

UNH B.S./M.S. Students (Advanced-standing) Applying to the Entry-Level Professional Master's Degree Program

Students who are completing a baccalaureate degree in occupational science at UNH apply with advanced standing to the entry-level master's in occupational therapy degree program. These students take the first year of the two-and-a-half year (five semesters) entry-level master's program as part of their baccalaureate in occupational science degree requirements.

Students in the combined B.S./M.S. program must apply for admission to the Graduate School to enter into the professional master's degree program, meet Graduate School requirements for entry into the graduate portion of their program, and be officially admitted by the Graduate

School. This process occurs in the spring semester of the senior year. An overall minimum grade point of 3.0 and a grade of B- or better in all OT coursework are required for admission.

Two letters of references must accompany the application for B.S./M.S. students:

- one from the student's undergraduate academic adviser; and
- one from an Occupational Therapy Department faculty member.

B.S./M.S. students planning to also complete a graduate certificate may apply into the accelerated cohort. Accelerated admission enables B.S./M.S. students to take graduate certificate courses at the 800 level in the J term and spring semester of their senior year in the B.S. program (see detailed instructions below).

UNH B.S./M.S. Students Applying to the Professional Master's Degree Program for Early Admission (Accelerated Master's)

Students applying into the accelerated cohort are those students in the B.S./M.S. program who plan to complete graduate certificates, such as the Graduate Certificate in Assistive Technology. Accelerated admission enables students to take graduate certificate courses at the 800-level in the J term and spring semester of their senior year in the B.S. program.

Applications for admission as an accelerated master's candidate must be completed by the posted deadlines. An overall minimum grade point of 3.2 and a grade of B- or better in all senior-level OT coursework is required for admission.

Two letters of references must accompany the application for B.S./M.S. students:

- one from the student's undergraduate academic adviser; and
- one from an Occupational Therapy Department faculty member.

Students in the accelerated master's professional program can **only** register in the graduate certificate-related courses at the 800 level; all other senior OT courses must be taken at the 700 level.

<https://chhs.unh.edu/directory/all>

Programs

- Occupational Therapy (M.S.) (p. 138)
- Assistive Technology (Graduate Certificate) (p. 142)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Occupational Therapy (M.S.)

<https://chhs.unh.edu/ot/occupational-therapy-ms-professional-track>

Description

Professional Occupational Therapy Program Requirements for Advanced--Standing Students B.S./M.S.

The program is two-and-a-half years (five semesters) of coursework, including fieldwork experiences. Students enroll in a 1-credit January term (J term) Level 1 fieldwork course in between the first and second semesters of the first year of the professional program. There are no summer course requirements.

Advanced--standing students complete the first year of the professional program as part of their B.S. degree in occupational science.

Professional Occupational Therapy Program Requirements for Entering Graduate Students M.S.

The program is two-and-a-half years (five semesters) of coursework, including fieldwork experiences. Students enroll in a 1-credit January term (J term) Level 1 fieldwork course in between the first and second semesters of the first year of the professional program. There are no summer course requirements.

Academic Standards and Policies

In order to be awarded a M.S. in occupational therapy from UNH, students must earn a minimum of B- in all required occupational therapy courses and receive a passing criterion score on the American Occupational Therapy Association Fieldwork Evaluation for the Occupational Therapist in both 12-week Level II fieldwork experiences. Students must maintain an overall GPA of 3.0 and meet professional behavioral standards, which are explained in detail in the *OT Department Policy and Procedure Manual*.

Because curriculum review and revision is undertaken annually, occupational therapy faculty work closely with students during academic advising sessions and share information about any policy and requirement changes during registration periods as well as throughout the academic year. Students are expected to take an active role in verifying expectations and requirements and should check with their departmental advisers each September for updated policies and requirements. Program requirements and policies for retention in the major are posted annually in the *OT Department Policy and Procedure Manual*, which is available on the OT department's organization site on MyCourses; students are provided a hard copy or a digital copy of the manual when they enter the program.

Students will participate in a variety of off-campus and fieldwork experiences throughout the course of study. Students are responsible for transportation to fieldwork sites and other off-campus learning experiences and are covered with basic personal liability insurance through UNH for all practical components of the curriculum. Students are responsible for meeting the health and criminal record clearances established by their fieldwork sites and off-campus learning experiences. Proof of immunization such as poliomyelitis, rubella, H1N1, and hepatitis B may also be required. For Level II fieldwork, health insurance and a physical examination, including a tuberculin test, are required. All fieldwork experiences are scheduled in centers approved by the

Department of Occupational Therapy and with whom active Memoranda of Understanding with UNH exist.

After successfully completing all Level II fieldwork requirements and academic work, students are awarded a Master of Science Degree in Occupational Therapy. They are then eligible to sit for the National Board Certification Examination in Occupational Therapy (NBCOT). Consistent with NBCOT expectations, students must sit for the certification examination within two years of completion of coursework and fieldwork. A felony conviction may affect a graduate's ability to sit for the NBCOT certification examination and/or obtain State Licensure.

Curriculum and schedule: Most classes will be scheduled during weekdays during the day and into early evening. Some courses require experiential, off-campus learning in addition to off-campus Level I and II fieldwork experiences that are two weeks and twelve weeks, respectively. These full time experiences are planned collaboratively with the academic fieldwork coordinator.

Requirements

Occupational Therapy B.S./M.S. (Advanced Standing)

B.S./M.S. Professional OCCUPATIONAL THERAPY PROGRAM REQUIREMENTS

Code	Title	Credits
Undergraduate Courses		
OT 710	OT Practice and Professional Roles	4
OT 741	Human Occupation	4
OT 751	Mind Body Systems/Neurologically Based Function and Dysfunction	4
OT 752	Human Movement and Environmental Effects on Everyday Occupations	4
OT 752L	Human Movement Lab	1
OT 744	Fieldwork and Professionalism - Level 1	1
OT 792	Level I Fieldwork	1
OT 785	Research Methods and Application to Practice	4
OT 760 & 760L	Psychosocial Evaluation and Intervention and Psychosocial Evaluation and Intervention Lab	5
OT 745	Administration and Management for Occupational Therapy Practice	4
Select one of the following:		4-5
OT 771 & 771L	Enabling Participation in Community Groups and Enabling Participation in Community Groups Lab	
OT 730 & 730L	Assistive Technology for Enhancing Occupational Performance and Assistive Technology for Enhancing Occupational Performance Lab	
Total Credits		36-37

Code	Title	Credits
Graduate Courses		
Advanced-standing students are required to have 44 graduate credits, which includes 16 to 18 credits of fieldwork, in addition to 36 credits, which includes 1 to 3 credits of fieldwork, taken as part of the occupational science degree.		
OT 854	Level II Fieldwork, I ¹	8
OT 855	Level II Fieldwork Discussion ¹	1
OT 856	Level II Fieldwork, II	8
OT 865	Occupational Therapy Practice and Professional Reasoning ²	3
Select one of the following (whichever was not taken the previous year):		5
OT 830 & 830L	Assistive Technology for Enhancing Occupational Performance and Assistive Technology for Enhancing Occupational Performance Lab	
OT 871 & 871L	Enabling Participation in Community Groups and Enabling Participation in Community Groups Lab	
OT 863	Occupational Therapy Intervention for Adults	3
OT 863L	Occupational Therapy Evaluation and Intervention for Adults - Lab	1
OT 863R	Adult Evaluation and Intervention Recitation	0
OT 862	OT Evaluation and Intervention for Children	3
OT 862L	OT Evaluation and Intervention for Children - Lab	1
OT 875	Leadership in Occupational Therapy Systems of Practice	3
OT 846	Transitions: Student to Professional	2
OT 886	Engagement in Research	3
Select at least 3 credits of graduate-level elective course(s)		3
Total Credits		44

¹ The spring semester of the second year is an extended semester of fieldwork. Students' Level II fieldwork is completed the third week of June.

² Course requirements for OT 865 Occupational Therapy Practice and Professional Reasoning, include a capstone experience in which students synthesize knowledge from academic coursework and fieldwork experiences to develop an innovative occupational therapy program that addresses the needs of a specific population or program.

Occupational Therapy, M.S. (Professional Track)

PROFESSIONAL OCCUPATIONAL THERAPY Requirements for Entering Graduate Students

The professional master's degree track requires the completion of 74 graduate-level credits, which includes 19 credits of fieldwork.

Required OT courses include:

Code	Title	Credits
OT 810	OT Practice and Professional Roles	3
OT 841	Human Occupation	4

OT 845	Administration and Management for Occupational Therapy Practice	3
OT 852 & 852L	Human Movement and Environmental Effects on Everyday Occupations and Human Movement and Environmental Effects on Everyday Occupations Lab	4
OT 853	Mind Body Systems: Neurologically-based Function and Dysfunction—Pediatric Conditions	4
OT 857	Mind Body Systems: Neurologically-based Function and Dysfunction—Adult Conditions	4
OT 892	Level I Fieldwork (J term)	1
OT 860 & 860L	Psychosocial Evaluation and Intervention and Psychosocial Evaluation and Intervention Lab	4
OT 862 & 862L	OT Evaluation and Intervention for Children and OT Evaluation and Intervention for Children - Lab	4
OT 863 & 863L	Occupational Therapy Intervention for Adults and Occupational Therapy Evaluation and Intervention for Adults - Lab	4
OT 846	Transitions: Student to Professional	2
OT 854	Level II Fieldwork, I	8
OT 855	Level II Fieldwork Discussion	1
OT 856	Level II Fieldwork, II	8
OT 865	Occupational Therapy Practice and Professional Reasoning ¹	3
OT 875	Leadership in Occupational Therapy Systems of Practice	3
OT 886	Engagement in Research	3
OT 871 & 871L	Enabling Participation in Community Groups and Enabling Participation in Community Groups Lab	5
OT 830 & 830L	Assistive Technology for Enhancing Occupational Performance and Assistive Technology for Enhancing Occupational Performance Lab	5
Select 3 credits of graduate-level elective course(s)		3

¹ Course requirements for OT 865 Occupational Therapy Practice and Professional Reasoning, include a capstone experience in which students synthesize knowledge from academic coursework and fieldwork experiences to develop an innovative occupational therapy program that addresses the needs of a specific population or program.

Elective Courses

Code	Title	Credits
OT 887	Upper Extremity Rehabilitation and Splinting	4
OT 888	Application of Physical Agent Modalities in Occupational Therapy Practice	3
OT 890	Occupational Therapy and Sensory Integration	4
OT 891	Ergonomics for Occupational Therapy	4
OT 831	Introduction to Assistive Technology Principles	2
OT 832	Introduction to Assistive Technology Practices	2
OT 833	Assistive Technology and Physical Disabilities for Electronic Devices	2
OT 834	Assistive Technology and Physical Disabilities for the Home, Community and Employment	2

OT 835	Assistive Technology for Communication and Cognitive Impairments	2
OT 836	Assistive Technology and Vision and Hearing Impairments	2
OT 889	Using iPads to Support Children with Disabilities	3
OT 866	AMPS Training	4
OT 895	Readings and Research in Occupational Therapy	1-6

OT 863 & 863L	Occupational Therapy Intervention for Adults and Occupational Therapy Evaluation and Intervention for Adults - Lab	4
OT 863R	Adult Evaluation and Intervention Recitation	0
OT 846	Transitions: Student to Professional	2
OT 854	Level II Fieldwork, I	8
OT 855	Level II Fieldwork Discussion	1
OT 856	Level II Fieldwork, II	8

Credits	32
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Third Year

OT 865	Occupational Therapy Practice and Professional Reasoning	3
OT 875	Leadership in Occupational Therapy Systems of Practice	3
OT 886	Engagement in Research	3
Choose additional graduate level electives		3
Credits	12	

Total Credits	80-81
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Degree Plan**Plan of Study for Advanced-Standing B.S./M.S.**

Course	Title	Credits
First Year		
OT 710	OT Practice and Professional Roles	4
OT 741	Human Occupation	4
OT 751	Mind Body Systems/Neurologically Based Function and Dysfunction	4
OT 752 & 752L	Human Movement and Environmental Effects on Everyday Occupations and Human Movement Lab	5
OT 744	Fieldwork and Professionalism - Level 1	1
OT 792	Level I Fieldwork	1
OT 760 & 760L	Psychosocial Evaluation and Intervention and Psychosocial Evaluation and Intervention Lab	5
OT 785	Research Methods and Application to Practice	4
OT 745	Administration and Management for Occupational Therapy Practice	4
Select one of the following:		4-5
OT 771 & 771L	Enabling Participation in Community Groups and Enabling Participation in Community Groups Lab	
OT 730 & 730L	Assistive Technology for Enhancing Occupational Performance and Assistive Technology for Enhancing Occupational Performance Lab	
Credits		36-37
Second Year		
Select one of the following:		5
OT 871 & 871L	Enabling Participation in Community Groups and Enabling Participation in Community Groups Lab	
OT 830 & 830L	Assistive Technology for Enhancing Occupational Performance and Assistive Technology for Enhancing Occupational Performance Lab	
OT 862 & 862L	OT Evaluation and Intervention for Children and OT Evaluation and Intervention for Children - Lab	4

Plan of Study for Entering Graduate Students M.S.

Course	Title	Credits
First Year		
OT 810	OT Practice and Professional Roles	3
OT 841	Human Occupation	4
OT 853	Mind Body Systems: Neurologically-based Function and Dysfunction–Pediatric Conditions	4
OT 852 & 852L	Human Movement and Environmental Effects on Everyday Occupations and Human Movement and Environmental Effects on Everyday Occupations Lab	4
OT 844	Fieldwork and Professionalism - Level 1	1
OT 892	Level I Fieldwork	1
OT 830	Assistive Technology for Enhancing Occupational Performance	3
OT 857	Mind Body Systems: Neurologically-based Function and Dysfunction–Adult Conditions	4
OT 845	Administration and Management for Occupational Therapy Practice	3
OT 860 & 860L	Psychosocial Evaluation and Intervention and Psychosocial Evaluation and Intervention Lab	4
Credits		31
Second Year		
OT 862 & 862L	OT Evaluation and Intervention for Children and OT Evaluation and Intervention for Children - Lab	4
OT 863 & 863L	Occupational Therapy Intervention for Adults and Occupational Therapy Evaluation and Intervention for Adults - Lab	4

OT 863R	Adult Evaluation and Intervention Recitation	0	OT 833	Assistive Technology and Physical Disabilities for Electronic Devices	2
OT 871 & 871L	Enabling Participation in Community Groups and Enabling Participation in Community Groups Lab	5	OT 834	Assistive Technology and Physical Disabilities for the Home, Community and Employment	2
OT 846	Transitions: Student to Professional	2	OT 835	Assistive Technology for Communication and Cognitive Impairments	2
OT 854	Level II Fieldwork, I	8	OT 836	Assistive Technology and Vision and Hearing Impairments	2
OT 855	Level II Fieldwork Discussion	1	One approved assistive technology elective course		3-4
OT 856	Level II Fieldwork, II	8	Total Credits		15-16
	Credits	32			
Third Year					
OT 865	Occupational Therapy Practice and Professional Reasoning	3			
OT 875	Leadership in Occupational Therapy Systems of Practice	3			
OT 886	Engagement in Research	3			
Choose additional graduate level electives		3			
	Credits	12			
	Total Credits	75			

Assistive Technology (Graduate Certificate)

<https://chhs.unh.edu/ot/assistive-technology-graduate-certificate>

Description

The online graduate certificate in assistive technology is a 15-credit program, available to students who have completed a bachelor's degree or higher. The program provides training in the application of AT for individuals of all ages who experience physical, sensory, or cognitive impairments that affect participation at home, school, or work. Coursework includes basic principles of assessment, selection, fabrication, and training in the use of AT. Graduates of the program are prepared to provide a wide variety of AT services including: conducting AT evaluations and consultations; designing, fabricating, modifying, customizing, and maintaining devices; and AT service coordination. Graduates of the program are prepared to work in collaborative teams and to become leaders in assistive technology. This online graduate certificate program is appropriate for individuals pursuing or engaged in the following careers: occupational, physical, speech, or recreation therapy; rehabilitation counseling; engineering; education; special education; or nursing. The online program includes optional ways to obtain hands-on interaction with AT, including one intensive AT day, on campus, interacting with technology related to each course offered in fall and spring. For additional program information, please visit our website at the link above.

Requirements

Certificate Requirements

Code	Title	Credits
OT 831	Introduction to Assistive Technology Principles	2
OT 832	Introduction to Assistive Technology Practices	2

Ocean Engineering (OE)

Degrees Offered: Ph.D., M.S., Graduate Certificate

This program is offered in Durham.

Ocean engineering (OE) offers programs leading to the master of science and doctor of philosophy degree in ocean engineering. Programs in OE are by definition interdisciplinary and require students to interact with the ocean science community, as well as the traditional engineering disciplines. Students are exposed to the broadbased issues of working engineering problems in the ocean environment, as well as discipline specifics. In these programs they will be trained to develop responsible solutions to problems that will lead to sustainable activity and life in the ocean.

A master of science in ocean engineering with an option in ocean mapping is available. This is a more structured path through this program, which is approved by the International Hydrographic Organization (IHO) and incorporates all aspects of hydrography as required by the IHO. Focus is on the engineering aspects of hydrography. The general purpose of these programs is to prepare engineering students for professional careers in ocean-related fields.

Additionally, a graduate certificate in ocean mapping is offered.

Admission Requirements

Applicants should have completed a baccalaureate degree in either chemical, civil, electrical, or mechanical engineering, or have an equivalent background.

<https://marine.unh.edu/oe>

Programs

- Ocean Engineering (Ph.D.) (p. 143)
- Ocean Engineering (M.S.) (p. 143)
- Ocean Engineering: Ocean Mapping (M.S.) (p. 144)
- Ocean Mapping (Graduate Certificate) (p. 144)

Faculty

See <https://marine.unh.edu/faculty> for faculty.

Ocean Engineering (Ph.D.)

<https://marine.unh.edu/program/ocean-engineering-degree-options>

Description

Students admitted to the ocean engineering Ph.D. program come from traditional engineering degree programs including physics, mathematics, computer science, and in some cases, marine science programs. Those entering the Ph.D. program with a B.S. degree from an engineering program should be prepared to begin the Ph.D. program directly. Those coming from a B.S. in physics, mathematics, or computer science will have their transcripts more carefully reviewed on an individual basis, as additional courses may be required.

A student in the ocean engineering Ph.D. program will be expected to take a minimum of 12 courses (exclusive of dissertation research) beyond those required for a B.S. degree.

Requirements

Required Courses

Code	Title	Credits
Select one of the following courses in oceanography or ocean science:		3-4
ESCI 850	Biological Oceanography	
ESCI 852	Chemical Oceanography	
ESCI 858	Introduction to Physical Oceanography	
ESCI 859	Geological Oceanography	
Complete the following core courses in ocean engineering:		18
OE 810	Ocean Measurements Laboratory	
OE 853	Ocean Hydrodynamics	
OE 854	Ocean Waves and Tides	
OE 864	Spectral Analysis of Geophysical Time Series Data	
OE 865	Underwater Acoustics	
Select two 900 level courses from the following list:		6-8
ME 909	Viscous Flow	
ME 910	Turbulence	
OE 965	Advanced Underwater Acoustics	
OE 972	Hydrographic Field Course	
OE 973	Seafloor Characterization	
OE 995	Graduate Special Topics	
Select two 800 or 900 level courses from MATH or IAM or select both:		6-8
ME 886	Introduction to Finite Element Analysis	
ME 986	Advanced Finite Element Analysis	
Select an additional four CEPS electives (two at the 800 level; two at the 900 level):		2-16

The general progress of a student through this program is expected to follow the time frame listed:

Year 1: Coursework

Year 2: Coursework, qualifier by the end of the year, form graduate dissertation committee

Year 3: Research, dissertation proposal defense

Year 4: Research

Year 5: Research, dissertation defense

The course selection and sequencing will be established in consultation with the student's guidance committee. There will be a qualifying examination on the core courses by the end of the second year. The goal of this exam is to test the breadth of a student's knowledge in topic areas essential to ocean engineering. A formal dissertation proposal defense will include a written proposal, a public presentation and an oral exam. After successful completion of the qualifying exam and dissertation proposal defense, the student will be advanced to candidacy. The dissertation will be defended in a public forum when completed.

Ocean Engineering (M.S.)

<https://marine.unh.edu/program/ocean-engineering-degree-options>

Description

Programs in Ocean Engineering are by definition interdisciplinary and require students to interact with the ocean science community as well as the traditional engineering disciplines. In this context, students are exposed to the broad-based issues of working engineering problems in the ocean environment. They are trained to develop responsible solutions to problems that will lead to sustainable activity and life in the ocean.

Requirements

M.S. Degree Requirements

Code	Title	Credits
Core Courses		
OE 990 & OE 991	Ocean Seminars I and Ocean Seminars II	2
Select one of the following:		3-4
ESCI 850	Biological Oceanography	
ESCI 852	Chemical Oceanography	
ESCI 858	Introduction to Physical Oceanography	
ESCI 859	Geological Oceanography	
Select four of the following courses:		13-16
OE 810	Ocean Measurements Laboratory	
OE 854	Ocean Waves and Tides	
OE 857	Coastal Engineering and Processes	
OE 858	Design of Ocean Structures	
OE 864	Spectral Analysis of Geophysical Time Series Data	
OE 865	Underwater Acoustics	
OE 874	Integrated Seabed Mapping Systems	
Select an additional two 800-900 level CEPS courses		6-8
Complete a master's thesis for 6 credits		
OE 899	Master's Thesis	6

Ocean Engineering: Ocean Mapping (M.S.)

<https://marine.unh.edu/oe>

Description

Ocean Mapping Option

This option is offered in conjunction with the Joint Hydrographic Center/Center for Coastal and Ocean Mapping. Students follow a more structured path through this program, which incorporates all aspects of hydrography as required by the International Hydrographic Organization (IHO).

Requirements

Code	Title	Credits
Core Courses		
OE 990 & OE 991	Ocean Seminars I and Ocean Seminars II	2
OE 810	Ocean Measurements Laboratory	4
OE 865	Underwater Acoustics	3
OE 871	Geodesy and Positioning for Ocean Mapping	4
OE 874	Integrated Seabed Mapping Systems	4
OE 875	Fundamentals of Ocean Mapping II	4
OE 972	Hydrographic Field Course	4
Select at least 3 additional credits from the following electives:		3-4
OE 854	Ocean Waves and Tides	
OE 857	Coastal Engineering and Processes	
OE 864	Spectral Analysis of Geophysical Time Series Data	
OE 895	Special Topics	
ESCI 858	Introduction to Physical Oceanography	
ESCI 896	Topics	
Complete a master's thesis for 6 credits		
OE 899	Master's Thesis	6
Total Credits		34-35

Students may fulfill the Category A (professional) International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO) Standards of Competence for Hydrographic Surveyors by completing, in addition to the core courses, some additional specialized requirements. For more information, please visit the Center for Coastal and Ocean Mapping website. (<https://ccom.unh.edu>)

Ocean Mapping (Graduate Certificate)

<https://marine.unh.edu/oe>

Description

The program goal is to provide advanced graduate training to working professionals in the area of ocean mapping. These professionals will

come from a variety of backgrounds ranging from earth science, geology, and biology to engineering. The graduate certificate in ocean mapping is awarded for completion of the core courses and associated practicum. The graduate certificate program fulfills the Category A International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO/ICA) Standards of Competence for Hydrographic Surveyors.

For more information, please visit the ocean mapping website (<http://ccom.unh.edu>) or contact the Center for Coastal and Ocean Mapping/ Joint Hydrographic Center at info@ccom.unh.edu.

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu>) for instructions about applying to the certificate program.

Requirements

Certificate Requirements

Code	Title	Credits
ESCI/OE 871	Geodesy and Positioning for Ocean Mapping	4
ESCI 872	Applied Tools for Ocean Mapping	2
MATH 896	Topics in Mathematics and Statistics	3
ESCI/OE 874	Integrated Seabed Mapping Systems	4
ESCI/OE 875	Fundamentals of Ocean Mapping II	4
ESCI 972	Hydrographic Field Course	4
OE 677	Seamanship and Marine Weather for Ocean Engineers and Scientists	
ESCI 896	Topics (for the optional Remote Sensing specialty)	3
Total Credits		24

Oceanography (OCE)

Degrees Offered: Ph.D., M.S.

This program is offered in Durham.

The Department of Earth Sciences (ESCI) in the College of Engineering and Physical Sciences (CEPS) offers M.S. and Ph.D. degrees in oceanography that include the study of biological oceanography, chemical oceanography, marine geology and geophysics, and physical oceanography. The OCE program also supports focused research in coastal and estuarine processes.

Admission Requirements

Applicants should have completed an undergraduate major related to one of the oceanography disciplines, including biology, chemistry, engineering, geology, physics, or mathematics, or an appropriate array of science and engineering courses within their major field. Applicants are expected to have completed one year each of calculus and chemistry and two semesters of physics and/or biology. It is not necessary to have had previous coursework in oceanography. Applicants must submit scores (within the last 5 years) from the general test of the Graduate Record Examination (GRE).

<https://marine.unh.edu/oe>

Programs

- Oceanography (Ph.D.) (p. 145)
- Oceanography (M.S.) (p. 146)

Faculty

See <https://marine.unh.edu/faculty> for faculty.

Oceanography (Ph.D.)

<https://marine.unh.edu/program/degree-options-0>

Description

The Oceanography (OCE) graduate program has a diverse set of faculty, staff, and students who examine ocean processes in broad fields of physical, biological, chemical, and geological oceanography and geophysics. Basic and applied research of an experimental, numerical, and analytical nature is conducted in oceanic settings that range from shallow nearshore and estuarine waters to the deep ocean and span all ocean basins on earth including the Arctic.

OCE offers programs leading to M.Sc. and Ph.D. degrees. These interdisciplinary programs prepare students for professional careers in ocean-related fields. In addition, students can also pursue an ocean mapping option within the Department of Earth Sciences and carried out within the Center for Coastal and Ocean Mapping.

Research and Facilities

The oceanography graduate program within the Department of Earth Sciences and the School of Marine Science and Ocean Engineering (SMSOE) is enhanced by the ocean engineering and marine biology graduate programs, and by other departments and institutes at UNH, including the civil and mechanical engineering and biology departments; the Institute for the Study of Earth, Oceans, and Space (EOS); the Center for Coastal and Ocean Mapping (CCOM); and the Ocean Processes Laboratory (OPAL). Other related programs include the N.H. Sea Grant Program, the Center for Collaborative Science, and the Atlantic Marine Aquaculture Center, Coastal Response Research Center (CRRC), Northeast Consortium (NEC), and the Piscataqua Region Estuaries Partnership (PREP). Oceanographic laboratories at UNH include the Shoals Marine Laboratory (SML) on Appledore Island, the Coastal Marine Laboratory (CML) in Newcastle, the Jackson Estuarine Laboratory (JEL) at Adams Point on the Great Bay, and the Chase Ocean Engineering Laboratory (COEL) on the main UNH campus. Additional laboratories for the oceanography faculty are located on campus in James, Morse, Rudman, and Spaulding Halls. The SMSOE operates a marine support facility and two UNH research vessels moored in Portsmouth Harbor at the UNH pier, the R/V Gulf Challenger and the R/V Gulf Surveyor, as well as a number of small boats. The SMSOE also supports the UNH Diving Program and oversees a shared use Instrumentation Pool for student and faculty use.

Requirements

Ph.D. Requirements

Students plan a program of study in conjunction with a faculty guidance committee (FGC). Students entering the program without a master's degree are expected to complete a minimum of 36 credit hours. Students with an M.S. degree in oceanography or related field in physical science from UNH or another university should first demonstrate (through accredited transcript or the qualifying examination) acceptable mastery in the basic core areas. Those deficient in any discipline will be required to complete the respective course.

All students must complete at least one course from each of the following categories: natural sciences, methods, ethics/policy/law, and seminar. Please see below for a list of courses that meet these specifications (other courses may qualify and should be approved by the FGC). Additional credit hours are determined by the FGC (typically 15 credit hours). Foreign language requirement is determined by the FGC. Students must complete a Coursework Approval Form, which summarizes all courses to be taken, and obtain signatures from their adviser, committee members, and the OCE program coordinator once the coursework is completed.

Students wishing to be admitted to doctoral candidacy will undergo a qualifying examination by the guidance committee designed to test the student's in-depth knowledge in their major field and their ability to conduct independent and original research in oceanography. Qualifying students will present to the guidance committee a research proposal in which the soundness, originality, and feasibility of the investigation are clearly stated, and which when approved based on a proposal examination by the committee, will form the basis for the doctoral dissertation.

Students are advanced to candidacy after successfully completing the comprehensive exam, proposal exam, and all coursework required by the guidance committee. Students must complete a dissertation, present their results at a public seminar, and pass an oral examination by the thesis committee.

Although not a strict requirement, all graduate students are encouraged to obtain teaching experience, preferably as a teaching assistant.

All students are required to spend time in the field, even if their research project and interests are primarily based on analytical research, modeling studies, or laboratory experiments. The field requirement could include extended time at sea onboard one of the UNH, UNOLS, NOAA, or similar oceanographic research vessels, or include field experiments at locations in New Hampshire, the U.S., or around the globe, and includes possible nearshore and estuarine studies, Antarctic expeditions, or other land-based studies related to oceanography. Successful completion of the field requirement will be determined by the guidance committee.

Natural Sciences

Code	Title	Credits
ESCI 850	Biological Oceanography	
ESCI 852	Chemical Oceanography	
ESCI 858	Introduction to Physical Oceanography	
ESCI 859	Geological Oceanography	

Methods

Code	Title	Credits
CHEM 862	Instrumental Methods of Chemical Analysis	
EOS 895	Topics (Model & Anal. Biogeochem Cycles)	
ESCI 801	Quantitative Methods in Earth Sciences	
ESCI 871	Geodesy and Positioning for Ocean Mapping	
ESCI 764	Spectral Analysis of Geophysical Time Series Data	
ESCI 874	Integrated Seabed Mapping Systems	
ESCI 875	Fundamentals of Ocean Mapping II	
ESCI 972	Hydrographic Field Course	
ESCI 996	Advanced Topics (Ocean Modelling)	
IAM 940	Asymptotic and Perturbation Methods	
ME 807	Analytical Fluid Dynamics	
MATH 835	Statistical Methods for Research	
MATH 839	Applied Regression Analysis	
MATH 845	Foundations of Applied Mathematics I	
MATH 853	Introduction to Numerical Methods	
OE 810	Ocean Measurements Laboratory	

Ethics, Policy, and Law

Code	Title	Credits
ECON 908	Environmental Economics: Theory and Policy	
NR 801	Ecological Sustainability and Values	
NR 818	Law of Natural Resources and Environment	
NR 820	International Environmental Politics and Policies for the 21st Century	
NR 824	Resolving Environmental Conflicts	
NR 902	Ecological Ethics and Values	
NR #915	Coastal Challenges Sci-Policy	
NR #916	Linking Decision-making and Coastal Ecosystem Science	
GRAD 930	Ethics in Research and Scholarship	
POLT 880	International Environmental Politics, Policy, and Law	

Seminar and Proposal Development

Code	Title	Credits
OE 990	Ocean Seminars I	
OE 991	Ocean Seminars II	
ESCI 997	Seminar in Earth Sciences	
ESCI 998	Proposal Development	
BIOL 997	Graduate Seminar in Biology	

Other Relevant Graduate Courses

Code	Title	Credits
CEE 822	Introduction to Marine Pollution and Control	
EOS 896	Topics (Bio-Optics & Primary Production)	
EOS 896	Topics (Dyn. of Global Marine Ecosystems)	
EOS #844	Biogeochemistry	
EOS 895	Topics (Climate and Fisheries)	
ESCI 834	Geophysics	
ESCI 841	Geochemistry	

ESCI 845	Isotope Geochemistry
ESCI 847	Aqueous Geochemistry
ESCI 854	Sedimentology
ESCI 856	Geotectonics
ESCI 762	Glacial Geology
ESCI 860	Paleoceanography
ESCI 865	Paleoclimatology
ESCI 896	Topics (Nearshore Processes)
ESCI 994	Advanced Seminar (Ocean)
ESCI 995	Advanced Topics (Geophysical Fluid Mechanics)
ME 807	Analytical Fluid Dynamics
ME 812	Waves in Fluids
ME 909	Viscous Flow
ME 910	Turbulence
OE 853	Ocean Hydrodynamics
OE 854	Ocean Waves and Tides
OE 857	Coastal Engineering and Processes
OE 895	Special Topics (Underwater Acoustics)
OE 995	Graduate Special Topics (Coastal Sediment Transport)
ZOOL 810	Ichthyology
ZOOL 872	Fisheries Biology

Oceanography (M.S.)

<https://marine.unh.edu/program/degree-options-0>

Description

The Oceanography (OCE) graduate program has a diverse set of faculty, staff, and students who examine ocean processes in broad fields of physical, biological, chemical, and geological oceanography and geophysics. Basic and applied research of an experimental, numerical, and analytical nature is conducted in oceanic settings that range from shallow nearshore and estuarine waters to the deep ocean and span all ocean basins on earth including the Arctic.

OCE offers programs leading to M.Sc. and Ph.D. degrees. These interdisciplinary programs prepare students for professional careers in ocean-related fields. In addition, students can also pursue an ocean mapping option within the Department of Earth Sciences and carried out within the Center for Coastal and Ocean Mapping.

Research and Facilities

The oceanography graduate program within the Department of Earth Sciences and the School of Marine Science and Ocean Engineering (SMSOE) is enhanced by the ocean engineering and marine biology graduate programs, and by other departments and institutes at UNH, including the civil and mechanical engineering and biology departments; the Institute for the Study of Earth, Oceans, and Space (EOS); the Center for Coastal and Ocean Mapping (CCOM); and the Ocean Processes Laboratory (OPAL). Other related programs include the N.H. Sea Grant Program, the Center for Collaborative Science, and the Atlantic Marine Aquaculture Center, Coastal Response Research Center (CRRC), Northeast Consortium (NEC), and the Piscataqua Region Estuaries Partnership (PREP). Oceanographic laboratories at UNH include the Shoals Marine Laboratory (SML) on Appledore Island, the Coastal Marine

Laboratory (CML) in Newcastle, the Jackson Estuarine Laboratory (JEL) at Adams Point on the Great Bay, and the Chase Ocean Engineering Laboratory (COEL) on the main UNH campus. Additional laboratories for the oceanography faculty are located on campus in James, Morse, Rudman, and Spaulding Halls. The SMSOE operates a marine support facility and two UNH research vessels moored in Portsmouth Harbor at the UNH pier, the R/V Gulf Challenger and the R/V Gulf Surveyor, as well as a number of small boats. The SMSOE also supports the UNH Diving Program and oversees a shared use Instrumentation Pool for student and faculty use.

Requirements

M.S. Degree Requirements

Students must complete a minimum of 30 credits for the thesis option or 34 credits for the non-thesis option.

Code	Title	Credits
Required Courses		
ESCI 997	Seminar in Earth Sciences	1
ESCI 998	Proposal Development	1
Select two of the following core courses:		6-8
ESCI 850	Biological Oceanography	
ESCI 852	Chemical Oceanography	
ESCI 858	Introduction to Physical Oceanography	
ESCI 859	Geological Oceanography	
Select one of the following:		6 or 2
Thesis Option:		
OCE 899	Master's Thesis (acceptable to the thesis-examining committee and must pass a thesis defense)	
Non-Thesis Option:		
ESCI 898	Directed Research	
or OCE 898	Directed Research	
Other Relevant Graduate Courses		16-22
CEE 822	Introduction to Marine Pollution and Control	
EOS #844	Biogeochemistry	
EOS 895	Topics (Model & Anal. Biogeochem Cycles)	
EOS 895	Topics (Climate & Fisheries)	
EOS 896	Topics (Bio-Optics & Primary Production)	
EOS 896	Topics (Dyn. of Global Marine Ecosystems)	
ESCI 801	Quantitative Methods in Earth Sciences	
ESCI 834	Geophysics	
ESCI 841	Geochemistry	
ESCI 845	Isotope Geochemistry	
ESCI 847	Aqueous Geochemistry	
ESCI 854	Sedimentology	
ESCI 856	Geotectonics	
ESCI 860	Paleoceanography	
ESCI 862	Glacial Geology	
ESCI 864	Spectral Analysis of Geophysical Time Series Data	
ESCI 865	Paleoclimatology	

ESCI 871	Geodesy and Positioning for Ocean Mapping
ESCI 874	Integrated Seabed Mapping Systems
ESCI 875	Fundamentals of Ocean Mapping II
ESCI 896	Topics (Nearshore Processes)
ESCI 972	Hydrographic Field Course
ESCI 994	Advanced Seminar (Ocean Seminar)
ESCI 995	Advanced Topics (Geophysical Fluid Dynamics)
ESCI 996	Advanced Topics (Ocean Modeling)
IAM 940	Asymptotic and Perturbation Methods
MATH 835	Statistical Methods for Research
MATH 839	Applied Regression Analysis
MATH 845	Foundations of Applied Mathematics I
MATH 846	Foundations of Applied Mathematics II
MATH 853	Introduction to Numerical Methods
ME 807	Analytical Fluid Dynamics
ME 812	Waves in Fluids
ME 909	Viscous Flow
MEFB 825	Marine Ecology
ME 910	Turbulence
OE 810	Ocean Measurements Laboratory
OE 853	Ocean Hydrodynamics
OE 854	Ocean Waves and Tides
OE 857	Coastal Engineering and Processes
OE 865	Underwater Acoustics
OE 995	Graduate Special Topics (Coastal Sediment Transport)
ZOOL 810	Ichthyology
ZOOL 872	Fisheries Biology

Total Credits 30-34

Painting (ARTS)

Degree Offered: M.F.A.

This program is offered in Durham.

Beginning in the 2018-2019 academic year, the MFA in Painting program will no longer be accepting new students. Current MFA in Painting students will continue to have access to the same high-quality education and resources until they graduate.

The Department of Art and Art History offers a program of courses leading to a master of fine arts degree in painting. The MFA program is directed at students who are prepared to complete their professional training at the highest level.

<https://cola.unh.edu/art-art-history>

Programs

- Painting (M.F.A.) (p. 148)

Faculty

See <https://cola.unh.edu/art-art-history/faculty-staff-directory> for faculty.

Painting (M.F.A.)

<https://cola.unh.edu/art-art-history/program/mfa/painting>

Description

Beginning in the 2018-2019 academic year, the MFA in Painting program will no longer be accepting new students. Current MFA in Painting students will continue to have access to the same high-quality education and resources until they graduate.

The MFA in Painting program is directed at students who are prepared to complete their professional training at the highest level. A bachelor of fine arts degree in painting or the equivalent in undergraduate coursework is required for admission to this program.

Requirements

Degree Requirements

Each student in the master of fine arts degree in painting program shall complete 60 credit hours of work. Twenty-six credits of work will be in the area of concentration (painting) leading toward a thesis exhibition. Eighteen credits will be in graduate-level drawing. Eight credits will be in graduate-level art history and the final eight credits will be in art electives to be chosen from drawing, printmaking, painting, or art history. In addition to the thesis exhibition, degree candidates will be required to submit a two-page written artist statement focusing on aesthetic, technical, and historical issues related to their work. Also required is participation in two major critiques per year. The graduate student will present their work with a verbal or written rationale to the entire graduate painting faculty, invited guests, and student peers.

Physics (PHYS)

Degrees Offered: Ph.D., M.S.

These programs are offered in Durham.

Physics is concerned with the properties of matter and the laws that describe its behavior. As a fundamental science, its discoveries and laws are basic to understanding in nearly all areas of science and technology. Advances in such diverse fields as medical instrumentation, solid state electronics, and space research have relied heavily on the application of basic physical laws and principles.

The mission of the Department of Physics is two-fold: to prepare students for a variety of career opportunities in business, industry, government and education/academia, and to conduct world-class research in various fields, including space and astrophysics, nuclear physics, high-energy physics, gravity, and solid state physics. The department has currently 24 teaching faculty, 29 research faculty and research scientists, 80 undergraduate students and 60 graduate students. It houses state-of-the-art educational and laboratory facilities; the affiliated UNH Observatory is open to the public.

The Department of Physics offers the degrees of Master of Science and Doctor of Philosophy. Interested students are encouraged to contact the department for further information. More detailed information is also on the physics department web page at www.physics.unh.edu (<http://physics.unh.edu>).

Admission Requirements

Applicants to the master of science and doctor of philosophy programs are expected to have a bachelor's degree in science, with at least 24 credits in physics and closely allied fields. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE), and from the GRE physics subject test.

Interdisciplinary Research

The department encourages research in areas related to physics or applied physics. If students desire to do research in a field related to physics, special provisions may be made. Contact the department chairperson or graduate adviser for details.

<https://physics.unh.edu/>

Programs

- Physics (Ph.D.) (p. 148)
- Physics (M.S.) (p. 149)

Faculty

See <http://physics.unh.edu/people/faculty> for faculty.

Physics (Ph.D.)

<https://physics.unh.edu/content/physics-phd>

Description

The Physics Ph.D. program prepares students for a career in industry, education, research or academia. Students will progress from studying a core curriculum encompassing fundamental areas of physics to taking elective classes in their area of interest. They will then conduct original research in a particular research area, leading to their PhD dissertation and defense.

For more details, please consult the physics graduate student handbook (<http://physics.unh.edu/content/graduate-student-handbook>).

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the program.

Cognate in College Teaching

The Cognate in College Teaching is essentially a minor in college level teaching; this minor is given in association with a PhD degree only (not with a Master's); it is not a stand-alone degree. The purpose of the Cognate is to prepare future faculty for their role as teachers. For more information please see the College Teaching (p. 55) program page in this catalog.

Requirements

Ph.D. Degree Requirements

Code	Title	Credits
PHYS 805	Experimental Physics (or equivalent demonstrated experimental proficiency)	4
PHYS 931	Mathematical Physics	3
PHYS 935	Statistical Physics	3
PHYS 939	Classical Mechanics	3
PHYS 941 & PHYS 942	Electromagnetic Theory I and Electromagnetic Theory II	6
PHYS 943 & PHYS 944	Quantum Mechanics I and Quantum Mechanics II	6
PHYS 806	Introduction to Physics Research and Teaching (two semesters, taken during the first year in the program)	1

Select four additional 3+ credit elective courses, of which 2 may be at the 800 level¹

Total Credits 38

¹ For Space Science students, these courses must include Plasma Physics (PHYS 951), Magnetohydrodynamics of the Heliosphere (PHYS 953), and one of Magnetospheres (PHYS 987), Heliospheric Physics (PHYS 954).

Students are required to

- demonstrate proficiency in teaching,
- pass the written comprehensive exam, and
- pass an oral qualifying exam on a thesis proposal.

Degree candidates are required to

- register for a minimum of two semesters of PHYS 999 Doctoral Research,
- pass the oral dissertation defense, and
- successfully submit the final dissertation to the Graduate School.

Physics (M.S.)

<https://physics.unh.edu/content/physics-ms>

Description

The Physics M.S. program prepares students for a career in industry, education, or government. The curriculum encompassing core areas of physics as well as elective classes that can be chosen to match their area of interest. The M.S. degree includes a capstone experience, which can be a Master's Thesis or a Master's project (for students in the PhD program, the oral thesis proposal satisfies the capstone requirement).

For more details, please consult the physics graduate student handbook (<http://physics.unh.edu/content/graduate-student-handbook>).

Applying

Please visit the Graduate School website (<http://gradschool.unh.edu/apply.php>) for detailed instructions about applying to the program.

Requirements

M.S. Degree Requirements

Code	Title	Credits
PHYS 805	Experimental Physics (or equivalent demonstrated experimental proficiency)	4
PHYS 931	Mathematical Physics	3
PHYS 939	Classical Mechanics	3
PHYS 941	Electromagnetic Theory I	3
PHYS 943	Quantum Mechanics I	3
PHYS 806	Introduction to Physics Research and Teaching (two semesters)	1

Select one of the following options: 15

Option A: 15 additional credits including a 6 credit Master's Thesis (PHYS 899)

Option B: 15 additional credits including a Master's Project (may account for up to 3 credits)

Option C: 15 additional credits of coursework and passing the written comprehensive and oral qualifying exams (for students in the PhD program only)

Political Science (POLT)

Degrees Offered: M.A.

This program is offered in Durham.

The Department of Political Science at UNH offers a Master of Arts in Political Science (MA). The MA program provides advanced study in international relations and comparative politics, American politics, and public policy. The program serves students interested in working in government, public service, nonprofit management, electoral politics, government relations, education and research, and in preparing for Ph.D. programs. This program gives students the flexibility to tailor their coursework to individual interests within a curriculum that ensures a strong foundation in international and domestic politics, research methods, and public management. Faculty engage in teaching and research activities encompassing the fields of international and comparative politics, American politics, and public administration.

This program is offered to full- and part-time students.

Admission Requirements

For the MA program, applicants are expected to have majored in political science or a related social science or humanities field. All applicants must possess a bachelor's degree from an accredited institution. The Graduate Record Examination (GRE) general test is required.

<https://cola.unh.edu/political-science>

Programs

- Political Science (M.A.) (p. 150)

Faculty

See <https://cola.unh.edu/political-science/faculty-staff-directory> for faculty.

Political Science (M.A.)

<https://cola.unh.edu/political-science/program/ma/political-science>

Description

The M.A. Program in Political Science is suitable for enterprising students seeking careers from teaching to research, electoral politics, and government work. Additionally, many students choose to pursue a Ph.D. after graduating.

Requirements

Degree Requirements

M.A. with Thesis Option

Master's degree students must complete a minimum of 30 credits for the degree: eight courses and a 6-credit master's thesis (POLT 899 Master's Thesis). Of the eight courses, two are required seminars: Pro Seminar (POLT 900 Political Science Pro-Seminar) and Introduction to Statistical Analysis (POLT 905 Introduction to Statistical Analysis or PPOL 908), and are to be taken during the student's first year. Students are also required to take electives totaling 9 credits.

Nine credits must be completed at the 800 or 900 level from political science courses or courses offered in related disciplines. Students are encouraged to work with the MA program director to identify relevant courses of interest across the College of Liberal Arts graduate offerings.

The MA program director must provide course approval for elective courses offered outside the department. Successful completion and defense of a 6-credit master's thesis is required.

Code	Title	Credits
POLT 900	Political Science Pro-Seminar ¹	3
POLT 905	Introduction to Statistical Analysis ¹	3
Select 6 additional courses		
POLT 899	Master's Thesis	6
Select 9 credits of electives ²		

¹ To be taken during the student's first year

² This must include two courses in the student's major subfield (Comparative Politics, International Politics, and American Politics/Public Administration).

M.A. Non-Thesis Option

Master's degree students must complete ten courses totaling a minimum of 30 credits for the degree. Students must also pass a comprehensive exam. Of the ten courses, two are required, Pro Seminar (POLT 900 Political Science Pro-Seminar) and Introduction to Statistical Analysis (POLT 905 Introduction to Statistical Analysis or PPOL 908), and are to be taken during the student's first year. Students are also required to take electives totaling 9 credits. This must include two courses in the student's major subfield (Comparative Politics, International Politics, and

American Politics/Public Administration). One course in a minor subfield is also required for this degree option.

Fifteen credits must be completed at the 800 or 900 level from political science courses or a related discipline. Students are encouraged to work with the MA program director to identify relevant courses of interest across the College of Liberal Arts graduate offerings. The MA program director must provide course approval for elective courses offered outside the department.

The comprehensive examination must be successfully completed in the student's final year of study.

Code	Title	Credits
POLT 900	Political Science Pro-Seminar ¹	3
POLT 905	Introduction to Statistical Analysis ¹	3
Select 9 credits of electives ²		
Select one course in a minor subfield		

¹ To be taken during the student's first year

² This must include two courses in the student's major subfield (Comparative Politics, International Politics, and American Politics/Public Administration).

Psychology (PSYC)

Degree Offered: Ph.D.

This program is offered in Durham.

Department of Psychology offers a four- or five-year program of study leading to the doctor of philosophy degree. The basic goal of the program is the development of behavioral scientists who have a broad knowledge of psychology, can teach and communicate effectively, and can carry out sound research in an area of specialization. Although some students seek employment outside academia, the program is oriented toward developing the skills required by the research psychologist who intends to become a college or university teacher.

Areas in which the student may specialize are brain, behavior, and cognition; developmental psychology; or social psychology/personality. The department does not offer training in clinical or counseling psychology.

Distinctive Features of the Program

All psychology graduate students in the Ph.D. program receive a stipend and a full tuition waiver for up to five years. A low graduate student/faculty ratio provides opportunities to work closely with one or more faculty mentors. Graduates typically acquire tenure-track academic or postdoctoral positions at colleges and universities across the U.S.

The Department of Psychology is a national model for preparing future faculty. All graduate students teach Introduction to Psychology while taking a year-long seminar in the teaching of psychology, as well as one or two undergraduate survey courses in statistics and/or the student's area of specialization.

There are active research laboratories in all areas represented in the graduate program. The department has strong partnerships with such nationally recognized programs as UNH's Child Study and Development Center and the Family Research Laboratory. UNH also has a Center for

Teaching Excellence to help graduate students and faculty improve the quality of their teaching.

Admission Requirements

In addition to meeting the requirements for admission to the Graduate School, applicants must intend to be full-time students working toward the doctoral degree (not just the master's degree), and they must submit Graduate Record Examination (GRE) general test scores, along with other standard application forms. The subject test in psychology is recommended. Scores must be current, within five years.

<https://cola.unh.edu/psychology>

Programs

- Psychology (Ph.D.) (p. 151)

Faculty

See <https://cola.unh.edu/psychology/faculty-staff-directory> for faculty.

Psychology (Ph.D.)

<https://cola.unh.edu/psychology/program/phd/psychology>

Description

The Department of Psychology offers a four- or five-year program of study leading to the doctor of philosophy degree. The basic goal of the program is the development of behavioral scientists who have a broad knowledge of psychology, can teach and communicate effectively, and can carry out sound research in an area of specialization. Although some students seek employment outside academia, the program is oriented toward developing the skills required by the research psychologist who intends to become a college or university teacher.

Specialization Areas

The three areas in which a student may specialize are:

- brain, behavior, and cognition
- developmental psychology
- social psychology/personality

Requirements

Ph.D. Degree Requirements

Code	Title	Credits
First-year students participate in a noncredit graduate proseminar which introduces students to the research programs of the faculty.		
PSYC 901 & PSYC 902	Graduate Pro-seminar and Graduate Pro-seminar	0
Required Courses		
PSYC 904	First-year Graduate Seminar	4
PSYC 905	Research Methodology and Statistics I	4
PSYC 906	Research Methodology and Statistics II	4
PSYC 907	Research Methods and Statistics III	4

PSYC 991 & PSYC 992	Practicum and Seminar in the Teaching of Psychology and Practicum and Seminar in the Teaching of Psychology	12
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Select six advanced graduate seminars

Depth in a particular area is obtained through participation in advanced seminars and by independent reading and research conducted under the supervision of a faculty member.

Prior to the doctoral dissertation, the student carries out original research that culminates in either a master's thesis or a paper of publishable quality. A master's degree is awarded upon the successful completion of a program approved by the department and dean of the Graduate School. This typically takes place by the end of the second year.

The third year of the program is dedicated to the practicum and seminar in the teaching of psychology in conjunction with the teaching of introductory psychology.

Advancement to candidacy for the Ph.D. degree depends on receiving the master's degree, passing a specialist examination in one of the department's areas of specialization, and identifying a topic for doctoral research. Advancement to candidacy is usually accomplished by the end of a student's fourth year in the program. During the fourth year, students typically begin dissertation research and teach an introductory course in their specialty area. Most students complete the Ph.D. degree in the fifth year.

Public Administration (CSPP)

Overview

<https://carsey.unh.edu/mpa>

Degree offered: M.P.A.

This program is offered in Durham and Manchester.

The Carsey School of Public Policy's public service graduate degrees offer a unique combination of academic rigor and real-life expertise to prepare you for a career with impact.

The Master of Public Administration (MPA) curriculum is built around a solid core of skills and knowledge for public service or non-profit professionals. A range of electives and specializations are offered to enhance your capacity to achieve your full potential in your current position and to prepare you for the next step in your professional career.

The highly flexible MPA curriculum enables you to start and finish when you like and continue to work while earning your degree in just 16 to 21 months by taking courses in the evenings and online.

Programs

- Public Administration (M.P.A.) (p. 152)

Faculty

See <https://carsey.unh.edu/directory/all> for faculty.

Public Administration (M.P.A.)

<https://carsey.unh.edu/mpa>

Description

The Master of Public Administration degree (MPA) offers you the opportunity to learn the skills you need in all aspects of government and nonprofit management including the tools of leadership, program evaluation, budgets, planning, personnel, collective bargaining, and policy analysis. The program provides an accessible and responsive curriculum so you can address issues that are important to your region which values democratic involvement, accountability, and administrative competency in the provision and delivery of public services through its towns, cities, state agencies, and a wide range of non-governmental organizations.

- The program's flexible schedule accommodates full-time working professionals with courses offered year-round, typically meeting one evening per week or online
- Study with public service professionals and professors who bring strong analysis and best practices to your learning
- Graduate in as little as 16 months (full time) or 21 months (part time)

Program Delivery & Location: Academic courses are offered in the evenings in person on the UNH Manchester campus and online, with additional elective courses offered in person on the UNH Durham campus.

Requirements

Students enrolled in the Carsey School's Master of Public Administration program are required to complete a thirty-six (36) credit program, consisting of:

- Four (4) BASIC Core Curriculum Courses
- Three (3) ADVANCED Core Curriculum Courses
- Five (5) ELECTIVE Courses

These provide students with a strong foundation in theory and the applied skills necessary to foster democratic involvement, accountability and administrative competency in the provision and delivery of public services in towns, cities, state agencies, and a wide range of nonprofit and non-governmental organizations. Further opportunities for depth and specialization are provided through a wide range of elective courses which vary by semester.

Code	Title	Credits
MPA BASIC Core Curriculum Courses (4 Courses):		
PA 905	Introduction to Statistical Analysis	3
PA 906	Foundations and Theories of Public Administration	3
PA 908A or PA 908B	Capstone in Public Administration ¹ Capstone in Public Administration	3
PA 909	Organization and Management in Public and Non-profit Sectors	3
MPA ADVANCED Core Curriculum Courses: Choose Three (3)		
PA 803	Performance Management in Public and Non-Profit Organizations	3
PA 804	Policy and Program Evaluation	3
PA 808	Administrative Law	3
PA 812	Leadership Theory and Practice	3

PA 815	Art of Negotiation	3
PA 907	Legal and Policy-Making Environment on Public and Non-Profit Sectors	3
PA 911	Public Management Techniques	3
PA 912	Human Resource Management in Public and Non-profit Sectors	3
PA 914	Financial Management and Budgeting in Public and Non-profit Sectors	3
PA 918	Non-Profit Management	3

MPA ELECTIVE Courses: Choose Five (5) 3-Credit PA 800/900 Elective Courses (or related discipline with MPA Academic Advisor's approval)² 15

Total Credits 36

- ¹ The Capstone project is the culmination of the student's graduate work, applying academic knowledge with practical experience. Students with public or nonprofit sector professional experience can enroll in PA 908A (3 credits) and those without this experience can enroll in 908B (6 credits).
- ² One or two of the required elective courses may be waived for students who have successfully completed specific training programs as identified on the MPA website.

Public Health (PHP)

Degree Offered: M.P.H., Graduate Certificate

This program is offered in Manchester.

The College of Health and Human Services offers an interdisciplinary curriculum leading to the master of public health (M.P.H.). The program is designed to provide students with an integrated, generalist M.P.H. degree. The M.P.H. program is accredited by the Council on Education for Public Health (CEPH).

The mission of the Master of Public Health (MPH) Program at the University of New Hampshire (UNH) is to promote an integrated public health workforce, while focusing on societal health needs to foster health equity. Graduates of the program are prepared to join the public health workforce and become public health leaders, as they are prepared for multiple career tracks by developing the skills and knowledge base necessary for success.

The Public Health Certificate Program provides a vehicle for individuals working in public or community health positions with the opportunity to earn a graduate certificate in public health. To enter the certificate program, an applicant must have a baccalaureate degree. Upon completion of the certificate program, students can apply to the M.P.H. program. If admitted into the M.P.H. program, the certificate credits will be applied to the M.P.H. degree program.

The master of public health and public health certificate seek to enhance the capacity of public health professionals to perform the 10 Essential Services of Public Health. The program is only offered at the University of New Hampshire Manchester Campus. Academic classes are offered in sessions within the academic semester and most courses are eight weeks in length and offered one evening per week for four hours. Working professionals can complete the M.P.H. program on a part-time basis over two years but have up to six years to complete the degree requirements.

For the purposes of determining academic standing, grades below the “B–” level in graded courses are considered failing grades. The MPH program director will recommend dismissal of a student to the Graduate School when a failing grade occurs in **six** or more credits, *either* in **two courses** or in *one course taken twice*. Repeating a course does *not* remove the original failing grade from the record. Students must have a cumulative grade point average of 3.0 (B), or higher, in order to graduate. Students admitted on a conditional or provisional basis must meet the conditions or provisions as stated in the letter of admission in order to remain in the Graduate School.

Admission Requirements

(Please note that this part-time program does not meet the full-time study requirements for international applicants with F-1 or J-1 visas.)

Applications are accepted for fall, spring, and summer semesters. The program encourages applications from persons who hold a baccalaureate degree from an accredited college or university. The admission committee uses previous academic records, current public health experience, responses to five essay questions regarding your interest in pursuing graduate education in public health, and recommendations from three individuals as indicators of success. Interviews with the program director are encouraged.

For more information on admission requirements please see the Graduate School website (<http://www.gradschool.unh.edu/php/posd.php?major=PB69>).

<https://chhs.unh.edu/health-management-policy/program/mph/public-health>

Programs

- Public Health (M.P.H.) (p. 153)
- Public Health (Graduate Certificate) (p. 153)

Faculty

See <http://chhs.unh.edu/faculty/hmp> for faculty.

Public Health (M.P.H.)

<https://chhs.unh.edu/health-management-policy/program/mph/public-health>

Description

The MPH curriculum requires 48 credits, including 11 classes (33 credits) of required coursework that is established to fulfill the competencies required for the CEPH accreditation and five electives (15 credits). Included in the MPH curriculum is a 100-hour field experience in which the student is expected to apply the theory and the practice to a particular area of interest in a professional public health setting. The final course in the curriculum is an integrating seminar in which students work in teams, bringing both their individual and joint perspectives, as well as their expertise to address a specific public health problem for a New Hampshire-based public health entity.

For the purposes of determining academic standing, grades below the “B–” level in graded courses are considered failing grades. The MPH

program director will recommend dismissal of a student to the Graduate School when a failing grade occurs in **six** or more credits, *either* in **two courses** or in *one course taken twice*. Repeating a course does *not* remove the original failing grade from the record. Students must have a cumulative grade point average of 3.0 (B), or higher, in order to graduate. Students admitted on a conditional or provisional basis must meet the conditions or provisions as stated in the letter of admission in order to remain in the Graduate School.

Requirements

M.P.H. Degree Requirements

The M.P.H. program requires 48 credits of coursework.

Code	Title	Credits
PHP 900	Public Health Care Systems	3
PHP 901	Epidemiology	3
PHP 902	Environmental Health	3
PHP 903	Biostatistics	3
PHP 904	Social and Behavioral Health	3
PHP 905	Public Health Administration	3
PHP 907	Public Health Policy	3
PHP 908	Public Health Ethics	3
PHP 922	Public Health Economics	3
PHP 990	Field Study	3
PHP 998	Integrating Seminar	3
Select five elective courses		15
A grade of B- or higher is required in all courses.		
Total Credits		48

Public Health (Graduate Certificate)

<https://chhs.unh.edu/health-management-policy/program/certificate/public-health>

Description

As part of the Master of Public Health Program’s continuing education program, a public health certificate (PHC) is offered. The Public Health Certificate Program provides a vehicle for individuals working in public or community health positions with the opportunity to earn a graduate certificate in public health. The Public Health Certificate is completed on a part-time basis over one calendar year. To earn the public health certificate, a student must successfully complete the 12-credit curriculum consisting of three required courses and one elective course. All courses (with the exception of workshops taken as part of PHP 996 Applied Topics in the Essentials of Public Health must be taken at UNH.

Grading Policy

For the purposes of determining academic standing, grades below the “B–” level in graded courses are considered failing grades. The MPH program director will recommend dismissal of a student to the Graduate School when a failing grade occurs in **six** or more credits, *either* in **two courses** or in *one course taken twice*. Repeating a course does *not* remove the original failing grade from the record. Students must have a cumulative grade point average of 3.0 (B), or higher, in order to graduate. Students admitted on a conditional or provisional basis must meet the

conditions or provisions as stated in the letter of admission in order to remain in the Graduate School.

Applying

To enter the certificate program, an applicant must have a baccalaureate degree. Applications are accepted for fall, spring, and summer semesters. Certificate program applicants must possess a baccalaureate degree from an accredited college or university. Students are expected to have experience in public health. Upon completion of the certificate program, students can apply to the M.P.H. program. If admitted into the M.P.H. program, the certificate credits will be applied to the M.P.H. degree program.

Please visit the Graduate School website (<http://www.gradschool.unh.edu/php/posd.php?major=PB72>) for detailed instructions about applying to the graduate certificate program.

Requirements

Certificate Requirements

The public health certificate is a 12–credit program that can be completed on a part-time basis over one calendar year. All courses (with the exception of workshops taken as part of PHP 996 Applied Topics in the Essentials of Public Health) must be taken at UNH. To earn the public health certificate, a student must successfully complete the following 12–credit curriculum consisting of following three required courses and one elective course.

Code	Title	Credits
PHP 900	Public Health Care Systems	3
PHP 901	Epidemiology	3
PHP 996	Applied Topics in the Essentials of Public Health ¹	3
Select one elective course ²		3
Total Credits		12

¹ This course has a unique structure that allows students to tailor their learning experience about the Ten Essential Services of Public Health to their professional goals and interests. To learn more about this course design, please consult the department.

² Students can take any M.P.H. course as long as any prerequisites have been met.

Public Policy (CSPP)

Degree Offered: M.P.P., M.P.P./M.S., M.P.P./J.D

This program is offered in Durham.

The Carsey School of Public Policy's public service graduate degrees offer a unique combination of academic rigor and real-life expertise to prepare you for a career with impact. While earning your Master in Public Policy (MPP), you will learn how to evaluate, design, implement, and advocate for public policies that are important in serving your communities and causes.

You can also broaden your expertise by enrolling in one of the Carsey School's dual degree programs, combining your MPP curriculum with an MS in Analytics (MPP/MS) or a Juris Doctor of Law (MPP/JD).

<https://carsey.unh.edu/mpp>

Programs

- Public Policy (M.P.P.) (p. 154)
- Public Policy and Analytics Dual Degree (M.P.P./M.S.) (p. 155)
- Public Policy and Juris Doctor Dual Degree (M.P.P./J.D.) (p. 156)

Faculty

See <https://carsey.unh.edu/mpp/faculty>.

Public Policy (M.P.P.)

<https://carsey.unh.edu/mpp>

Description

The Master in Public Policy degree (MPP) offers you the opportunity to learn the skills you need to succeed in today's public policy profession—analytical expertise, strategic vision, clear and compelling communications, and the tools of leadership. The MPP degree is ideal whether you will be completing your bachelor's degree in the near future or are currently working in a policy-related field. You can choose a track focused on policy analysis or strategy and communications—and select from a broad range of electives to personalize your degree. Built into the unique curriculum are a variety of experiential learning opportunities to deepen and broaden what you learn in the classroom, such as:

- **Colloquium in Washington, DC:** You will be immersed in the capital scene – meeting with leaders in Congress, the White House, government agencies, political parties, advocacy groups, think tanks, and more.
- **Policy Internship:** You will work in a policy-focused organization to gain practical, real-world experience and a valuable perspective on careers in public policy.
- **Capstone Project:** You will employ the skills you have gained to delve deeply into a specific policy area to produce a comprehensive written report and oral presentation.

You can earn your MPP degree in as little as 14 months (or 12 months for accelerated UNH students). You can also choose to earn your MPP degree over a longer period by attending part time.

Program Delivery & Location: *Academic courses are offered in person on the UNH Durham campus with a portion of the experiential learning taking place offsite: Washington, DC, for the Colloquium and at the Internship site location during the internship experience.*

Requirements

Students enrolled in the Carsey School's Master in Public Policy program are required to complete a forty (40) credit program, consisting of:

- Five (5) CORE Curriculum Courses
- Four (4) EXPERIENTIAL LEARNING Activities

- Two (2) PUBLIC POLICY TRACK Courses (Strategy and Communication Track or Policy Analysis Track)
- Four (4) ELECTIVE Courses

These provide the foundational analytical, strategic, and communication skills for a successful career in the world of policy making. Students focus their policy studies by choosing either the Strategy and Communication Track or the Policy Analysis Track and completing two courses in one of the tracks. Courses in both tracks can also be taken as open electives. Further opportunities for depth and specialization in substantive policy areas are provided by open elective courses which vary by semester.

Code	Title	Credits
MPP CORE Curriculum Courses (5 Courses):		
PPOL 902	Strategy and Practice of Public Policy	3
PPOL 904	Economics for Public Policy	3
PPOL 906	Fundamentals of Policy Analysis	3
PPOL 908	Quantitative Methods for Policy Research	3
PPOL 910	Policy Across Borders	3
MPP EXPERIENTIAL LEARNING Activities (4 Courses):		
PPOL 950	Washington DC Colloquium	3
PPOL 990A	Policy Capstone Planning	1
PPOL 990	Policy Capstone	3
PPOL 998A	Policy Internship ¹	0
or PPOL 998	Policy Internship	
PUBLIC POLICY TRACK (2 Courses):²		6
Two (2) courses are selected based upon the chosen track: Strategy and Communication Track or Policy Analysis Track		
ELECTIVE Courses (4 Courses):^{1,3}		12
Four (4) open elective courses are selected in substantive areas approved by the MPP program (or 3 open elective courses if the Policy Internship is taken for credit, PPOL 998) ¹		
Total Credits		40

¹ In special cases and with your MPP Advisor's permission, the Policy Internship may be taken for credit (PPOL 998, 3 credits), supervised by a faculty member who will provide the academic structure to parallel the applied experience. If this is the case, the required number of MPP-approved elective courses is reduced to three (3) courses.

² Students choose two (2) courses from either the Strategy and Communication Track or the Policy Analysis Track. Courses in both tracks can also be taken as open elective courses.

³ Open elective courses are available in many substantive areas. Topics and courses are added on a continuing basis. Students may propose additional electives if they make sense in terms of the student's interests and academic plan. Discussion with an MPP Academic Advisor should inform this choice.

Public Policy and Analytics Dual Degree (M.P.P./M.S.)

<https://carsey.unh.edu/mpp-ms-analytics>

Description

The Public Policy and Analytics Dual Degree equips you with the skills and knowledge required to analyze critical societal issues, develop effective policy solutions, and translate analysis into action.

You can choose to start the program with either the Master in Public Policy (fall term) or the MS in Analytics (summer term) and study a mix of content from both programs each year. Your capstone experience during the second year for both paths will demonstrate your command of skills from each program. In just two years, you will graduate with two highly marketable and sought-after degrees: Master in Public Policy and MS in Analytics.

Program Delivery & Location: Academic courses for both programs are offered in person on the UNH Durham campus with a portion of the MPP experiential learning taking place offsite: Washington, DC, for the Colloquium and at the Internship site location during the internship experience.

Requirements

Students enrolled in the Public Policy and Analytics Dual Degree program are required to earn a minimum of thirty-one (31) credits in the Master in Public Policy program (MPP) and thirty (30) credits in the MS in Analytics program, resulting in a minimum of 61 credits in total. Students completing their dual degree will graduate with two master's degrees: Master in Public Policy and Master of Science in Analytics.

Students can choose to start the dual degree in the fall term with MPP coursework or in the summer term with MS in Analytics coursework. It is highly recommended that students meet with their Academic Advisors for both programs prior to starting the Dual Degree to insure they have a clear understanding of the dual degree program requirements and course schedule.

Below are the courses required for the Public Policy (MPP) and Analytics (MS) programs to successfully complete this Dual Degree curriculum:

Public Policy M.P.P. - Dual Degree Curriculum - Required Courses

Code	Title	Credits
MPP CORE Curriculum Courses (4 Courses):		
PPOL 902	Strategy and Practice of Public Policy	3
PPOL 904	Economics for Public Policy	3
PPOL 906	Fundamentals of Policy Analysis	3
PPOL 910	Policy Across Borders	3
MPP EXPERIENTIAL LEARNING Activities (4 Courses):		
PPOL 950	Washington DC Colloquium	3
PPOL 990A	Policy Capstone Planning ¹	1
PPOL 990	Policy Capstone ¹	3
PPOL 998	Policy Internship ²	3
MPP ELECTIVE Courses: Choose 3 MPP-Approved Elective Courses^{1,3}		9
Total Credits		31

- ¹ With your MPP Academic Advisor's approval, DATA 911 Analytics Practicum I and DATA 912 Analytics Practicum II courses can fulfill the PPOL 990 Policy Capstone requirements if there is a policy-relevant component to the Practicum. If this is the case, an additional MPP-approved elective course is required. All students are required to take PPOL 990A Policy Capstone Planning.
- ² The Policy Internship is supervised by a faculty member who will provide the academic structure to parallel the applied experience.
- ³ Electives are available in many substantive areas with topics and courses added on a continuing basis. Students may also propose additional electives if they make sense in terms of the student's interests and academic plan. Discussion with an advisor should inform this choice.

Analytics M.S. - Dual Degree Curriculum - Required Courses

Code	Title	Credits
MS in Analytics BEGINNER Courses (4 Courses):		
DATA 800	Introduction to Applied Analytic Statistics	3
DATA 801	Foundations of Data Analytics	3
DATA 802	Analytical Tools and Foundations	3
DATA 803	Introduction to Analytics Applications	3
MS in Analytics INTERMEDIATE & ADVANCED Courses (4 Courses):		
DATA 900	Data Architecture	3
DATA 901	Analytics Applications I	3
DATA 902	Analytics Methods	3
DATA 903	Analytics Applications II	3
MS in Analytics EXPERIENTIAL LEARNING Activities (2 Courses):		
DATA 911	Analytics Practicum I ¹	3
DATA 912	Analytics Practicum II ¹	3
Total Credits		30

- ¹ DATA 911 Analytics Practicum I and DATA 912 Analytics Practicum II must be policy-relevant to fulfill the MPP program's PPOL 990 Policy Capstone requirement. Consult with your MPP Academic Advisor prior to the Practicum courses for details and guidance.

Please consult the MS in Analytics program website for program information and detailed requirements.

Public Policy and Analytics Dual Degree Credit Summary

Code	Title	Credits
Master in Public Policy Program Course Credits		31
MS in Analytics Program Course Credits		30
Total Credits		61

Public Policy and Juris Doctor Dual Degree (M.P.P./J.D.)

<https://carsey.unh.edu/mpp-jd>

Description

The Public Policy and Juris Doctor Dual Degree will provide you with a deep understanding of how legal and policy issues relate and will equip you with the critical skills and knowledge required to tackle a broad range of complex public policy challenges and make a difference in the contemporary world of law and public policy.

You will start the dual degree program with your first year at the UNH School of Law followed by one year at the Carsey School earning your Master in Public Policy. You will then return for a final year and a half at the law school to complete your Juris Doctor degree. In just three and a half years, you will graduate with two highly marketable and sought-after degrees.

Program Delivery & Location: Academic courses for the JD program are offered in person on the UNH School of Law campus in Concord, NH. Academic courses for the MPP program are offered in person on the UNH Durham, NH, campus with a portion of the MPP experiential learning taking place offsite: Washington, DC, for the Colloquium and at the Internship site location during the internship experience (or if doing a legal residency, at the externship location).

Requirements

Students enrolled in the Public Policy and Juris Doctor Dual Degree program are required to earn a minimum of 104 credits to successfully complete the dual degree. If both degrees are pursued separately, students are required to take a total of 125 Credits: 85 Credits for the Juris Doctor Degree and 40 Credits for the Master in Public Policy degree (MPP), taking approximately four and one half years to complete. With the Public Policy and Juris Doctor Dual Degree, the UNH School of Law accepts up to 12 Credits of approved MPP courses and the Carsey School accepts up to 9 Elective Credits of approved JD courses, reducing the total required credits to 104 and time to complete the two degrees to three and one half years.

Students start their dual degree by completing their first year of the Juris Doctor program. Students then complete one year of coursework in the MPP program and return to the Law School for their final one and one half years of coursework. It is highly recommended that students meet with with Academic Advisors of both programs prior to starting the Dual Degree to insure they have a clear understanding of the program requirements and course schedule. Students completing the dual degree will graduate with two degrees: Master in Public Policy degree and Juris Doctor degree.

Below are the courses required for the Master in Public Policy (MPP) portion of this Dual Degree. Students should refer to the UNH School of Law's Juris Doctor curriculum for specific course requirements and schedule.

Master in Public Policy Curriculum (for MPP/JD Dual Degree)

Code	Title	Credits
MPP CORE Curriculum Courses (5 Courses):		
PPOL 902	Strategy and Practice of Public Policy	3
PPOL 904	Economics for Public Policy	3
PPOL 906	Fundamentals of Policy Analysis	3

PPOL 908	Quantitative Methods for Policy Research	3
PPOL 910	Policy Across Borders	3
MPP EXPERIENTIAL LEARNING Activities (4 Courses):		
PPOL 950	Washington DC Colloquium	3
PPOL 990A	Policy Capstone Planning	1
PPOL 990	Policy Capstone	3
PPOL 998	Policy Internship ¹	3
	or PPOL 998A Policy Internship	
PUBLIC POLICY TRACK (2 Courses) ²		6
Two (2) courses are selected based upon the chosen track: Strategy and Communication Track or Policy Analysis Track		
JD ELECTIVES: Choose 3 JD Elective Courses		9
Total Credits		40

¹ In general, the Policy Internship is credit-bearing (PPOL 998), supervised by a faculty member who will provide the academic structure to parallel the applied experience. In some cases, a policy internship may not be appropriate for academic credit or the requirement may be satisfied through the UNH Law School's Externship; in such cases the internship/externship experience fulfills the requirement but does not provide credits (PPOL 998A). If the Internship is not taken for credit (PPOL 998A), students are required to take an additional MPP-approved elective course. It is highly recommended that students consult with their MPP Academic Advisor to determine the best path for the student.

² Students choose two (2) elective courses from either the **Policy Analysis Track** or **Strategy and Communication Track** list of courses.

Recreation Management and Policy (RMP)

Degree Offered: M.S.

This program is offered in Durham.

The Department of Recreation Management and Policy (RMP) offers the master's of science degree in Recreation Management and Policy with options in **Recreation Administration (30 credits)**, **Therapeutic Recreation Administration (30 credits)**, and **Adaptive Sports (32-33 credits)**.

The Department is accredited by the National Council on Accreditation of Parks, Recreation, Tourism, and Related Professions (COAPRT), and the Commission on the Accreditation of Recreational Therapy Education (CARTE).

The primary purpose of the RMP Graduate Program is to prepare professionally educated recreation, therapeutic recreation, and adaptive sports administrators to serve their communities and provide leadership that addresses the quality of life issues of an increasingly diverse and complex society. The MS program in RMP provides a foundation in leisure theory, research, and data analysis to conduct applied research within the field, and administration skills for management level positions in practice.

An atmosphere of collegiality and collaboration fosters interactions between faculty and students. Faculty and students are actively engaged in applied research.

RMP graduate courses are generally offered once a week in three-hour blocks in the afternoon and/or evenings. Some courses are offered in an online format.

Admission Requirements

Individuals seeking a career change to recreation administration, therapeutic recreation administration, or adaptive sports with an undergraduate degree in a related field (e.g., education, psychology, business, special education) may be admitted to the Graduate School as a provisional student, with the expectation that they complete any required prerequisites prior to, or concurrently with, graduate courses. Prerequisite courses will be determined based on professional experience and educational background. A specially designed curriculum is available to provisionally admitted students.

Admission is based on a personal history that demonstrates academic achievement and/or exemplary work experience, as well as the applicant's ability to articulate in the personal statement his or her potential and desire for graduate study in recreation administration, therapeutic recreation administration, or adaptive sports (See the personal statement questions in application portal).

Generally, students must have earned a minimum undergraduate GPA of 3.00 to be considered for admission. Applicants are required to submit copies of prior academic records (official academic transcripts), three professional references, a current resume or curriculum vita, written personal statement (questions provided in application portal), and a complete Graduate School application.

A baccalaureate degree must be conferred prior to beginning the program. Face-to-face, phone, or video call interviews are encouraged but not required for all applicants. Students who wish to apply for a graduate assistantship should contact the department's Graduate Coordinator for an application or obtain it from the department's website (<http://chhs.unh.edu/rmp/graduate-programs>). Admission to the program and funding opportunities are selective and limited. It is in the applicant's best interest to apply early.

<https://chhs.unh.edu/rmp>

Programs

- Recreation Management and Policy: Adaptive Sports (M.S.) (p. 157)
- Recreation Management and Policy: Recreation Administration (M.S.) (p. 158)
- Recreation Management and Policy: Therapeutic Recreation Administration (M.S.) (p. 159)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Recreation Management and Policy: Adaptive Sports (M.S.)

<https://chhs.unh.edu/rmp/adaptive-sports-option>

Description

The Adaptive Sports Option prepares professionals for middle to upper-level administrative positions within the adaptive sports sector of the field, including positions within parks and recreation departments, rehabilitation hospitals, Veteran's Administration hospitals and

outpatient clinics, non-profits agencies, public school settings, grassroots adaptive sport organizations, national and international adaptive sport organizations, and/or commercial sport and recreation providers.

The Adaptive Sports Option leverages our unique partnership with Northeast Passage, a nationally recognized TR and adaptive sports program associated with the RMP Department, and affiliate of Disabled Sports USA. Graduate students will be exposed to Northeast Passage's Adaptive Sports and Recreation program, which offers a spectrum of services from entry-level instruction to ongoing recreation and competitive sports opportunities for people with disabilities (www.nepassage.org (<http://www.nepassage.org>)).

Requirements

The 32-33 credit Adaptive Sports Option consists of required and elective coursework. In consultation with a faculty adviser, students will select either a thesis or non-thesis track. The core curriculum combines courses in adaptive sports and recreation facilitation, program administration in sport and recreation, law and public policy, non-profit administration and leadership, fund development and grant writing, and a supervised fieldwork experience in an adaptive sports setting. Students develop research competencies through an applied project or thesis specifically tailored to adaptive sport practice. Students also take one elective course to support desired specialization.

Full-time students typically take two years and one summer session to progress through the Adaptive Sport option degree requirements. Part-time students typically complete the program in three+ years.

Code	Title	Credits
Required Core Competencies		17
RMP 820	Adaptive Sports and Recreation Facilitation	3
RMP 860	Program Administration in Recreational Sport	3
RMP 872	Law and Public Policy in Leisure Services	3
RMP 912	Non-Profit Administration and Leadership	3
RMP 924	Fund Development and Grantwriting	3
RMP 963	Graduate Field Practicum	2
Required Research Competencies		6-7
RMP 998	Special Topics (Research Methods)	3
Select one of the following Graduate statistics' courses:		
SW 962	Data Analysis and Statistics	3
EDUC 881	Introduction to Statistics: Inquiry, Analysis, and Decision Making	4
Capstone Course (choose 1 track)		
Thesis Track		
RMP 899	Master's Thesis (I & II, 3 credits each)	6
Non-thesis Track:		
RMP 980	Independent Study	3
RMP 995	Colloquium Seminar (Project Track:)	3
Elective (not an all-inclusive list)		3-4
Select one of the following:		
KIN 865	Advanced Topics in Coaching (highly encouraged)	4
KIN 831	Inclusive Teaching Through Sport	4
KIN 881	Inclusion in Physical Education	4
OT 822	Introduction to Assistive Technology	4
OT 824	Assistive Technology and Physical Disabilities	4

OT 826	Assistive Technology and Sensory, Communicative, and Cognitive Disabilities	4
COMM 914	Augmentative and Alternative Communication	3-4
SW 812	Understanding Developmental Disabilities	3
SW 897	Special Topics in Social Work and Social Welfare (Mental Health Aspects of IDD)	3
SW 897	Special Topics in Social Work and Social Welfare (Youth Emotional Behavior)	3
EDUC 852	Contemporary Issues in Learning Disabilities	4
EDUC #853	Contemporary Issues in Behavioral Disabilities	4
EDUC #854	Contemporary Issues of Developmental Disabilities	4
EDUC #855	Facilitating Social Understanding and Relationships for Students with Disabilities	2
EDUC 856	Supporting Families of Individuals with Exceptionalities	4
EDUC 857	Contemporary Issues in Autism Spectrum Disorders	4

Recreation Management and Policy: Recreation Administration (M.S.)

<https://chhs.unh.edu/rmp/recreation-administration-option>

Description

The Recreation Administration option prepares professionals with advanced knowledge and skills to plan and administer recreation services. Postgraduate employment opportunities include directors of municipal recreation programs, YMCAs, resort programs, camps, campus/intramural sports, fitness centers, youth services agencies, and sports and recreation facilities as well as outdoor recreation planners for the U.S. Forest Service, National Park Service, and state park systems. New specializations are available in adaptive sports through our partnership with Northeast Passage (www.nepassage.org (<http://www.nepassage.org>)), or in campus recreation through our partnership with UNH Campus Recreation (<http://campusrec.unh.edu/>).

Requirements

Degree Requirements

The 30-credit Recreation Administration option consists of required and elective coursework. In consultation with a faculty adviser, students will select either a thesis or non-thesis track. Full-time students typically take two years to progress through the RA option degree requirements. If a student takes leveling courses, they may need to complete more than two years. Part-time students typically complete the program in three years.

Code	Title	Credits
Required Core Competencies		12-13
RMP 800	Concepts of Recreation and Leisure	3
RMP 806	Recreation Administration and Organizational Behavior	3
RMP 998	Special Topics (Research Methods)	3
Select one of the following Graduate-level stats' courses		
SW 962	Data Analysis and Statistics	3

EDUC 881 Introduction to Statistics: Inquiry, Analysis, and Decision Making 4

Elective Courses 12-15

Select courses (4 courses/12 credits for the thesis option or 5 courses/15 credits for the non-thesis option with at least one elective from RMP):

RMP 811 Recreation Resource Management 3
 RMP 820 Adaptive Sports and Recreation Facilitation 3
 RMP 830 Camp Administration and Leadership 3
 RMP 850 Aging, Advocacy, and Active Learning 3
 RMP 860 Program Administration in Recreational Sport 3
 RMP #868 Theories of Youth Development 3
 RMP 870 Management and Design of Recreation and Park Facilities 3
 RMP 872 Law and Public Policy in Leisure Services 3
 RMP 875 Entrepreneurial and Commercial Recreation 3
 RMP 912 Non-Profit Administration and Leadership 3
 RMP 924 Fund Development and Grantwriting 3
 RMP 964 Graduate Internship 3
 RMP 970 Teaching Practicum 3
 RMP 980 Independent Study 1-3

Capstone Course (choose 1 track)

Thesis Track:

RMP 899 Master's Thesis (I & II, 3 credits each) 6

Non-Thesis Track:

RMP 995 Colloquium Seminar 3
 RMP 980 Independent Study 3

Example of electives outside of the department (not all-inclusive list):

Code	Title	Credits
ADMN 832	Exploration in Entrepreneurial Management	3
ADMN 852	Marketing Research	3
ADMN 952	Organizations, Leadership, and Environments	3
ADMN 953	The Social Power of Leadership in the 21 Century	3
ADMN 956	Managerial Decision Making	3
ADMN 960	Marketing/Building Customer Value	3
ADMN 970	Economics of Competition	3
ADMN 982	Creating Winning Strategies	3
HMP 900	Introduction to the Health Services Industry	3
HMP 812	Health Analytics	4
KIN 802	Health Content and Youth Risk Behaviors	4
KIN 831	Inclusive Teaching Through Sport	4
KIN 841	Social Issues in Contemporary Sports	4
KIN 840	Athletic Administration	4
KIN 843	Sport Marketing	4
KIN 865	Advanced Topics in Coaching	4
KIN 880	Psychological Factors in Sport	4
KIN 882	Therapeutic Applications of Adventure Programming	4
KIN 881	Inclusion in Physical Education	4
KIN 883	Psych Factors of Adventure Ed	4
KIN 884	Historical Foundations of Outdoor Experiential Education	4

KIN 885 Program Models and Evaluation in Outdoor Education 4

PHP 900 Public Health Care Systems 3

PHP 902 Environmental Health 3

PHP 904 Social and Behavioral Health 3

PHP 905 Public Health Administration 3

PHP 907 Public Health Policy 3

PHP 924 Policy and Practice of Community Health Assessment 3

PHP #930 Climate Change and Health 3

PHP 938 Health Education and Promotion 3

PHP 940 Health and the Built Environment 3

PHP #920 Social Marketing 3

PHP 922 Public Health Economics 3

RAM #805 Ecotourism: Managing for the Environment 4

RAM 867 Social Impact Assessment 4

RAM 877 Topics in Community Planning 4

SOC #988 Medical Sociology: Health, Healing, and Society 4

SOC 880 Social Conflict 4

SW 840 Implications of Race, Culture, and Oppression for Social Work Practice 3

SW 814 Introduction to Addiction: Assessment and Intervention 3

SW 897 Special Topics in Social Work and Social Welfare 2

or

3

Recreation Management and Policy: Therapeutic Recreation Administration (M.S.)

<https://chhs.unh.edu/rmp/therapeutic-recreation-administration-option>

Description

The Therapeutic Recreation Administration option prepares advanced personnel for administrative responsibilities in clinical-based practice & administrative leadership in community-based recreation services that meet the needs of individuals with disabilities. Graduate education serves Therapeutic Recreation Specialists who wish to move into administrative positions such as supervisor/manager/director, senior therapist, treatment coordinator, assisted-living manager, and senior center supervisor. A specialization in community-based TR is also available through our partnership with Northeast Passage (<http://www.nepassage.org>), including coursework and practice experiences related to in-home/community health promotion programming, TR service delivery in the school system, and adaptive sports.

Students without an academic or clinical background in therapeutic recreation may use the M.S. program to satisfy the academic requirements for the national credentialing examination used by the National Council on Therapeutic Recreation Certification (NCTRC) and for New Hampshire state licensure. While the graduate program does not require prerequisite courses to qualify for admission, the credentialing examination (<http://www.nctrc.org>) does require coursework outside the

M.S. curriculum requirements and the department may require leveling coursework upon acceptance to the M.S. program.

Requirements

Degree Requirements

The 30-credit Therapeutic Recreation Administration option consists of required and elective coursework. In consultation with a faculty adviser, students will select either a thesis or non-thesis track. Full-time students with a TR undergraduate degree typically take two years to progress through the degree requirements; full-time students without a TR undergrad degree need more than two years. Part-time students typically complete the program in 3 years.

Code	Title	Credits
Required Courses 12-13		
RMP 800	Concepts of Recreation and Leisure	3
RMP 805	Management and Policy in Therapeutic Recreation	3
RMP 998	Special Topics (Research Methods)	3
Select one of the following Graduate-level statistics' courses:		
SW 962	Data Analysis and Statistics	3
EDUC 881	Introduction to Statistics: Inquiry, Analysis, and Decision Making	4
Elective Courses 12-15		
Select courses (4 courses/12 credits for the thesis option or 5 courses/15 credits for the non-thesis option with at least one elective from RMP):		
RMP 806	Recreation Administration and Organizational Behavior	3
RMP 811	Recreation Resource Management	3
RMP 820	Adaptive Sports and Recreation Facilitation	3
RMP 830	Camp Administration and Leadership	3
RMP 840	Therapeutic Recreation Service Delivery in Community Settings	3
RMP 860	Program Administration in Recreational Sport	3
RMP 850	Aging, Advocacy, and Active Learning	3
RMP #868	Theories of Youth Development	3
RMP 870	Management and Design of Recreation and Park Facilities	3
RMP 872	Law and Public Policy in Leisure Services	3
RMP 875	Entrepreneurial and Commercial Recreation	3
RMP 912	Non-Profit Administration and Leadership	3
RMP 924	Fund Development and Grantwriting	3
RMP 964	Graduate Internship	3
RMP 970	Teaching Practicum	3
RMP 980	Independent Study	1-3
Capstone Course (choose 1 track)		
Thesis Track:		
RMP 899	Master's Thesis (I & II, 3 credits each)	6
Non-thesis Track:		
RMP 995	Colloquium Seminar	3
RMP 980	Independent Study	3

Code	Title	Credits
Example of electives outside of the department (not an all-inclusive list):		
KIN 881	Inclusion in Physical Education	4
PHP #920	Social Marketing	3
PHP 922	Public Health Economics	3
RAM 867	Social Impact Assessment	4
RAM 877	Topics in Community Planning	4
SOC #988	Medical Sociology: Health, Healing, and Society	4
HMP 900	Introduction to the Health Services Industry	3
HDFS 846	Human Sexuality	4
HDFS 857	Race, Class, Gender, and Families	4
HDFS 860	Family Programs and Policies	4
HDFS 876	Children, Adolescents and the Law	4
HDFS 894	Families and the Law	4
HDFS 993	Theoretical Approaches to Human Development and Family Studies	4
HDFS 843	Families, Schools, and Community	4
KIN 802	Health Content and Youth Risk Behaviors	4
KIN 831	Inclusive Teaching Through Sport	4
KIN 882	Therapeutic Applications of Adventure Programming	4
KIN 883	Psych Factors of Adventure Ed	4
NUTR 840	Nutrition for Children with Special Needs	4
NUTR 865	Geriatric Nutrition	4
NUTR 873	Clinical Nutrition	4
NUTR 880	Critical Issues in Nutrition	4
OT 822	Introduction to Assistive Technology	4
OT 824	Assistive Technology and Physical Disabilities	4
OT 826	Assistive Technology and Sensory, Communicative, and Cognitive Disabilities	4
OT 830	Assistive Technology for Enhancing Occupational Performance	3
OT 830L	Assistive Technology for Enhancing Occupational Performance Lab	2
OT 889	Using iPads to Support Children with Disabilities	3
PHP 900	Public Health Care Systems	3
PHP 904	Social and Behavioral Health	3
PHP 905	Public Health Administration	3
PHP 907	Public Health Policy	3
PHP 908	Public Health Ethics	3
PHP 912	Public Health Law	3
PHP 914	Public Health Policy Analysis	3
PHP 924	Policy and Practice of Community Health Assessment	3
PHP 938	Health Education and Promotion	3
SW 805	Child and Adolescent Risks and Resiliency: Program, Policy and Practice	3
SW 814	Introduction to Addiction: Assessment and Intervention	3
SW 820	Social Welfare Policy I	3
SOC 880	Social Conflict	4
SW 840	Implications of Race, Culture, and Oppression for Social Work Practice	3

SW 850	Human Behavior and the Social Environment I	3
SW 865	Adventure Therapy: Facilitation and Processing of the Experience	3
SW 897	Special Topics in Social Work and Social Welfare	2 or 3

Resource Administration and Management (RAM)

Degree Offered: M.S.

This program is offered in Durham.

The Department of Natural Resources and the Environment coordinates the interdisciplinary master of science degree program in resource administration and management. Students may specialize in management of publicly and privately owned natural resources or in administration of natural resource laws and policies.

Admission Requirements

Applicants are expected to have completed either an undergraduate degree in the field in which they plan to specialize or show adequate preparation in the basic support courses of the field. A minimum of one course in each of the areas of ecology or natural resources, intermediate microeconomics, and introductory statistics is required. Persons having professional experience in resource administration, management, or related areas receive priority for admittance to the program. An applicant is required to submit an essay of up to 2,000 words describing his or her background and goals.

Applicants with good undergraduate records who lack a background in a particular field may be admitted to a program, provided they are prepared to correct the deficiencies. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

<https://colsa.unh.edu/natural-resources-environment>

Programs

- Resource Administration and Management (M.S.) (p. 161)

Faculty

<https://colsa.unh.edu/natural-resources-environment/people>

Resource Administration and Management (M.S.)

<https://colsa.unh.edu/natural-resources-environment/program/ms/resource-administration-management>

Description

The Department of Natural Resources and the Environment coordinates the interdisciplinary master of science degree program in resource administration and management. Students may specialize in

management of publicly and privately owned natural resources or in administration of natural resource laws and policies.

Requirements

M.S. Degree Requirements

The master of science degree in resource administration and management is conferred upon successful completion of a program amounting to not less than 34 credits, including the following course requirements or equivalent:

Code	Title	Credits
NR 903	Approach to Research	2
Quantitative methods or analytical techniques		4
POLT 905	Introduction to Statistical Analysis	
SOC 903	Sociological Methods III: Advanced Social Statistics	
ECON 976	Microeconomics I	
Or an alternative with approval from the Graduate Coordinator		
RAM 911	Natural and Environmental Resource Management	4
An advanced course in environmental policy		4
NR 820	International Environmental Politics and Policies for the 21st Century	
Or an alternative with approval from the Graduate Coordinator		
Capstone Course:		
Select one of the following:		
RAM 898	Directed Research	4
RAM 899	Master's Thesis	6-10
Final oral and/or written examination		

Social Work (SW)

Degrees Offered: M.S.W., M.S.W./M.S., M.S.W./J.D., Graduate Certificate

This program is offered in Durham, Online, and in Manchester.

The Department of Social Work offers a master of social work (M.S.W.) degree. The M.S.W. program develops advanced professional knowledge and skills for persons interested in pursuing careers in the field of social work. It concentrates on strengths and empowerment models that encourage individuals and families, and communities and organizations to realize their full potential.

The M.S.W. program is accredited by the Council on Social Work Education (CSWE). It requires two years of full-time study or three-to-four years of extended-time study. All programs require classroom work and two year long field internships.

Program Options

The Durham Campus Program is our traditional model with admission to the program once a year. Required first year courses are scheduled Monday-Wednesday leaving Thursdays and Fridays open for first year field internships. Second year courses are scheduled Wednesdays and Thursdays leaving Monday, Tuesday, and Friday for internships.

The Durham program also has an **advanced standing** option for eligible students who have graduated from the B.S.W. program within five years.

The UNH Manchester Program has academic classes delivered in a weekend model with admission every other year. Students complete the Manchester program in three years. Field internship hours are typically completed during normal business hours.

The M.S.W Online Program allows students to earn their Master of Social Work degree online in 28 months. M.S.W online students are required to complete two field internships at a program or agency in their local community and work with Social Work Department field office to identify acceptable field sites. The online program admits three times a year (fall, spring, summer). No campus visits are required at any time.

Dual Degree Programs:

The Social Work and Kinesiology Dual Degree consists of a master in Social Work (M.S.W.), as well as a master of science (M.S.) in Kinesiology with a concentration in Outdoor Education. In two and a half years students will be able to complete these two graduate degrees with a concentration in Outdoor Education to prepare them for a career in adventure therapy.

The Social Work and Law Dual Degree consists of a master in social work (M.S.W.) as well as JD law degree from the School of Law at the University of New Hampshire (UNH) (**JD/M.S.W.**). In four years, students will be able to complete two graduate degrees, a master in social work (M.S.W.) and a Juris Doctor to prepare them for a career in law and social work.

Admission Requirements

The department encourages applications from those who hold a baccalaureate degree from an accredited college or university; have attained an overall grade-point average of "B" or better in undergraduate coursework; and have completed courses in a broad range of liberal arts and science disciplines. Applicants should include a resume of two pages or less, which lists educational, work, and volunteer experiences, as well as any special skills or attributes. Applicants must submit professional recommendations from three individuals, one of whom could be a member of an academic faculty. Professional letters of reference should describe the applicant's volunteer or work duties, skills and values relevant to social work practice with diverse populations, ability to collaborate with others, and overall strengths and challenges relevant to graduate study. Applicants should complete a personal statement of interest in pursuing graduate education in the field. Significant volunteer and/or work experience in the field is strongly recommended. Application expectations include graduation from an accredited undergraduate institution with a broad liberal arts background. Applicants who do not meet these requirements may fulfill them after admissions but before their second year of study. All applicants are encouraged to contact departments directly to discuss program specific application questions. Standardized graduate examinations are not required, but results of such tests may be submitted to supplement other admission materials. **To apply to all programs, go to <http://www.gradschool.unh.edu/>.**

Students applying to the **online M.S.W. program** must meet the application requirements shown above. The Online M.S.W. Program provides the same quality education that the campus-based programs offer. The Online program admits students every fall, spring, and summer. Students can complete their coursework and field practicum work at

home and in their own community. No campus visits are required at any time.

Students applying for **advanced standing** must hold a B.A. from an accredited S.W./B.S.W. program with a minimum overall grade point average of 3.2 (4.0 point scale). This coursework must have been completed within five years of the date of M.S.W. matriculation. Advanced-standing applicants must also submit a reference from a B.S.W. faculty member and the undergraduate field supervisor or field coordinator. Students applying to the extended-time program at UNH Manchester are advised that the Manchester program admits students every other year and that Advanced Standing options are only available in unique circumstances.

Students applying to the **dual-degree programs** must meet the application requirements for both the Departments of Social Work and Kinesiology or the UNH School of Law. See Kinesiology (http://chhs.unh.edu/kin_oe/master-social-work-master-science-adventure-therapy) and the UNH School of Law (<http://law.unh.edu>) for their admission requirements.

Graduate Certificates

The department offers graduate certificates in **Intellectual and Developmental Disabilities (IDD)**, **Child Welfare** and **Substance Use Disorders**.

The **IDD certificate** emphasizes an interdisciplinary, collaborative approach to providing holistic, family-centered services to children and families.

The **Child Welfare** certificate is designed to educate individuals interested in improving the quality of life for children and families vulnerable to abuse and neglect. For training programs, the Title IVE Child Welfare Training Program and a University Partnerships (UP) child welfare program are available for eligible M.S.W. students interested in a career in child protective services. Program information and application materials can be found at <http://chhs.unh.edu/sw/child-welfare-and-partnerships-training>.

The **Substance Use Disorder** certificate provides a two year, 12 credit program of study, through a series of four required courses. Course content includes substance use disorder theory, etiology, research, policy, and practice, with a strong emphasis on biology, cognitive-behavioral, systems and strengths perspective.

<https://chhs.unh.edu/sw>

Programs

- Social Work (M.S.W.) (p. 163)
- Social Work (Advanced Standing) (M.S.W.) (p. 163)
- Social Work and Kinesiology Dual Degree (M.S.W./M.S.) (p. 164)
- Social Work and Juris Doctor Dual Degree (M.S.W./J.D.) (p. 164)
- Child Welfare (Graduate Certificate) (p. 165)
- Intellectual and Developmental Disabilities (Graduate Certificate) (p. 166)
- Substance Use Disorders (Graduate Certificate) (p. 167)

Faculty

See <https://chhs.unh.edu/directory/all> for faculty.

Social Work (M.S.W.)

<https://chhs.unh.edu/social-work/program/msw/social-work>

Description

The M.S.W. program features an **advanced generalist concentration**, which is the most common concentration in social work. It is very well suited for practice in rural, suburban, and urban settings and is viable for career positions where a CSWE-accredited degree is required. Completion of the M.S.W. program provides the foundation for license eligibility.

MSW students will be able to select three electives in one or more fields of practice:

1. Health and mental health;
2. Addictions and substance abuse;
3. Children, youth, and families,
4. Disabilities; or a self-designed field of practice.

Requirements

M.S.W. Degree Requirements

An M.S.W. candidate must complete 62 credit hours of 800- or 900-level courses including two, two-semester field internships, comprising a total of 1,240 hours in the field. Grades below the B level in a graded course or a "fail" in a credit/fail course are considered failing grades for the purposes of determining academic standing. Repeating a course does not remove the original failing grade from the record. Graduate students receiving failing grades in 9 or more credits, received either in three courses or in any combination of courses taken twice, will be dismissed from the M.S.W. program.

Although a significant portion of the curriculum is required, students will be able to complete three elective courses. At least one of these must be taken from among Department of Social Work course offerings.

Core MSW Program Advanced Generalist Courses

Code	Title	Credits
Core courses		
SW 820	Social Welfare Policy I	3
SW 830	Social Work Practice I	3
SW 840	Implications of Race, Culture, and Oppression for Social Work Practice	3
SW 850	Human Behavior and the Social Environment I (HBSE I)	3
SW 880	Field Internship I ¹	3
SW 860	Research Methods in Social Work	3
SW 831	Social Work Practice II: Practice in Small Groups and Community Organizations	3
SW 851	Human Behavior and the Social Environment II (HBSE II)	3
SW 926	Social Welfare Policy II	3

SW 881	Field Internship II ²	3
SW 930	Advanced General Practice III: Clinical Assessment and Intervention	3
SW 952	Human Behavior and the Social Environment III	3
SW 962	Data Analysis and Statistics	3
SW 982	Field Internship III ³	4
SW 931	Advanced Generalist Practice IV: Community and Administrative Practice	3
SW 965	Program and Practice Evaluation	3
SW 983	Field Internship IV ⁴	4

Electives

Select three 3-credit elective courses of social work (other graduate programs with permission):		9
SW 801	Women and Aging	
SW 805	Child and Adolescent Risks and Resiliency: Program, Policy and Practice	
SW 806	Social Action in the Dominican Republic	
SW 812	Understanding Developmental Disabilities	
SW 813	School Social Work	
SW 814	Introduction to Addiction: Assessment and Intervention	
SW 815	Practice with Gay, Lesbian, Bisexual, and Transgender People	
SW 816	Addiction: Myth, Science and Policy	
SW 819	Addiction Recovery	
SW 865	Adventure Therapy: Facilitation and Processing of the Experience	
SW 870	Intimate Partner Violence	
SW 897	Special Topics in Social Work and Social Welfare	
SW 957	Fund Development and Grantwriting	
SW #973	Interventions with Groups	
SW 974	Social Work Supervision	
SW 975	Theory and Practice of Family Therapy	
SW 979	Social Work and the Law	

Total Credits 62

- ¹ Seminar and concurrent two-day/week internship/academic year
- ² Seminar and two-day/week internship continued from SW 880 Field Internship I
- ³ Seminar and concurrent three-day/week internship/academic year
- ⁴ Seminar and three-day/week internship continued from SW 982 Field Internship III

Social Work (Advanced Standing) (M.S.W.)

<https://chhs.unh.edu/sw/master-social-work-msw>

Description

Advanced Standing Program

The M.S.W. program at the Durham campus considers advanced standing for exceptional students with undergraduate degrees from accredited baccalaureate social work programs. Applicants must have graduated

from the B.S.W. program within five years of matriculation into the M.S.W. program. Advanced standing students complete a minimum of 35 credits for graduation. This includes a 10-week summer practicum and seminar, which students must take prior to their advanced practice and field placement.

Requirements

MSW Program Advanced Standing (post B.S.W./B.S.S.W.) Courses

Code	Title	Credits
SW 900	Advanced Standing Practice and Field Seminar	3
SW 840	Implications of Race, Culture, and Oppression for Social Work Practice	3
SW 930	Advanced General Practice III: Clinical Assessment and Intervention	3
SW 952	Human Behavior and the Social Environment III	3
SW 962	Data Analysis and Statistics	3
SW 982	Field Internship III (seminar and concurrent internship)	4
SW 926	Social Welfare Policy II (unless completed in B.S.W./B.S.S.W., then an elective)	3
SW 931	Advanced Generalist Practice IV: Community and Administrative Practice	3
SW 965	Program and Practice Evaluation	3
SW 983	Field Internship IV (Seminar & Concurrent Internship)	4
One Elective Course		3
Total Credits		35

Social Work and Kinesiology Dual Degree (M.S.W./M.S.)

<https://chhs.unh.edu/social-work/program/msw/social-work>

Description

Social Work and Kinesiology

Dual-degree Social Work and Kinesiology students take classes simultaneously over the course of two-and-a-half years in both Social Work and Kinesiology: Outdoor Education and complete a minimum of 77 credits for graduation. This includes two internships, one during their first year of study, and a second specialized block placement internship over the summer following the second year of study, which concentrates on the utilization and application of adventure therapy in an agency setting. This block placement internship may occur in New England or in other appropriate settings across the U.S. Students are required to also complete an advanced studies project during their last year of study, which is supervised by faculty in Kinesiology: Outdoor Education and Social Work

Admission Requirements

Dual degree applicants in Social Work and Kinesiology: Outdoor Education must meet the requirements for both Social Work and

Kinesiology: Outdoor Education. Applicants should check each program for their requirements which may be different. GREs are required.

Dual degree applications are **due by February 1st**.

For additional information regarding the Social Work/KIN dual degree admission requirements, contact Anita Tucker at Anita.Tucker@unh.edu.

Requirements

Social Work and Kinesiology Dual Degree Program MSW/MS Courses

Code	Title	Credits
SW 820	Social Welfare Policy I	3
SW 830	Social Work Practice I	3
SW 840	Implications of Race, Culture, and Oppression for Social Work Practice	3
SW 850	Human Behavior and the Social Environment I (HBSE I)	3
SW 880	Field Internship I (seminar and concurrent twoday/week internship/academic year)	3
KIN 882	Therapeutic Applications of Adventure Programming	4
SW 860	Research Methods in Social Work	3
SW 831	Social Work Practice II: Practice in Small Groups and Community Organizations	3
SW 851	Human Behavior and the Social Environment II (HBSE II)	3
SW 881	Field Internship II	3
KIN 883	Psych Factors of Adventure Ed	4
SW 930	Advanced General Practice III: Clinical Assessment and Intervention	3
SW 962	Data Analysis and Statistics	3
SW 952	Human Behavior and the Social Environment III	3
KIN 897	Advanced Topics in Outdoor Education	2-6
SW 931	Advanced Generalist Practice IV: Community and Administrative Practice	3
KIN 886	Organization and Administration of Outdoor Education Programs	4
SW 865	Adventure Therapy: Facilitation and Processing of the Experience	3
SW 926	Social Welfare Policy II	3
SW 982	Field Internship III	4
SW 983	Field Internship IV	4
KIN 884	Historical Foundations of Outdoor Experiential Education	4
Total Credits		71-75

Social Work and Juris Doctor Dual Degree (M.S.W./J.D.)

<https://chhs.unh.edu/sw/juris-doctoratemaster-social-work>

Description

Social Work and UNH School of Law

The Department of Social Work and the School of Law at the University of New Hampshire (UNH) also offer a dual degree resulting in the JD/M.S.W. In four years, students will be able to complete two graduate degrees, a master in social work (M.S.W.) and a Juris Doctor to prepare them for a career in law and social work. For additional information regarding the social work/law dual degree course requirements, contact Patrick Shannon, patrick.shannon@unh.edu.

Requirements

Social Work and Law JD/MSW Courses

Please visit this website for JD Course Requirements: <http://law.unh.edu/academics/degrees/juris-doctor-degree> (<http://law.unh.edu/academics/degrees/juris-doctor-degree>)

Code	Title	Credits
SW 820	Social Welfare Policy I	3
SW 830	Social Work Practice I	3
SW 840	Implications of Race, Culture, and Oppression for Social Work Practice	3
SW 850	Human Behavior and the Social Environment I (HBSE I)	3
SW 880	Field Internship I ¹	3
SW 860	Research Methods in Social Work	3
SW 831	Social Work Practice II: Practice in Small Groups and Community Organizations	3
SW 851	Human Behavior and the Social Environment II (HBSE II)	3
SW 926	Social Welfare Policy II	3
SW 881	Field Internship II ²	3
SW 930	Advanced General Practice III: Clinical Assessment and Intervention	3
SW 952	Human Behavior and the Social Environment III	3
SW 962	Data Analysis and Statistics	3
SW 982	Field Internship III ³	4
SW 931	Advanced Generalist Practice IV: Community and Administrative Practice	3
SW 965	Program and Practice Evaluation	3
SW 983	Field Internship IV ⁴	4
Capstone:		
SW 983	Field Internship IV ⁵	4
Total Credits		57

¹ Seminar and concurrent two-day/week internship/academic year

² Seminar and two-day/week internship continued from SW 880 Field Internship I

³ Seminar and concurrent three-day/week internship/academic year

⁴ Seminar and three-day/week internship continued from SW 982 Field Internship III

⁵ In Field IV (SW 983 Field Internship IV), students will complete an assignment that will highlight their ability to demonstrate all 9 social work competencies.

Child Welfare (Graduate Certificate)

<https://chhs.unh.edu/sw/certificate-programs>

Description

About the Program

The Child Welfare Graduate Certificate Program is designed to educate individuals interested in improving the quality of life for children and families vulnerable to abuse and neglect. In addition, the certificate will provide additional pathways of preparation for students interested in careers in public child welfare and will aid in increasing valuable resources toward supporting children and families vulnerable to child abuse and neglect.

Who should apply?

- Individuals interested in improving the quality of life for children and families vulnerable to abuse and neglect
- Individuals receiving the Title IV-E grant or UP grant
- Individuals interested in taking graduate courses at UNH with the option of applying credit toward a graduate degree in social work
- Individuals interested in advancing their career options or in developing a new career focus

Contact Information

Melissa Wells, PhD
Melissa.wells@unh.edu
 603-862-0076

Requirements

Certificate Requirements

Students complete four courses for a total of 12 credits.

Code	Title	Credits
Select three courses from the following:		9
SW 805	Child and Adolescent Risks and Resiliency: Program, Policy and Practice	
SW 897	Special Topics in Social Work and Social Welfare (Child Maltreatment and Child Protection)	
SW 897	Special Topics in Social Work and Social Welfare (Leadership in Child Welfare)	
SW 897	Special Topics in Social Work and Social Welfare (Trauma Informed Child Welfare Practice)	
Select one elective course from the following:		3
SW 813	School Social Work	
SW 814	Introduction to Addiction: Assessment and Intervention	
SW 860	Research Methods in Social Work	
SW 870	Intimate Partner Violence	
SW 974	Social Work Supervision	

SW 975	Theory and Practice of Family Therapy
SW 979	Social Work and the Law
Elective courses offered online:	
SW 897	Special Topics in Social Work and Social Welfare (Mental Health Aspects of IDD)
SW 897	Special Topics in Social Work and Social Welfare (Social Work and Spirituality)
SW 897	Special Topics in Social Work and Social Welfare (Understanding Youth with Emotional and Behavioral Challenges)
SW 897	Special Topics in Social Work and Social Welfare (Forensic Mental Health)
SW 897	Special Topics in Social Work and Social Welfare (Understanding Suicide: Assessment, Prevention and Intervention)
<hr/>	
Total Credits	12

Intellectual and Developmental Disabilities (Graduate Certificate)

<https://chhs.unh.edu/sw/certificate-programs>

Description

About the Program

The College of Health and Human Services, Department of Social Work at the University of New Hampshire (UNH) and the New Hampshire Leadership Education in Neurodevelopmental and Related Disabilities (NH-LEND) training program at the Institute on Disability cosponsor the Intellectual and Developmental Disabilities Graduate Certificate program. The needs of individuals with intellectual and developmental disabilities extend beyond the boundaries of any one discipline. Therefore, this program emphasizes an interdisciplinary, collaborative approach to providing holistic, family-centered services to children and families. This 12 credit hour interdisciplinary program is designed to focus on the development of advocacy and practice skills for professional work with individuals with intellectual and developmental disabilities and their families.

Students enrolled in the graduate certificate program will benefit from collaboration and interaction with faculty and students from many departments within the university. Additionally, students will benefit from working with staff and faculty associated with the Institute on Disability. A unique feature of this program is its collaborative relationship with the NH-LEND program. The NH-LEND program focuses on developing educational excellence related to:

1. the most current knowledge regarding neurodevelopmental disabilities,
2. the process of interdisciplinary collaboration and partnership, and
3. strategies for continuous improvement of effective leadership.

Students in the Intellectual and Developmental Disabilities program will participate in a two semester Special Topics Seminar series on Neurodevelopmental and Related Disabilities with MCH-LEND trainees and faculty representing the disciplines of health management and policy, nursing, nutrition, occupational therapy, pediatrics, physical

therapy, psychology, social work, speech language pathology, and special education.

Who Should Apply

- Individuals interested in improving the quality of life for children with special health care needs and disabilities and their families
- Individuals enrolled in the New Hampshire-Leadership in Education in Neurodevelopmental Disabilities (N-LEND) training program
- Individuals interested in developing leadership skills to work with children with special health care needs and disabilities, and families
- Individuals interested in taking graduate-level courses at a leading university, with the option of applying credit toward a graduate degree in their respective disciplines
- Individuals interested in working with a dynamic interdisciplinary group of faculty and students
- Individuals interested in advancing their careers
- Individuals interested in developing new career options

Contact Information

Individuals holding a bachelor's degree from an accredited institution are eligible to apply. Applicants must submit:

1. an application form,
2. official transcripts, and
3. a \$25 processing fee (this fee is waived for graduate students who are currently enrolled).

Applications are available by contacting the program coordinator. Applications will be accepted anytime, and admissions decisions are made promptly. For more information about the program and the application process, contact:

Patrick Shannon, Associate Professor Project Coordinator
 Department of Social Work and NH-LEND Program University of New Hampshire
 55 College Road, 311 Pettee Hall
 Durham, NH 03824
 (603) 8625016
 Patrick.shannon@unh.edu

Requirements

Certificate Requirements

There are two separate tracks for this program. **Track 1** is for students enrolled in the New Hampshire-Leadership Education in Neurodevelopmental Disabilities (NH-LEND) training program. **Track 2** is for all other students. The program of study consists of two required courses (6 credit hours), and two (2) electives (6 credit hours) or one (1) elective and one (1) three(3)credit hour independent study. Below is a detailed description of each track.

Track 1 (NH-LEND Trainees)

Code	Title	Credits
Required courses		
HHS 898	Special Topics (LEND Seminar – Fall Semester)	3
HHS 898	Special Topics (LEND Seminar – Spring Semester)	3
Electives		

Select one of the following options:

6-8

Two electives ¹

One elective and one three-credit hour independent study (SW 992) ²

Total Credits 12-14

¹ Electives with a focus on Developmental Disabilities may be accepted upon approval from the Graduate Certificate Coordinator. This includes but not limited to HDF5 897, EDUC 856, OT 890, OT 862, SW 860, EDUC 850, SW 851, SW 813

² Related to disability and/or special health care needs focused on children, youth, and/or families.

An independent study can focus on leadership, policy, practice, or research that supports individuals with intellectual and developmental disabilities. For example, students could conduct a policy analysis, research, program evaluation, advocacy, training, or other systems change related activity (3 credits).

Track 2 (All Other Students)

Code	Title	Credits
Required Courses		
Select two of the following: 6-7		
SW 812	Understanding Developmental Disabilities (Spring)	
EDUC 850	Introduction to Exceptionality (Fall)	
COMM 916	Autism Spectrum Disorders (Spring)	
SW 897	Special Topics in Social Work and Social Welfare (Mental Health Aspects of IDD)	
Electives		
Select one of the following options: 6-8		
Two electives ¹		
or		
One elective and one three credit hour independent study (SW 992) ²		
Total Credits 12-15		

¹ Electives with a focus on Developmental Disabilities may be accepted upon approval from the Graduate Certificate Coordinator. This includes but not limited to HDF5 897, EDUC 856, OT 890, OT 862, SW 860, EDUC 850, SW 851, SW 813.

² Related to disability and/or special health care needs focused on children, youth, and/or families.

An independent study can focus on leadership, policy, practice, or research that supports individuals with intellectual and developmental disabilities. For example, students could conduct a policy analysis, research, program evaluation, advocacy, training, or other systems change related activity (3 credits).

All coursework for the certificate must be completed within three years. Students who successfully complete the program will receive an official student certificate from the University of New Hampshire Graduate School.

Courses completed during the certificate program may be applied toward degree requirements upon the approval of the appropriate graduate program coordinator and the Graduate School. Tuition is equal to the rates for resident graduate degree students. Tuition for nonresident students will be 10 percent above the resident rate.

Substance Use Disorders (Graduate Certificate)

<https://chhs.unh.edu/sw/certificate-programs>

Description

About the Program

The Substance Use Disorders certificate program helps students develop general and specific competencies aligned with the "core functions and practice dimensions of addiction counseling" outlined by the New Hampshire Board of Licensing for Alcohol and Other Drug Use Professionals, including intake, assessment, treatment planning, case management, referral, crisis intervention, record keeping, and the counseling of individuals, and groups and families.

Who Should Apply?

- MSW students attending the University of New Hampshire Manchester or Durham.
- Non-matriculating students who may potentially apply to the MSW program.
- Students from other disciplines and other universities.
- Students pursuing continuing education units (CEU) for a variety of state licenses.
- Social service workers from substance use disorder and co-occurring disorder treatment agencies, (outpatient and inpatient), hospitals, schools, judicial/correctional facilities, military/veteran programs.

Contact Information

Brian Miller LICSW, MLADC Clinical Assistant Professor Substance Use Disorders Graduate Certificate Program Coordinator (603) 862-1013 Office (603) 862-4374 Fax Brian.miller@unh.edu

Requirements

Certificate Requirements

The Substance Use Disorders Graduate Certificate consists of 12 credit hours acquired through a series of four required courses covering etiology of addictions, addiction policy analysis, addiction research and best practices, and system theory and strengths perspective.

Students are required to complete the following social work courses in no particular order:

Code	Title	Credits
SW 816	Addiction: Myth, Science and Policy	3
SW 814	Introduction to Addiction: Assessment and Intervention	3
SW 897	Special Topics in Social Work and Social Welfare (Treatment of Addictions)	3
SW 819	Addiction Recovery	3
Total Credits		12

Courses are offered at the UNH Durham as well as at the Manchester campus during evenings and weekends. SW 814 is offered online.

Sociology (SOC)

Degrees Offered: Ph.D., M.A.

This program is offered in Durham.

The Department of Sociology offers M.A. and Ph.D. degrees in sociology. The master's degree program emphasizes theory and methodology. Students in the doctoral program are expected to select one major area for intensive study and examination. There are five major substantive areas for possible specialization: crime and conflict, family, social stratification, health and illness, and community and environment. Students may pursue specialties within or across the major areas of specialization or propose to the graduate committee other major areas of specialization that fall within the faculty's competence.

Admission Requirements

In addition to meeting the general Graduate School requirements, applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). All international applicants must take the TOEFL or IELTS exam.

Undergraduate majors in other fields may be admitted. However, if the student's undergraduate work has not included introductory courses in sociological theory, research methods, and statistics, these courses must be taken, or equivalent knowledge demonstrated, in addition to the requirements outlined above.

All students entering the program must complete the M.A. before admission to the Ph.D. program. The department welcomes applicants who plan to continue for the Ph.D. as well as students planning for the M.A. only.

<https://cola.unh.edu/sociology>

Programs

- Sociology (Ph.D.) (p. 168)
- Sociology (M.A.) (p. 168)

Faculty

See <https://cola.unh.edu/sociology/people> for faculty.

Sociology (Ph.D.)

<https://cola.unh.edu/sociology/program/phd/sociology>

Description

Students in the doctoral program in sociology select an area of specialization for intensive study. The five specialty areas available in our program are:

Crime and Conflict
Sociology of the Family
Social Stratification
Health and Illness
Community and Environment

Students may also pursue specialties within or across the primary areas of specialization, or propose self-designed areas to the Graduate Committee for consideration.

Requirements

Ph.D. Degree Requirements

Students must complete a minimum of three years in residence and take a minimum of sixteen courses in sociology (at least eight as seminars) other than dissertation research.

Code	Title	Credits
SOC 900	Pro-seminar	2
SOC 911	Sociological Theory I	4
SOC 912	Sociological Theory II	4
SOC 901	Sociological Methods I: Intermediate Social Statistics	4
SOC 902	Sociological Methods II: Research Design	4
SOC 903	Sociological Methods III: Advanced Social Statistics	4
SOC 904	Sociological Methods IV: Qualitative and Historical Research Methods	4

Select four courses in a major area

Select five electives

Students must pass written examinations in the major area of sociological specialization and in advanced theory and methodology, and write and defend the doctoral dissertation.

Sociology (M.A.)

<https://cola.unh.edu/sociology/program/ma/sociology>

Description

The master's program emphasizes Sociological theory and methods. Some students earn the M.A. to prepare for positions as applied sociologists. Their work often includes field experience. Others view the M.A. degree as preparation for Ph.D. studies. An M.A. thesis or publishable paper describes results from the student's own original research.

Requirements

M.A. Degree Requirements

Students must complete at least 26 credit hours (seven courses) of graduate-level coursework in sociology. In addition, students must complete 6-10 credits of Master's Thesis work.

Code	Title	Credits
SOC 900	Pro-seminar	2
SOC 901	Sociological Methods I: Intermediate Social Statistics	4
SOC 902	Sociological Methods II: Research Design	4
SOC 911	Sociological Theory I	4

Select three graduate seminars

SOC 899

Master's Thesis

6-10

Successful completion of the thesis constitutes the capstone experience for the M.A. degree.

Spanish (SPAN)

Degree Offered: M.A., Graduate Certificate

This program is offered in Durham.

The program in Spanish in the Department of Languages, Literatures, and Cultures offers a master of arts degree of Spanish with courses in the following areas: Topics in Second Language Acquisition, Pedagogy and Methodology# Topics in Hispanic Literature and Cultural Studies# and Topics in Hispanic Linguistics and Cultural Studies. The program also supports work in interdisciplinary Hispanic studies. The program also offers a Graduate Certificate in Spanish.

Admission Requirements

Applicants shall have received a bachelor's degree from an accredited institution with an undergraduate major in Spanish or its equivalent. The personal statement for the graduate application should be written in Spanish. Two of the three letters of recommendation should come from current or former professors. Graduate Record Examination (GRE) scores are not required.

Financial Aid

Applicants whose permanent residence is Maine or Vermont are eligible for the New England Regional Program for which tuition is assessed at the in-state New Hampshire rate plus 50%.

You may wish to visit the financial aid section of the Graduate School website (http://www.gradschool.unh.edu/grad_aid.php) for more information about graduate assistantships and other types of aid available to graduate students.

<https://cola.unh.edu/languages-literatures-cultures/program/ma/spanish>

Programs

- Spanish (M.A.) (p. 169)
- Spanish (Graduate Certificate) (p. 170)

Faculty

See <https://cola.unh.edu/languages-literatures-cultures/faculty-staff-directory> for faculty.

Spanish (M.A.)

<https://cola.unh.edu/languages-literatures-cultures/program/ma/spanish>

Description

The Program in Spanish in the Department of Languages, Literatures and Cultures offers a master of arts degree of Spanish with courses in the following areas: Second Language Acquisition, Pedagogy and

Methodology; Hispanic Literature and Cultural Studies; and Hispanic Linguistics and Cultural Studies. The program also supports work in interdisciplinary Hispanic studies.

Requirements

Degree Requirements

To obtain the degree, the candidate must complete a minimum of 30 credits. To satisfy the course requirements, the candidate must successfully complete ten graduate courses, eight of which should be from the offerings below. Two of the ten courses can be taken in allied fields approved by the department. All candidates must take (SPAN 901 Bibliography and Methods of Research), a 3-credit course dealing with bibliography and methods of research. Preparation of a bibliographical essay in this course is the final requirement for graduation.

Graduate assistants teaching in the department must take (SPAN 903 Applied Linguistics). Both SPAN 901 and SPAN 903 count toward the ten courses required to complete the degree.

Graduate students are also expected to take (SPAN 997 Graduate Seminar) each semester they are enrolled in the program.

Code	Title	Credits
Choose 8 courses from the following:		
SPAN 890	Topics in Second Language Acquisition/ Pedagogy/Methodology	3
LLC 891	Methods of Foreign Language Teaching	3
SPAN 897	Topics in Hispanic Literature and Cultural Studies	3
SPAN 898	Topics in Hispanic Linguistics and Cultural Studies	3
SPAN 899	Master's Thesis	1-6
SPAN 995	Independent Study	1-3
SPAN 997	Graduate Seminar	3

Final Project

- Non-thesis option
- Thesis option

Final project

The MA in Spanish offers two options to fulfill the concluding experience of the program:

1) Non-thesis option (30 credits, ten classes). Students who select this option will present a seminar paper or project at a local, regional, or national conference. Presentation at the UNH Graduate Research Conference is acceptable to fulfill this requirement.

2) Thesis option (30 credits, eight classes plus thesis). Enrollment in Spanish 899 (Master's Thesis, 6 credits) counts for two of the ten required courses for the M.A. The thesis option involves the preparation of a Master's Thesis or an equivalent research project directed by a faculty advisor. This research track is specifically designed for those students interested in pursuing a Ph.D. in Spanish or in a related field.

Examples of Past Seminar Titles:

- Econovels of Central America
- Contemporary Spanish Literature
- Second Language Acquisition: Technology
- El Camino de Santiago

- Cultures of Spain: Basque, Catalan, and Galician
- Baroque Literature: Sor Juana
- Latin American Lit. & the Border
- Spanish Phonetics & Dialectology
- Latin American Afro Caribbean Lit.
- The Baroque: Siglo de Oro
- Structure & Applied Linguistics
- Baroque to Surrealism & Beyond
- Spanish Sociolinguistics
- Literatura comparada
- Literatura y cultura argentinas
- La nueva mirada del cine femenino español
- Mood, Tense & Pronouns: Structure, Meanings, & Variation in Spanish Syntax
- Literary & Cultural Trends of Contemporary Central America
- Digital Media in Second Language Acquisition
- The World of Salvador Dalí
- Hispanic Literature and Culture in the Digital Age

Spanish (Graduate Certificate)

<https://cola.unh.edu/languages-literatures-cultures/program/certificate/spanish-graduate>

Description

Spanish Graduate Certificate Program Description:

Through advanced study of Hispanic languages, literatures, and cultures, the Graduate Certificate in Spanish strives to expose students to various forms of authentic cultural production from numerous regions of the Spanish-speaking world, including the United States. It is designed to provide teachers, professionals, and graduate students from other disciplines with additional language training in Spanish as well as advanced analytical skills in the fields of literature, linguistics, and cultural studies. Coursework is offered in face-to-face, online, and hybrid classroom environments in the following areas: Second Language Acquisition, Pedagogy and Methodology; Hispanic Literature and Cultural Studies; and Hispanic Linguistics and Cultural Studies. The program also supports work in interdisciplinary Hispanic studies.

Program goals include:

- Improving students' proficiency in oral and written Spanish.
- Fostering skills required to analyze linguistic, literary, and cultural texts and objects produced in the Hispanic world. The acquisition and mastery of these skills is the core of the Graduate Certificate in Spanish; whereas the specific material studied varies from course to course, students will develop linguistic (interpretive reading and listening, presentational writing and speaking), cultural (intercultural competence), and analytical (textual analysis) skills that will complement their primary programs of study.
- Promoting cultural understanding and awareness of regional, national and international Hispanic-language communities.

Admissions Requirements:

Students applying for the Graduate Certificate in Spanish must have a bachelor's degree from an accredited institution with a minimum grade point average of 3.0 (on a 4.0 scale). If the B.A./B.S. degree did not include a major or concentration in Spanish, students must have

completed advanced-level conversation, composition or advanced language course(s), or equivalent. Study abroad in a Spanish-speaking country is highly recommended. Degree and course equivalency is determined on a case-by-case basis, in consultation with the Graduate Coordinator (who serves as the administrator for the Certificate Program).

The Graduate Certificate application consists of:

An online application for admission (available through the UNH Graduate School website).

Undergraduate transcripts.

Two letters of recommendation are required and may come from current or former professors or colleagues.

Graduate Record Examination (GRE) scores are not required.

Requirements

Program Requirements:

Five three-credit courses in Spanish, organized in logical manner to provide knowledge and expertise relevant to a specific aspect of professional and/or personal development. These five courses may include any combination of online, hybrid, or face-to-face classroom environments. Only courses completed with a grade of B- or higher may be used to fulfill certificate requirements. A student who receives more than one grade below B- will be required to withdraw from the certificate program. All course work for the certificate must be completed within 3 years from the date of enrollment in the program after admission.

Program Courses:

The graduate course offerings in Spanish are, with the exception of the two pedagogy courses (SPAN 890 and LLC 891), always special topics classes. These classes are not occasionally offered 'extras', but rather the core of the program. The flexibility of the specific topics allow faculty to teach classes closely related to their research interests, while still fitting within several core areas, as indicated by the letters/topics specified in the catalog descriptions. For SPAN 897, the core areas are: Spanish literature, film, and cultural studies; Latin American literature, film, and cultural studies; and U.S. Latino literature, film, and cultural studies. For SPAN 898, these core areas are: structures of the Spanish language; variation of the Spanish language; and history of the Spanish language.

Code	Title	Credits
SPAN 890	Topics in Second Language Acquisition/ Pedagogy/Methodology	3
SPAN 897	Topics in Hispanic Literature and Cultural Studies	3
LLC 891	Methods of Foreign Language Teaching	3
SPAN 898	Topics in Hispanic Linguistics and Cultural Studies	3
SPAN 997	Graduate Seminar	3
Total Credits		15

Systems Design (ENGR)

Degree Offered: Ph.D

This program is offered in Durham.

The systems design doctoral degree is an interdepartmental program that addresses contemporary engineering and scientific technical problems that can be solved only through the cooperation of a variety of disciplines. Students in systems design can elect either one of two professional directions. The first develops professionals with the technical expertise of a Ph.D. and with the ability to work with and

direct groups of people working on large-scale technical projects. The second direction develops engineers with capabilities in the theory and analysis of large-scale complex systems. Concentration in an area of specific individual interest is combined with participation in a larger interdisciplinary project.

Admission Requirements

Qualified students with bachelor's or master's degrees in engineering, mathematics, or the physical sciences are eligible for admission to the program. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). To be admitted, students must present evidence that they have sufficient background in the area in which they propose to specialize. They must also find a College of Engineering and Physical Sciences (CEPS) faculty member to serve as their adviser.

<https://ceps.unh.edu/mechanical-engineering/program/phd/systems-engineering>

Programs

- Systems Design (Ph.D.) (p. 171)

Faculty

See <https://ceps.unh.edu/directory/all> for faculty.

Systems Design (Ph.D.)

<https://ceps.unh.edu/mechanical-engineering/systems-engineering-phd>

Description

The systems design doctoral degree is an interdepartmental program that addresses contemporary engineering and scientific problems that can be solved only through the cooperation of a variety of disciplines. Students in systems design can elect one of two professional directions. The first develops professionals with the technical expertise of a Ph.D. and with the ability to work with and direct groups of people working on large-scale technical projects. The second direction develops engineers with capabilities in the theory and analysis of large-scale complex systems. Concentration in an area of specific individual interest is combined with participation in a larger interdisciplinary project.

Requirements

Degree Requirements

Following entrance into the program, a guidance committee is appointed for the student by the dean of the Graduate School upon recommendation of the student's area coordinator. This committee assists the student in outlining a program and may specify individual coursework requirements in addition to those required by the area of specialization. The committee also conducts an annual in-depth review of each student's progress and, following substantial completion of a student's coursework, administers the qualifying examination. This committee is also responsible for administering the language examination and/or research-tool proficiency requirements. Coursework and language requirements should normally be completed by the end

of the second year of full-time graduate study and must be completed before the student can be advanced to candidacy. Typically, at least 13 courses beyond the Bachelor of Science degree are required.

Upon the successful completion of the qualifying examination and other proficiency requirements, the student is advanced to candidacy and, upon the recommendation of the student's area coordinator, a doctoral committee is appointed by the dean of the Graduate School. The doctoral committee conducts an annual review of the student's progress, supervises, and approves the doctoral dissertation, and administers the final dissertation defense.

To obtain a Ph.D. degree, a student must meet all of the general requirements as stated under academic regulations and degree requirements of the Graduate School. Students are normally expected to take coursework equivalent to two full-time academic years beyond the baccalaureate and to complete a dissertation on original technical research that will require at least one additional year of full-time study.

Women's Studies

<https://cola.unh.edu/womens-studies>

Overview

Degree Offered: Graduate Certificate

This program is offered in Durham.

The Graduate Certificate in Feminist Studies is intended to serve the needs of both students who are matriculated in a graduate program and non-degree students who are interested in developing specific knowledge in the areas of feminist theory, critical women's, gender, and sexuality studies as well as feminist methodologies. There are three specific audiences:

- *Current and future UNH graduate students* from a variety of M.A. and Ph.D. programs who would like to connect their area of study to feminist theory and critical women's, sexuality, and gender studies, gain specific knowledge and skills in Feminist Studies and graduate with an additional, demonstrable credential;
- *UNH graduates* with bachelor's degrees, who may or may not have majored or minored in Women's Studies, whose career paths have led them to seek more knowledge and skills in feminist theory and critical women's, gender, and sexuality studies in order to gain a deeper understanding of the issues involved in their current job and/or to pursue advancement in their field;
- *Members of the community* or residents of the greater Seacoast region who hold a bachelor's or graduate degree who are interested in connecting their previous areas of study or current intellectual or political interests with the aspects of feminist theory and critical women's, gender, and sexuality studies by pursuing additional knowledge and skills in these areas.

Please visit the the Graduate School Website (<https://gradschool.unh.edu>) for detailed instructions about applying for the graduate certificate program.

Programs

- Feminist Studies (Graduate Certificate) (p. 172)

Feminist Studies (Graduate Certificate)

<https://cola.unh.edu/womens-studies/program/certificate/feminist-studies>

Description

The Graduate Certificate in Feminist Studies at the University of New Hampshire is designed to provide students with an opportunity to pursue feminist scholarship within a structured, interdisciplinary curriculum. The Graduate Certificate in Feminist Studies can be earned by students enrolled in a Graduate Degree Program, or as a stand-alone certificate for those who have completed their Bachelor's Degree from an accredited institution.

The Graduate Certificate in Feminist Studies enables students to develop specific skills for use in their own personal and professional development by providing tools such as feminist theoretical frameworks and an understanding of contemporary feminist activism. The Feminist Studies Graduate Certificate also enables students to conduct research in the areas of critical Women's, Gender, and Sexuality Studies and centrally relies on analyses from such fields as critical race, ethnicity, nationality, class, age, religion, and disability studies.

The faculty of the Women's Studies program will act as advisors to students pursuing the certificate, helping to plan and facilitate an individualized course of study that fulfills student's academic, professional, and research needs. The certificate provides students a concentrated inquiry in advanced Feminist Studies that is supplemental to their disciplinary training, thereby qualifying them for positions requiring such expertise. In addition, it is an added component to graduate studies that informs and enriches careers, activism, and professional networks.

Requirements

This graduate certificate program requires 12 total credits.

Required Courses

Code	Title	Credits
WS 832	Feminist Theory	4
WS 898	Colloquium in Feminist Studies	4

Elective Courses

Students will be advised by the certificate program director and other participating faculty members about which electives might be most appropriate and consistent with their interests and career goals. The list of approved electives affords students opportunities to focus on particular areas of feminist or to seek the acquire additional methodological skills and disciplinary approaches in areas such as policy analysis or economics. Other electives offered by the University of New Hampshire graduate programs may be approved by the Feminist Studies certificate program director.

Any 2 courses, 6 credits

Code	Title	Credits
EDUC 932	Society and Culture: Contemporary Issues in Counseling	4

EDUC 950	Research in Culture, Behavior, and Development	4
EDUC 818	Critical Social Justice in and Beyond Education	4
ENGL 897	Special Studies in Literature	4
ENGL 914	Special Topics in Composition and Rhetoric	4
ENGL 922	Advanced Topics in Literacy Instruction	1-6
ENGL 927	Seminar: Feminist Criticism Theory and Practice	4
ENGL 935	Seminar: Studies in American Literature	4
ENGL 974	Seminar: Studies in 20th Century British Literature	4
HDFS 857	Race, Class, Gender, and Families	4
HIST 865	Themes in Women's History	4
HIST 897	Colloquium (Queer Theory)	4
MGT 798	Topics (Women in Leadership)	4
POLT 821	Feminist Political Theory	3
PPOL 902	Strategy and Practice of Public Policy	3
PPOL 912	Strategies for Policy Impact	3
SOC 876	Family Violence Research Seminar	4
SPAN 897	Topics in Hispanic Literature and Cultural Studies	3
SPAN 898	Topics in Hispanic Linguistics and Cultural Studies	3
SW 801	Women and Aging	3

Course Descriptions

A

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- Administration (ADMN) (p. 174)
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B

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D

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E

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H

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L

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T

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W

- Women's Studies (<http://catalog.unh.edu/graduate/course-descriptions/ws>)

Z

- Zoology (ZOO) (p. 284)

Accounting and Finance (ACFI)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ACFI 820 - Corporate Taxation**Credits:** 3

Provides coverage of advanced topics from a strategic viewpoint and an understanding of the history and development of taxation, the role taxes play in financial and managerial decisions, and how taxes motivate people and institutions. The major tax issues inherent in business and financial transactions and their consequences are also explored.

ACFI 830 - Advanced Auditing**Credits:** 3

This course is designed to establish an advanced competence in auditing theory and practice. Specifically, students will gain an in-depth understanding of current academic auditing research and the philosophy of strategic-systems auditing through readings, presentations, case studies, and a service learning project with a local non-profit organization.

ACFI 840 - Forensic Acctg & Fraud Exam**Credits:** 3

This course builds on audit coursework, but is not limited to an audit perspective. It covers the major schemes used to defraud organizations and individuals. Students develop skills in the areas of fraud protection, detection, analysis, and some skills relating to investigations.

ACFI 844 - Topics in Advanced Accounting**Credits:** 3

Theory and practice of accounting for corporate acquisitions and mergers and the preparation and presentation of consolidated financial statements. Other topics include multinational consolidations, interim reporting and partnership accounting. Prereq: M.S. in Accounting.

ACFI 850 - Accounting Theory and Research**Credits:** 3

The objective of this course is to study the role of accounting information both in a decision-making and in a performance-evaluation context. This objective will be achieved by studying various accounting theories and the role that research has played in developing and testing those theories. Prereq: M.S. in Accounting.

ACFI 860 - Advanced Business Law**Credits:** 3

Focuses on legal issues such as the formation, management, and operation of corporations, and partnerships, and rights and liabilities of shareholders and partners; as well as an analysis of securities regulations. Also covers the due process and equal protection provisions of the Constitution as they relate to business activities. Includes an in depth analysis of the Uniform Commercial Code such as sales, secured transactions, and negotiable instruments. Real and personal property issues are also explored.

ACFI 890 - Accounting Information Systems**Credits:** 3

Accounting information systems and the use of computers for decision making with emphasis on sources and types of information and the use of analytical tools in solving accounting management problems. Prereq: M.S. in Accounting.

ACFI 895 - Governmental and Non-Profit Accounting**Credits:** 3

Planning, budgeting, internal and external financial reporting for governmental entities and not for organizations including healthcare and educational institutions. Prereq: M.S. in Accounting.

ACFI 896 - Topics**Credits:** 3

Special topics may be repeated up to a maximum of 12 credits. Prereq: consent of advisor and instructor.

ACFI 897 - Ethics and Professional Practices**Credits:** 3

The study of ethics as a significant and worthwhile endeavor that infuses all professional activities. Case work forms an integral part of the course. Analysis of situations of potential and actual ethical conflict and discussion of major ethical theories.

ACFI 898 - Master's Project**Credits:** 3

Master's paper on a topic approved by the program director. Prereq: M.S. in Accounting.

Administration (ADMN)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ADMN 823 - Topics in Finance**Credits:** 3

Prereq: ADMN 930.

ADMN 829 - Corporate Financial Strategy**Credits:** 3

Analytical tools and practical skills for recognizing and solving complex problems of business finance. A complement to ADMN 930, this course covers the major decision-making areas of managerial finance and some selected topics in financial management such as real options, leasing, mergers and acquisitions, corporate re-organizations, financial planning, and working-capital management. Prereq: ADMN 930.

ADMN 830 - Investments**Credits:** 3

Discusses principles for selecting and managing financial assets, including equities, fixed-income securities, and alternative investments. Topics include asset pricing, efficient market hypothesis, arbitrage pricing theory, portfolio theory, and risk management. Prereq: ADMN 930.

ADMN 832 - Exploration in Entrepreneurial Management**Credits:** 3

Examination of the management of change and innovation especially the role of entrepreneur in managing new ventures. Uses case analysis, guest speakers, and business plan preparation to study the characteristic behavioral, organizational, financial, and market problems of entrepreneurs and new enterprises.

ADMN 834 - Private Equity/Venture Capital**Credits: 3**

Covers the financial aspects of new venture creation. Early stage private equity market and mechanisms available for financing the entrepreneurial venture, from seed and startup financing to initial public offering. Includes financing stages from both entrepreneur's and the investor's perspective. Focus on U.S., Europe, and Asian markets. Prereq: ADMN 930; ADMN 834 can be taken concurrently with ADMN 930.

ADMN 835 - Financial Institutions**Credits: 3**

Examination of financial institutions and markets. Emphasis on how institutions create, value, the regulatory environment under which they operate, and the role of risk management. Prereq: ADMN 930 or permission.

ADMN 840 - International Business**Credits: 3**

Issues and problems confronting managers in the international economy. Emphasis on problems of working across national borders rather than on those encountered within the framework of different national economies, cultures, and institutions. for managers working in a multinational enterprise. Prereq: ADMN 970.

ADMN 841 - International Management**Credits: 3**

Develops an understanding of international business from the point of view of management and leadership, human resource management, and organizational structure and change. Emphasis on cultural impact on management thinking and business practice and on skills for managing effectively in international and multicultural environments. Prereq: ADMN 912.

ADMN 845 - Supply Chain Management**Credits: 3**

The purpose of this course is to learn how to design, plan, and operate supply chains for competitive advantage; to develop an understanding of how the key drivers of supply chain operations (inventory, transportation, information, and facilities) can be used to improve performance; and to develop knowledge of logistics and supply chain methodologies and the managerial context in which they are used. Prereq: ADMN 940; ADMN 845 can be taken concurrently with ADMN 940.

ADMN 846 - International Financial Management**Credits: 3**

Financial management problems facing multinational firms. Focus is on identifying and managing foreign exchange rate exposures and making financial decisions in a global context. Prereq: ADMN 930.

ADMN 852 - Marketing Research**Credits: 3**

Identification, collection, and analysis of data for the marketing process. Strengths, limitations, environment, and evaluation of research in the marketing process. Prereq: ADMN 960.

ADMN 857 - Integrated Marketing Communications**Credits: 3**

Provides balanced coverage of all marketing communication tools, both traditional format and digital format: advertising, sales promotion, public relations, direct marketing, personal selling. Emphasizes the integration of these tools across formats so target audiences receive a consistent, persuasive message that promotes the organization's goals. Prereq: ADMN 960.

ADMN 859 - Managing Technological Innovations**Credits: 3**

This course explores the formulation of technological innovation strategy by using case-based examples and technological frameworks to identify industry- and firm-level patterns of innovation and organizational characteristics that promote innovativeness. Prereq: Two core ADMN 900 level courses.

ADMN 860 - International Marketing**Credits: 3**

This course examines marketing practices in a global environment. The course assumes familiarity with marketing management and utilizes this as a base to develop insights and understanding in an international context. Special emphasis is placed on how to develop global marketing strategies, adaptation of marketing execution (communications, products, pricing, channels), and multinational and global structuring of the marketing and sales organization. Pre- or Coreq: ADMN 960.

ADMN 863 - Marketing Analytics**Credits: 3**

Marketing Analytics is the art and science of developing and utilizing quantitative marketing decision models to plan, implement, and analyze marketing strategies and tactics. The course is primarily designed for graduate students who have already acquired basic data analysis skills as well as principles of marketing. Using marketing cases and related exercises tied to Marketing Engineering for Excel (ME-EL), students will develop marketing plans in various decision contexts. Specifically, this course will introduce a wide variety of quantitative models to improve marketing decision making in such areas as market response, customer segmentation/targeting, product/brand positioning, new product development, and allocation of marketing mix expenditures. Prereq: ADMN 960.

ADMN 864 - New Product Development**Credits: 3**

Provides a practical introduction to the process of designing and marketing new products. Covers the major phases of market-focused product development from idea to launch, including opportunity identification and market definition, customer research and product concept development, pre-marketing testing and launch marketing. Presents proven approaches and techniques used in new product development. Allows student teams to apply lessons to the development and testing of new product concepts. Prereq: ADMN 960.

ADMN 888 - Strategic Pricing**Credits: 3**

The overall objective of this course is to provide students with the know-how and tools to make pricing decisions that align with the firm's strategy, drive profitability, and lead to sustainable competitive advantage. This course focuses on thoroughly understanding and articulating the monetary and psychological value drivers of the firm's value proposition, applying appropriate monetary equivalents, and successfully communicating these to the purchaser. Rather than seeking to "optimize" prices for the short run, this course takes a longer-term view of managing markets strategically. Prereq: ADMN 960.

ADMN 898 - Topics**Credits: 2-3**

Special topics; may be repeated. Prereq: consent of adviser and instructor.

ADMN 901 - PAUL Assessment of Core Knowledge**Credits:** 0

One of the learning objectives in the MBA Program is that all students will graduate with an understanding of these core knowledge assembled from various disciplines that contribute courses to the program. We assess the learning as part of our Assurance of Learning Program. This zero credit course provides an administrative mechanism for accomplishing this goal.

ADMN 902 - MBA Internship**Credits:** 3

Provides students the opportunity to gain business experience in a professional setting, working for one company eight hours per week. Students explore the relationship between theory and practice and complete a research project. Students with less than two years work experience are required to take this course. Cr/F.

ADMN 905 - Corporate Consulting Project I**Credits:** 3

Designed to enhance student's field and research experience. Students work with faculty and Corporate Roundtable members on projects that apply and integrate concepts learned in class.

ADMN 906 - Corporate Consulting Project II**Credits:** 3

Designed to enhance student's field and research experience. Students work with faculty and Corporate Roundtable members on projects that apply and integrate concepts learned in class.

ADMN 912 - Managing Yourself & Leading Others**Credits:** 3

Uses the evidence from behavioral science to develop an understanding of individual and work group dynamics in relation to personal and group effectiveness in diverse organizations. Case studies, group projects and personal application will provide students with the opportunity to put theory into practice as they learn to understand individual differences, lead teams, enhance their personal influence, and plan to lead employees, teams and organizations during times of rapid change.

ADMN 919 - Accounting/Financial Reporting, Budgeting, and Analysis**Credits:** 3

An introduction to the preparation and interpretation of financial information, with emphasis on the use of accounting information for management decision-making. It highlights the guiding principles by which accounting reflects the underlying economic events. It also focuses on reporting and measurement issues that help managers make better decisions.

ADMN 926 - Leveraging Technology for Competitive Advantage**Credits:** 3

Building competitive advantage depends on a company's ability to strategically and tactically manage its information systems. Information technology is quickly expanding its importance in the business models and operations of companies. Managers in today's world depend on accurate, accessible and useful information to make decisions. The course provides the student with an understanding of the strategic role of information technology and its use within the enterprise to create sustainable competitive advantage for the organization.

ADMN 930 - Financial Management/Raising and Investing Money**Credits:** 3

Focuses on financial decision making to maximize shareholder value. Course concepts are integrated into the standard theories of risk and return, valuation of assets and market efficiency and risk management. Students are expected to develop dexterity with financial decision tools and models, the quantitative elements of this course. Prereq: ADMN 919. Pre or Coreq: ADMN 970.

ADMN 940 - Managing Operations**Credits:** 3

This course provides a foundation for dealing with managerial decisions about technology and operations issues. Based on the premise that the technology and operations can be a significant source of competitive advantage for a firm. Prepares students to identify and implement operating improvements that directly affect firm performance. Prereq: ADMN 950.

ADMN 950 - Data Driven Decisions**Credits:** 3

Introduction to the basics of applied statistics for decision-making and for assessing risk and uncertainty. The course will mainly cover the broadly defined subjects of descriptive statistics, probability, decision trees, random variables, random sampling, hypothesis testing for continuous/categorical data and regression analysis/model building. Course delivery will be a mix of lectures, hands-on problem solving and data-driven case discussions led by students.

ADMN 952 - Organizations, Leadership, and Environments**Credits:** 3

Examines both private and public institutions as open systems whose effectiveness depends on the design of internal structures and cultures to fit external demand, opportunities and threats. Develops students' analytic and diagnostic skills as designers of ethical and socially responsible organizations. Prereq: ADMN 912.

ADMN 953 - The Social Power of Leadership in the 21 Century**Credits:** 3

The goal of this cross-disciplinary course is to develop students' deep understanding of the dynamic, mutually reinforcing power of leadership follower relations in modern organizations - including both toxic and beneficial processes and outcomes. Readings draw on the literatures from business, social sciences, and philosophy to illuminate the complexities of leading in 21st century corporations, public service organizations, institutions of higher learning, and government agencies. A diverse cross-section of students from doctoral and master level programs across all UNH schools, colleges, and departments participate in the course in order to most broadly examine how the leader-follower relationship can succeed or fail in its pursuit of organizational strategies and objectives.

ADMN 956 - Managerial Decision Making**Credits:** 3

The use of quantitative information as an aid in the decision making process. A thought process and an approach to the analysis of, and providing recommendations for, a complex decision making situation. The course is a combination of a lecture, class discussion, problem solving, project presentations and "unstructured" decision making problem approach. Prereq: ADMN 926; ADMN 956 can be taken concurrently with ADMN 926.

ADMN 960 - Marketing/Building Customer Value**Credits:** 3

This is the core marketing course in the MBA program. It is designed to serve as an introduction to the theory and practice of marketing. We will explore the theory and applications of marketing concepts through a mix of cases, discussions, lectures, guest speakers, individual assignments, simulations, and group projects. We will draw materials from a variety of courses and settings including services, consumer, and business-to-business products.

ADMN 970 - Economics of Competition**Credits:** 3

A study of economic principles useful to business managers. Microeconomic topics include market behavior, economic costs, and economic decision-making. Macroeconomic topics include macroeconomics performance, financial markets, international trade and finance, and monetary and fiscal policy.

ADMN 982 - Creating Winning Strategies**Credits:** 3

A "capstone" course, focused on industries, companies, and other organizations in operation, and studied through the role of the strategic manager and case examples, with emphasis on integration of materials covered in prior courses, providing students with synergistic knowledge and a "strategy tool kit" to help achieve organizational purpose, excellence, and competitive advantage. Prereq: ADMN 912, ADMN 919, ADMN 930, ADMN 950, ADMN 960, ADMN 970. Prereq or Coreq: ADMN 926 and ADMN 940.

ADMN 992 - Special Projects and Independent Study**Credits:** 1-6

Projects, research, and reading programs in areas required for concentration. Sixty days advance approval of the student's plan of study by adviser and by proposed instructor required. Maximum of 6 credit, except by special permission. Variable credit.

Agriculture, Nutrition and Food Systems (ANFS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ANFS 895 - Special Topics**Credits:** 1-4

Advanced studies in specific areas of relevance to agriculture, nutrition, and/or food systems. Prereq: permission. May be repeated to a maximum of 8 credits. Open to COLSA graduate students only.

ANFS 899 - Master's Thesis**Credits:** 1-10

Master's thesis research. May be repeated up to 10 credits. Cr/F.

ANFS 997 - Agriculture, Nutrition, and Food Systems Seminar**Credits:** 1

Graduate student, faculty and invited presenters on current topics in agriculture, animal science, plant science, nutritional sciences and food systems. May be repeated up to a maximum of 4 credits. Open to COLSA graduate students only.

ANFS 999 - Doctoral Dissertation Research**Credits:** 0

Doctoral dissertation research. Cr/F.

Analytics (DATA)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

DATA 800 - Introduction to Applied Analytic Statistics**Credits:** 3

This course is designed to give students a solid understanding of the experience in probability, and inferential statistics. The course provides a foundational understanding of statistical concepts and tools required for decision making in a data science, business, research or policy setting. The course uses case studies and requires extensive use of statistical software.

DATA 801 - Foundations of Data Analytics**Credits:** 3

This course introduces students to the principles and practice of analytics. The course emphasizes software tools used in the field of data science and covers topics such as data exploration and imputation, linear modeling, time series forecasting, customer segmentation, multivariate techniques and predictive modeling. Prereq: DATA 800.

DATA 802 - Analytical Tools and Foundations**Credits:** 3

The course introduces students to the tools used in applications of data analytics programming, data management, visualization, and web analytics. Students learn how to use SAS and R programming as well as data visualization tools in a case analysis based environment. Base SAS programming focuses primarily on data extraction from various sources, web scraping, data cleaning and management. The emphasis is on making students proficient in statistical programming languages like SAS, SQL, R, and Python. Prereq: DATA 800.

DATA 803 - Introduction to Analytics Applications**Credits:** 3

The course introduces students to various analytics applications including web analytics, Data Mining, Simulation and Text Mining. Students learn these techniques through hands-on case studies from various industries. Prereq: DATA 800.

DATA 812 - Health Analytics**Credits:** 3

This course introduces students to the field of health analytics and data science. It expands upon introductory statistical and data manipulation methods to include data mining, predictive analytics, cluster analysis, trend and pattern recognition, and data visualization. It couples data skills with interpretive and communication skills. Students will also be exposed to basic statistical programming. There will be a graduate component of the course (812) where students will work on advanced concepts and complete a separate culminating project.

DATA 820 - Programming for Data Science**Credits:** 3

In this class, students will build their foundational toolbox in data science: upon completion, students will be able to use the computer from the command line; practice version control with GIT & GitHub; gain a mastery of programming in Python; data wrangling with Python and perform an exploratory data analysis (EDA) in Python. All learning objectives are achieved through active application of these techniques to real world datasets. Pre- or Coreq: DATA 800.

DATA 821 - Data Architecture**Credits:** 3

In this class, students will learn the foundations of databases and large datasets: upon completion, students will be able to explore out-of-ran datasets through traditional SQL databases and NoSQL databases. Students will also be introduced to distributed computing. All learning objectives are achieved through active application of these techniques to world datasets. Prereq: DATA 800; DATA 820.

DATA 822 - Data Mining and Predictive Modeling**Credits:** 3

In this class, students will learn foundations of practical machine learning: upon completion, students will be able to understand and apply supervised and unsupervised learning in Python to build predictive models on real world datasets. Techniques covered include (but not limited to): preprocessing, dimensionality reduction, clustering, feature engineering and model evaluation. Models covered include: generalized linear models, tree-based models, bayesian models, support vector machines, and neural networks. All learning objectives are achieved through active application of these techniques to real world datasets. Prereq: DATA 800; DATA 820 Pre- or Coreq: DATA 821.

DATA 860 - Data Visualization Foundations**Credits:** 3

This course provides foundational knowledge about human visual intelligence and cognition, and how it informs the best practices of data visualization and communication. Subjects to be covered include – understanding and evaluating the data to be displayed; the importance of, and techniques for, creating personas and researching mental models; when to use a table versus when to use a graph; the correct use of color and layout. Building on these fundamentals students will also learn the best practices of report and dashboard design development, testing and deployment, and will apply this knowledge to create several projects and graphical displays of data using the Tableau software application. Prereq: statistics (any college level).

DATA 888 - Special Topics**Credits:** 3

This course will explore the purpose, design, and analysis of a real-world data science project guided by faculty. Students will be provided a collection of data sets and systematically work through data cleaning, data merging, and the application of a variety of data science methods. The outcome of the course will be an iterative, faculty-guided exploration. The outcomes of the class will be a formal presentation for public consumption using data science visualizations. Prereq: Permission.

DATA 896 - Self-Designed Analytics Lab I**Credits:** 3

This is the first of a two course self-designed thesis sequence offered under the master's of science degree in analytics. The nature of the class will be applied learning directly around a student directed analytic thesis project. Students will have a choice of either bringing an analytical problem of their interest or one assigned by the instructor out of the ongoing projects in the lab. The student chosen problem will be vetted thoroughly and a decision will be made based on the depth of the proposed data management and analysis proposed submitted in the proposal. Once approved by the committee, the students will collect, clean, merge and create readable analytical files for the project and write a formal 2000+ words report on the data mining part of the project. Prereq: DATA 803 and permission.

DATA 897 - Self Designed Analytics Thesis Lab II**Credits:** 3

This is the second of a two course self-designed thesis sequence offered under the master's of science degree in analytics. The nature of the class is applied learning directly around a student directed analytic thesis project. The class requires competency in two areas for the successful completion of the course. Students will have completed the data collection, cleaning and management and created readable analytic files for the project of their choice in the first of the two course sequence. Students are primarily responsible to apply modern analytical tools and techniques like predictive modeling, segmentation, and network analysis etc. They are also required to write a formal 2000+ word report on the findings of the project. The report is expected to include modern data visualization synthesized with analysis results. Prereq: DATA 803.

DATA 900 - Data Architecture**Credits:** 3

The module-driven course builds off previous introductory analytics coursework and exposes students to advanced level concepts and techniques with respect to big data, data management, architecture, mining, privacy, and security concerns. Prereq: DATA 800.

DATA 901 - Analytics Applications I**Credits:** 3

This is the second of the four advanced core courses. This course is partly geared towards analytical business problem solving. This course covers the following broad topics areas: Text Mining, Visualization, Customer analytics and Segmentation, Financial Analytics, Optimization, and Risk analytics. The course is taught by different faculty and industry experts. Prereq: DATA 800.

DATA 902 - Analytics Methods**Credits:** 3

This is the third of the four advanced core courses. The module-driven course builds off previous introductory analytics coursework and exposes students to advanced level programming and data management, predictive modeling, experiment design, multivariate techniques, probability and statistical inference. Prereq: DATA 800.

DATA 903 - Analytics Applications II**Credits:** 3

This is the last of the four advanced core courses. The module-driven course covers the following broad topic areas: survival analysis, propensity score matching, time series and forecasting, simulation, survey and psychometrics, and web analytics format. This course is taught by a mix of Analytics Program faculty and industry experts. Prereq: DATA 800.

DATA 911 - Analytics Practicum I**Credits:** 3

This course introduces students to the practicum project and synthesizes learning from the curriculum into the analysis of their team projects. It includes applied skills in data cleaning, data mining, and analysis, but also professionalization, including business writing, presentation skills and messaging. Prereq: DATA 800.

DATA 912 - Analytics Practicum II**Credits:** 3

This course continues the practicum learning experience with teams applying principles and tools to address their assigned project question. In addition, this course continues to develop the professional skills of students culminating in the delivery of a professional team presentation to their sponsor agency of their results. Prereq: DATA 800.

DATA 950 - Population Health Analytics**Credits:** 3

This on-line course provides students with a foundation in population health principles, strategies and analytics. It provides a tool kit of analytic solutions that address lowering the cost of high needs patients, improving health outcomes, and sustaining population health. The instructional methodologies include brief lectures, multi-media resources, case studies, simulations, hackathons, virtual site visits, discussion forums, use cases, and a demo day.

Animal Sciences (ANSC)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ANSC 801 - Physiology of Reproduction**Credits:** 4

Comparative aspects of embryology, anatomy, endocrinology, and physiology of reproduction. Lab.

ANSC 808 - Ruminant Nutritional Physiology**Credits:** 3

Anatomy of the ruminant gastrointestinal tract, physiological factors related to rumen function, and microbial and whole-body metabolism of carbohydrates, protein, and lipids. Prereq: general microbiology or equivalent.

ANSC 810 - Dairy Nutrition**Credits:** 4

Feeding and related management of dairy cows, nutrients and their use, digestive anatomy, physiology, energy systems, forage quality and conservation methods, metabolic disorders, ration balancing. Prereq: principles of nutrition; nutritional biochemistry or equivalent, permission.

ANSC 815 - Physiology of Lactation**Credits:** 4

Examines the biological and biochemical influences of the lactation process. Emphasis on the physiological effects of environments, hormones, and nutrition on milk synthesis and secretion, mammary physiology, and maternal response. Prereq: physiology of reproduction, permission.

ANSC 818 - Mammalian Physiology**Credits:** 4

Advanced study of the systems that control mammalian functions with emphasis on cellular and molecular mechanisms. Includes the nervous, muscular, cardiovascular, renal, gastrointestinal, and endocrine systems. Prereq: BMS 501 or BMS 503-504; GEN 604. Permission required.

ANSC 824 - Reproductive Management and Artificial Insemination**Credits:** 4

Focus on goals and fundamentals of reproductive management of horses, dairy and livestock animals, and, through experience, development of competency in performing modern breeding techniques for equine or bovine reproduction. Permission required. Special fee. Lab.

ANSC 827 - Advanced Dairy Management I**Credits:** 4

Advanced management evaluation of milking procedures, reproduction, nutrition, mastitis, and calf and heifer management. Prereq: principles of nutrition, permission.

ANSC 828 - Advanced Dairy Management II**Credits:** 4

Advanced management evaluation of dairy cattle, housing, milking equipment, milk quality, record keeping, herd health, financial, personnel management, environmental issues. Visits to farms in the area to provide critical assessments of dairy farm businesses. Prereq: advanced dairy management I, permission. Special fee.

ANSC 853 - Cell Culture**Credits:** 5

Principles and technical skills fundamental to the culture of animal and plant cells, tissues and organs. Introduction to the techniques of sub-culturing, establishing primary cultures, karyotyping, serum testing, cloning, growth curves, cryopreservation, hybridoma formation and monoclonal antibody production, and organ cultures. Application of cell culture to contemporary research in the biological sciences. Prereq: general microbiology and lab. Special fee. Lab.

ANSC 895 - Investigations**Credits:** 1-4

Investigations in genetics, nutrition, management, diseases, histology, equestrian management/agribusiness, physiology, cell biology, microbiology, dairy management, or teaching experience. May be repeated up to a maximum of 4 credits. Prereq: permission.

ANSC 899 - Master's Thesis**Credits:** 1-6

Master's students must enroll for a total of 6 credits of this course. Students may enroll in 1-6 credits per semester. Cr/F.

ANSC 900 - Contemporary Topics in Animal, Nutritional, and Biomedical Sciences**Credits:** 1

An informal forum for graduate students to gain experience in evaluating the current literature of a contemporary topic. (Also offered as NUTR 900.) May be repeated for a maximum of 2 credits. Offered both fall and spring semesters. Cr/F.

ANSC #913 - Contemporary Topics in Immunobiology**Credits:** 2

Topical lectures, seminars, and assigned reading emphasizing recent advances in immunology. May be repeated for a maximum of 4 credits. (Offered in alternate years.)

ANSC 995 - Non-thesis Investigations in Animal Science**Credits:** 1-4

Advanced investigations in a research project, exclusive of thesis project. Elective only after consultation with the instructor. May be repeated for a maximum of 4 credits. Offered both fall and spring semesters.

ANSC 999 - Doctoral Research**Credits:** 0

Cr/F.

Arts/History & Studio (ARTS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ARTS #846 - Advanced Painting**Credits:** 4

Development and refinement of technical skills leading to more advanced conceptual problems will be emphasized. Along with structured in-class work, graduate students will be required to develop sustained out of class projects in consultation with the instructor. May be repeated for a total of 8 credits. Prereq: permission.

ARTS 897 - Seminar in Art History**Credits:** 4

Topics and prerequisites to be announced before preregistration. May be repeated with permission instructor up to a maximum of 12 credits. (Also offered as ARTS 799.)

ARTS 932 - Graduate Drawing**Credits:** 6

Structured to emphasize developing skills and to explore techniques to create invented and observed space. Drawing will be considered as an inventive tool to extend the students' repertoire of ideas. May be repeated for a total of 12 credits. Prereq: advanced drawing; permission. Special fee.

ARTS 932T - Graduate Drawing (Teaching)**Credits:** 6

This course intends to encourage the practice and study of drawing and introduces students to approaches to the teaching of drawing. Students work on projects designed to develop individual bodies of work in drawing and explore the teaching of drawing through development of course syllabi and observation of Introductory Drawing courses. The course includes discussions and demonstrations of the use of slides, reproductions, digital imagery, and critiques in the teaching of drawing. Special fee.

ARTS 996 - Independent Study in the Visual Arts**Credits:** 1-6

C01 - Drawing; D01 - Painting; E01 - Printmaking; I01 - Painting in Italy; L01 - Art History. An opportunity for independent study in the above listed disciplines. The content and structure of the course will be developed through collaboration of the graduate student and the supervising faculty member. May be repeated for a total of 18 credits in any one area. Prereq: undergraduate degree in studio art and permission.

ARTS 997 - Graduate Painting Thesis**Credits:** 10

The Graduate Painting Thesis is the culmination of the MFA student's graduate work in painting. The course requires: 1) continued work in the studio under supervision of graduate faculty; 2) a more formal midterm critique with graduate faculty (oral summarization of thesis work); 3) extensive work with The Art Gallery in preparation for the MFA Thesis Exhibition (including hanging the exhibition); 4) the thesis exhibition itself; and 5) an oral presentation to the faculty during the thesis exhibition.

ARTS 998 - Graduate Painting Seminar**Credits:** 4

Students meet once a week for a three-hour structured session of painting from life under the supervision of the instructor. Students are expected to apply the information gained in these sessions to the development of their individual bodies of work in their studios. Additional requirements could include readings, presentations, gallery and museum visits, discussions, and critiques. Special fee.

Biochemistry (BCHM)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

BCHM 802 - Endocrinology**Credits:** 4

Structure and function of vertebrate endocrine systems through the lens of physiology, biochemistry, and cell and molecular biology, with special reference to mammals. Current investigations of the body's major endocrine glands, such as the brain, thyroid, pancreas, adrenals and gonads, as regulators and integrators of biological systems. A previous cell biology course is recommended. Prereq: one semester of biochemistry.

BCHM 850 - Physical Biochemistry**Credits:** 3

Structure, interactions, and physical-chemical properties of biomolecules. Thermodynamic, kinetic, and spectroscopic methods for the study of proteins and nucleic acids. Prereq: 2 semesters organic chemistry, 1 semester of calculus; or permission.

BCHM 851 - Principles of Biochemistry I**Credits:** 4

In-depth survey of biochemistry: macromolecule structure; structure and function of proteins, nucleic acids, carbohydrates, and lipids; introduction to metabolic pathways. Prereq: One semester of organic chemistry; or permission.

BCHM 852 - Principles of Biochemistry II**Credits:** 4

In-depth survey of biochemistry: metabolism of amino acids, nucleotides, carbohydrates and lipids; synthesis and regulation of macromolecules; molecular biology of the eukaryotic cell. Prereq: BCHM 851 or permission.

BCHM 854 - Molecular Biology Research Methods**Credits:** 5

Theory and application of current technologies to manipulate DNA. Hands-on experience that includes DNA isolation and quantitation methods, cloning, PCR, DNA sequencing, and analysis of gene products. Prereq: introductory genetics. Special fee. Lab.

BCHM 855 - Laboratory in Biochemistry and Molecular Biology**Credits:** 5

Application of modern techniques to the characterization and purification of biomolecules, with an emphasis on proteins and nucleic acids. Analysis of enzyme kinetics and basic techniques used in molecular biology. Prereq: one semester of biochemistry or permission. Special fee.

BCHM 860 - Pharmacology**Credits:** 4

Introduction to the basic principles and fundamental concepts of pharmacology, with a focus on molecular mechanisms and pathological basis of therapeutics and the curative effects. Foundations of pharmacology including pharmacodynamics and pharmacogenomics; drugs affecting the nervous system (neuropharmacology); drugs affecting other systems; chemotherapeutic drugs. Prereq: one semester of biochemistry or permission.

BCHM 863 - Biochemistry of Cancer**Credits:** 4

Evaluation of the hallmarks of cancer, including molecular mechanisms of carcinogenesis, roles of oncogenes and dysregulated cell development, function and metabolism, tumor immunology, and the biological basis of cancer therapy. Prereq: one semester of biochemistry or permission.

BCHM 883 - Proteomics for Biological Discoveries**Credits:** 4

Large-scale, high-throughput study of proteins; characterization of entire set of proteins in a biological sample (proteome); quantification of changes in protein composition, interactions and post-translational modifications; major technology platforms; pharmaceutical and biomedical applications. Develop skills in processing samples from research projects; analysis of mass spectrometric data. Prereq: one semester of biochemistry or permission.

BCHM 894 - Protein Structure and Function**Credits:** 4

Analysis of how the three-dimensional architecture of soluble and membrane proteins contributes to their biochemical function; methods for determining the structure of proteins; protein folding; protein targeting; and mechanisms of enzyme catalysis. Computer resources used for protein modeling and structural prediction. Prereq: one semester of biochemistry.

Biology (BIOL)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

BIOL 801 - Plant Physiology**Credits:** 5

Structure-function relationship of plants, internal and external factors regulating plant growth and development, plant hormones, plant metabolism, water relations, and mineral nutrition. Prereq: introductory botany or concepts of plant growth; one year of college chemistry (e.g., general chemistry); organic chemistry or basic chemistry; or permission.

BIOL 802 - Techniques in Plant Physiology and Biochemistry**Credits:** 4

The course provides hands-on experience with instrumentation and experimental procedures for analysis of plant growth and metabolism. Experiments demonstrate the regulation of plant growth and development in response to environmental and chemical factors, analysis of cellular contents and processes, and use of modern instrumentation for physiological and biochemical studies. The experiments deal with plant water relations, photosynthesis, plant hormones, enzyme kinetics, using spectrophotometry, aseptic procedures, and liquid and thin-layer chromatography. Prereq: BIOL 411 and BIOL 412, or permission of instructor. Special fee.

BIOL 804 - Plant-Microbe Interactions**Credits:** 3

This course provides an overview of the molecular, cellular and biochemical factors underlying the interactions of plants with various microbes, including bacterial fungal, oomycete and viral pathogens, and mutualistic symbionts, such as mycorrhizal fungi and rhizobium. Unifying themes underlying disease, resistance, and symbiosis are emphasized. Prereq: BIOL 411 and BIOL 412, BMS 503 and BMS 504 or GEN 604.

BIOL 805 - Molecular and Cellular Neurobiology**Credits:** 4

The overarching goal of this course is to examine the molecular and cellular mechanisms underlying neuronal function. This course builds on fundamental knowledge in neuroscience. Students will be exposed to primary literature regarding the most advanced techniques in neuroscience, with emphasis in cellular and molecular processes. Students will learn how different model organisms have been used to understand neurons. Graduate students should have a strong background in chemistry, biochemistry and cell biology, and must obtain permission to register.

BIOL 809 - Plant Stress Physiology**Credits:** 3

Examines the physiological and biochemical mechanisms of plant response to abiotic stresses including drought, salt, high and low temperature, visible and ultraviolet radiation, heavy metals, and air pollutants. Discusses current hypotheses, agricultural and ecological implications. Prereq: plant physiology; biochemistry; or permission.

BIOL 811 - Applied Biostatistics II**Credits:** 4

Design and analysis of biological and ecological research experiments. "Real world" studies used to discuss the identification of hypotheses, appropriate experimental design, and the application of statistical analyses including ANOVA, ANCOVA, correlation and regression, cluster analysis, classification and ordination techniques. Theoretical statistical concepts tailored to consider student's own thesis and dissertation research, allowing statistical problems to be addressed at various stages of the research process. Common computer packages used for analyses. Prereq: BIOL 528; permission.

BIOL 813 - Biochemistry of Photosynthesis**Credits:** 4

The physiology and biochemistry of photosynthesis in higher plants and microorganisms: light reactions, electron transport, membrane structure and function, carbon assimilation pathways, energy conservation, and metabolic regulation. Agronomic and ecological aspects of photosynthesis are examined. Prereq: plant physiology or biochemistry. (Not offered every year.)

BIOL 820 - Plant-Animal Interactions**Credits:** 4

This course will explore interactions between plants and animals and their evolutionary consequences on individual organisms as well as on ecological communities. Readings from the primary literature will serve as case studies to discuss hypotheses related to plant-animal interactions, the methods employed to test these hypotheses, and the conclusions drawn from these experiments. A weekly discussion session will be used as a grant-writing workshop, with activities designed to help students prepare an NSF-style grant as the culminating course project. Prereq: BIOL 411 and BIOL 412.

BIOL 827 - Animal Communication**Credits:** 4

This course examines the principles underlying how animals communicate with each other and why they communicate the way they do by using perspectives drawn from a broad range of disciplines including physics, chemistry, ecology, psychology, economics, and behavioral ecology. Students will explore the primary literature, and work in teams to conduct independent research. The course is intended for advanced undergraduate or graduate students interested in neuroscience and behavior, evolution, wildlife and conservation biology, or zoology. Prereq: BIOL 412.

BIOL 829 - Agricultural Waste Management**Credits:** 4

The management of agricultural wastes is crucial in the development of sustainable agricultural practices. This course covers principles of managing, handling, treating, and applying animal manures and organic byproducts from an agricultural system perspective. Topics include waste characterization, descriptions of systems and technology, utilization of wastes as resources (land application, composting, electricity generation, fertilization, etc.), land application principles, preparations of waste management plans, and potential impacts to the environment. Prereq: SAFS 502 or permission of instructor.

BIOL 852 - Mycology**Credits:** 4

Classification, identification, culturing, life histories, and ecology of fungi, from slime molds to hallucinogenic mushrooms; the significance of fungi in human history, from their contribution to the art of bread making and alcoholic fermentation to their destructiveness as agents of deadly diseases of plants and animals. Prereq: principles of biology I, II or introduction to botany, or equivalent. Special fee. Lab.

BIOL 858 - Plant Anatomy**Credits:** 5

Anatomy of vascular plants from a functional/developmental point of view with emphasis on Angiosperms. Basic cell and tissue structure of plant organs will be covered as well as the importance of chaos, fractals, scaling, mechanical stress and environmental factors in determining the role anatomy plays in the biology of plants. Prereq: principles of biology or introductory botany. Lab. Special fee. (Not offered every year.)

BIOL 895 - Advanced Studies**Credits:** 1-4

Advanced research or seminar, supervised by a faculty member.

BIOL 899 - Master's Thesis**Credits:** 1-10

Master's thesis research. May be repeated up to 10 credits. Cr/F.

BIOL 901 - Introductory Graduate Seminar**Credits:** 2

This seminar provides an introduction to the Biological Sciences Graduate Program, offering students an overview of program structure and requirements, introducing faculty research and campus resources, and helping participants develop skills and strategies useful in graduate school. Requirements include preparation of a written research proposal and a brief oral presentation. Cr/F.

BIOL 902 - Writing and Publishing Science**Credits:** 2

Participants in this seminar (1) make significant progress on one or more of their current academic writing projects; (2) increase their understanding of the genres, protocols, and mechanisms of scientific writing and publishing; and (3) develop strategies and skills for getting professional writing done efficiently and well, in graduate school and beyond. Cr/F.

BIOL 903 - Graduate Research Techniques**Credits:** 2

Introduction to a range of research approaches in biology and to research skills needed for success in graduate school and beyond. Topics include scientific methods and experimental design, research techniques, and instrumentation available for graduate research. Cr/F. Offered every spring.

BIOL 933 - Design, Analysis, and Interpretation of Experiments**Credits:** 4

Through in-depth consideration of common general linear models used in the analysis of variance, this course introduces graduate students to the fundamental concepts and statistical methods necessary to plan, conduct, and interpret effective experiments. The course provides an opportunity for graduate students to receive critical input on the experimental design and analysis of their individual graduate research projects. All analysis is conducted using the open-source package R; no previous coding experience is required.

BIOL 950 - Scientific Communication**Credits:** 2

Professional success in science depends on the ability to communicate, both by publishing in professional journals and by explaining the implications of research to a broad audience. This course covers a wide range of topics related to scientific communication. Students work on multiple forms of communication, practice communicating science to the public, strengthen peer reviewing skills, explore online scientific communities, and enhance awareness of relevant economic, legal, and ethical issues.

BIOL 997 - Graduate Seminar in Biology**Credits:** 1-2

Current topics in biological sciences; discussion of literature in the field, and student research. Topics span a wide range of biological disciplines (agricultural sciences, marine biology, integrative and organismal biology, etc.), and vary to reflect the faculty and student interests.

BIOL 999 - Doctoral Dissertation Research**Credits:** 0

Doctoral dissertation research. Cr/F.

Chemical Engineering (CHE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

CHE 805 - Fossil Fuels and Renewable Energy Sources**Credits:** 4

Processing and refining of coal, crude oil, natural gas, tar sands and shale oil. Biomass co-combustion, biofuel extraction, impediments to widespread utilization. Exploration of environmental issues with energy generation and consumption. Lab. (Not offered every year.)

CHE 806 - Electrochemical Methods for Energy Applications**Credits:** 4

Fundamentals and applications of thermodynamics of electrochemical processes; kinetics of electrochemical reactions; electrocatalysis basics and current technologies for batteries, supercapacitors and fuel cells. Prereq: CHEM 683, CHEM 684. (Not offered every year.)

CHE 809 - Fundamentals of Air Pollution and Its Control**Credits:** 4

The origin and fate of air pollutants. Fundamentals of atmospheric meteorology, chemistry, and dispersion phenomena. Control of air pollutants and the related equipment. Current issues. Lab. (Not offered every year.)

CHE 812 - Introduction to Nuclear Engineering**Credits:** 4

Development of nuclear reactors; binding-energy; radioactivity; elements of nuclear reactor theory; engineering problems of heat transfer, fluid flow, materials selection, and shielding; environmental impacts. (Not offered every year.)

CHE 822 - Introduction to Microfluidics**Credits:** 4

Fundamentals and applications of microfluidics; scaling laws; microfabrication technology; hydrodynamics and electrohydrodynamics; interfacial phenomena; capillary effects and diffusion; microvalves; micropumps; lab-on-a-chip systems; biochips. Prereq: fluid mechanics course or permission of instructor.

CHE 844 - Corrosion**Credits:** 4

Fundamentals of corrosion processes in industrial and environmental settings; thermodynamics, kinetics, and mass transport in local corrosion cells; protection by electrochemical, chemical, surface modification, or barrier methods; instrumental methods in corrosion science. Lab. (Not offered every year.)

CHE 852 - Process Dynamics and Control**Credits:** 4

Dynamic behavior of chemical engineering processes described by differential equations; feedback control concepts and techniques; stability and analysis. Lab.

CHE 861 - Biochemical Engineering**Credits:** 4

Immobilized enzyme technology, microbial biomass production, transport phenomena in microbial systems, biological reactor design, process instrumentation and control, applications in separation and purification processes. Lab.

CHE 862 - Biomedical Engineering**Credits:** 4

Overview of the biomedical engineering through topical studies such as drug delivery and sensors. Discussion of modern engineering methods through primary research sources. Prereq: differential equations and statistics.

CHE 866 - Biomaterials**Credits:** 4

Fundamental principles of biology and material science, along with latest topics in biomaterials research. Topics include cell biology, wound healing, host response to foreign materials, polymers, hydrogels, diffusion and methods of material characterization. Specific medical applications of biomaterials such as orthopedic and dental implants, heart valves, artificial blood vessels, cochlear and ophthalmic implants and tissue engineering. Laboratory.

CHE 898 - Chemical Engineering Project**Credits:** 3

Concluding experience for Master of Engineering Degree. Chemical Engineering majors only.

CHE 899 - Master's Thesis**Credits:** 1-6

May be repeated to a maximum of 6 credits. Cr/F.

CHE 900 - Seminar**Credits:** 1

Topics of interest to graduate students; reports of research ideas, progress, and results; lectures by outside speakers. Must be taken once for 1.00 credit. Students register for 0.00 for all other semesters in ChE graduate program. Chemical Engineering majors only. Cr/F.

CHE 913 - Advanced Fluid Mechanics**Credits:** 3

Basic equations describing behavior of static and dynamic fluid systems. The equations of motions and application to laminar and turbulent flow. Momentum and energy equations for advanced problems associated with flow inside conduits. Flow of compressible fluids and boundary layer phenomena.

CHE 915 - Heat Transfer**Credits:** 3

Steady-state and transient heat conduction in solids; heat convection; analytical solutions, similarity relations, boundary layer methods; radiation.

CHE 916 - Diffusive Mass Transfer**Credits:** 3

Physical aspects of diffusion; theories of diffusion in dilute gases, dense gases, liquids, and solids; surface diffusion; mixing processes. Simultaneous heat and mass transfer.

CHE 923 - Advanced Chemical Engineering Thermodynamics**Credits:** 3

The multi-component open system; the volumetric and phase behavior of pure substances and of multi-component systems at physical and chemical equilibrium, fugacity and activity; thermal properties of equilibrium, chemically reacting systems; introduction to statistical thermodynamics.

CHE 932 - Advanced Chemical Engineering Kinetics**Credits:** 3

Specialized applied kinetics problems; catalysis; fast reaction and shock tubes; combustion and detonation processes; non-isothermal kinetics; heat and mass transfer in non-equilibrium, chemically reacting systems.

CHE 996 - Graduate Independent Study**Credits:** 1-4

Directed reading or investigation at the advanced level on topics in chemical engineering, including internships for graduate students. Only open to Chemical Engineering majors.

CHE 999 - Doctoral Research**Credits:** 0

Cr/F.

Chemistry (CHEM)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

CHEM 800 - Chemistry Teaching Seminar**Credits:** 1

Introduction for graduate students to their role as chemistry teaching assistants: professional responsibilities, safety, and ethics; theory-based teaching, learning, and assessment; reflective practice. Pre-semester sessions and periodic seminars during semester. Cr/F.

CHEM 802 - Critical and Creative Thinking for Chemists**Credits:** 1

Students prepare two proposals, one based on their research and a second based on an original idea. They develop critical thinking skills by critiquing proposals from other students. Lectures discuss topics relative to research proposal development including presentation, coming up with new ideas, keeping up with the chemical literature and research costs.

CHEM 808 - Spectroscopic Investigations of Organic Molecules**Credits:** 3

Identification and structural analysis of chemical compounds by selected instrumental methods. Typical topics include proton and carbon-13 NMR spectroscopy, IR and UV spectroscopy, and mass spectrometry.

CHEM 855 - Advanced Organic Chemistry**Credits:** 3

An overview of organic chemistry at the intermediate levels. Aspects of synthetic organic chemistry and physical organic chemistry, including stereochemistry, are covered.

CHEM 862 - Instrumental Methods of Chemical Analysis**Credits:** 3

Theory, instrumentation, and application of methods such as atomic absorption, coulometry, emission spectrography, gas and liquid chromatography, IR and UV-VIS absorption spectrophotometry, and mass spectrometry to chemical analysis. Prereq: quantitative analysis; physical chemistry as a pre- or co requisite;/ or permission.

CHEM 874 - Inorganic Chemistry**Credits:** 3

Intermediate level overviews of modern inorganic chemistry including structure, bonding, and reactivity. Prereq: organic chemistry; physical chemistry;/ or permission.

CHEM 876 - Physical Chemistry III**Credits:** 3

Application of quantum theory to atomic electron structure, spectroscopy, and molecular structure.

CHEM 895 - Special Topics**Credits:** 2-4

New or specialized topics not covered in regular course offerings. May be repeated. Prereq: permission. Lab. (Not offered every year.)

CHEM 899 - Thesis/Problems**Credits:** 1-10

Conferences, library, and experimental work in some field of chemistry. May be repeated to a maximum of 10 credits. Cr/F.

CHEM 902 - Theoretical Organic Chemistry II**Credits:** 3

A continuation of CHEM 901. (Not offered every year.)

CHEM 903 - Advanced Inorganic Chemistry I**Credits:** 3

Survey of important advanced topics in concepts of modern inorganic chemistry.

CHEM 904 - Advanced Inorganic Chemistry II**Credits:** 3

Overview of current trends in inorganic research, including transition metal reactions and mechanisms and organometallic chemistry. (Not offered every year.)

CHEM 905 - Advanced Physical Chemistry I**Credits:** 3

Introduction to topics in quantum mechanics and group theory, which form the background of all areas of modern chemistry. (Not offered every year.)

CHEM 911 - Synthetic Organic Chemistry I**Credits:** 4

Fundamentals of synthetic organic methodology and applications in multiple syntheses. Fourth hour recitation session.

CHEM 917 - Special Topics in Organic Chemistry**Credits:** 2-4

Advanced courses dealing with specialized sub-disciplines of organic chemistry. (Not offered every year.)

CHEM 918 - Special Topics in Organic Chemistry**Credits:** 2-4

Advanced courses dealing with specialized sub-disciplines of organic chemistry. (Not offered every year.)

CHEM 925 - Surface Chemistry**Credits:** 3

Bulk and surface structure of solids, experimental methods of surface characterization, molecule-surface interactions, principles of homogeneous and heterogeneous catalysis. This course typically discusses adsorption/desorption kinetics, surface reaction mechanisms, adsorption isotherms, volcano plots, zeolite catalysis, applications to renewable energy, photovoltaics, nanoscience, all from a chemical standpoint.

CHEM 926 - Physical Chemistry of Condensed Phases**Credits:** 3

Thermodynamics and kinetics of molecules and ions in solution and at interfaces.

CHEM 927 - Chemical Kinetics and Reaction Dynamics**Credits:** 3

The course reviews macroscopic chemical kinetics, then investigates the microscopic origins of rate laws. Scattering theory. Transition state theory. Unimolecular and bimolecular reactions.

CHEM 930 - Advanced Optical Methods**Credits:** 3

Techniques of chemical identification and analysis utilizing optical instrumentation from the standpoint of theory and application. Topics include UV-visible absorption, luminescence, atomic spectroscopy, IR, NMR, x-ray methods, and mass spectrometry. Prereq: CHEM 935 or permission. (Not offered every year.)

CHEM 933 - Chemical Separations**Credits:** 3

The use of various separation techniques prior to analysis; separations as methods of analysis. Prereq: CHEM 934 or permission. (Not offered every year.)

CHEM 934 - Chemical Equilibria**Credits:** 3

Formulation and solution of chemical equilibrium problems of relevance to analytical chemistry. (Not offered every year.)

CHEM 935 - Advanced Analytical Chemistry**Credits:** 3

Advanced analytical chemical methods, including: potentiometry and voltammetry, X-ray fluorescence, electron spectroscopy, scanning electron microscopy and modern methods of mass spectrometry.

CHEM 947 - Inorganic Biochemistry**Credits:** 3

Introduction to the inorganic chemistry and biochemistry of the interactions of metals with proteins, nucleic acids, and other biomolecules. Relevant small metal complexes (model compounds) and synthetic chelating agents are also covered. Prereq: CHEM 903 or permission. (Offered every other year.)

CHEM 991 - Graduate Presentation Portfolio**Credits:** 1

A graduate course for Chemistry Master of Science students designed to provide them with expertise in preparing, organizing, and giving research presentations. Cr/F.

CHEM 992 - Graduate Writing Portfolio**Credits:** 1

A graduate course for Chemistry Master of Science students to acquire and practice appropriate professional data documentation and writing skills. Cr/F.

CHEM 995 - Colloquium**Credits:** 1-4

A) Inorganic Chemistry; B) Organic Chemistry; C) Theoretical Organic Chemistry; D) Physical Chemistry; E) Analytical Chemistry; F) Chemical Education. Sections of the course may be taken to a total of 12 credits. (Not offered every year.)

CHEM 996 - Colloquium**Credits:** 1-4

A) Inorganic Chemistry; B) Organic Chemistry; C) Theoretical Organic Chemistry; D) Physical Chemistry; E) Analytical Chemistry; F) Chemical Education. Sections of the course may be taken to a total of 12 credits. (Not offered every year.)

CHEM 997 - Seminar**Credits:** 1

Presentation and discussion of recent investigations in chemistry. Cr/F.

CHEM 998 - Seminar**Credits:** 1

Presentation and discussion of recent investigations in chemistry. Cr/F.

CHEM 999 - Doctoral Research**Credits:** 0

Cr/F.

Civil and Environmental Engineering (CEE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

CEE 800 - Building Information Modeling**Credits:** 3

Building Information Modeling (BIM) is the process of generating and managing project data during its life cycle by integrating 3D multidisciplinary drawings with dynamic scheduling and visualization. BIM provides a digital representation of project data to facilitate the exchange of information beyond the standard two dimensional plan set. This course introduces students to the fundamentals of model creation, scheduling, material take-offs, visualizations, and animations that improve the communication of information to potential clients. Prereq: AUTOCAD Experience or by permission.

CEE 804 - Transportation Engineering and Planning**Credits:** 3

Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission.

CEE 805 - Introduction to Sustainable Engineering**Credits:** 3

Course begins with exploration of the precept that we live in, and must design engineering works for, a world with a finite supply of natural resources and with limited life support capacity. Tools for sustainability engineering are the major focus of the course, which include life cycle, analysis and life cycle impact analysis, the metrics and mass and energy flow analyses used in the field of industrial ecology, and environmental management systems.

CEE 806 - Environmental Life Cycle Assessment**Credits:** 3

This course teaches knowledge and hands-on skills in conducting environmental life cycle assessment (LCA), which is a widely used technique by industries, academics, and governments. Students will learn to use popular LCA software (e.g., SimaPro), apply proper LCA techniques, critically analyze LCA results, and provide client-oriented suggestions during this course. Class time is primarily devoted to a combination of lectures and computer labs.

CEE 819 - Green Building Design**Credits:** 3

This course gives an overview of green designs and sustainable practices in building construction. We cover technical topics and requirements of a nationally recognized rating system (LEED), with a specific focus on Green Building Design and Construction. Students are introduced to basic building designs and systems related to sustainability. Additionally, they learn about green design topics such as site plans, water and energy efficiency, material and resources usage, environmental quality and renewable energy source. As an outcome of the course, students are able to assess and incorporate green technologies and designs into building projects. They are prepared to contribute in building projects that target LEED certifications. Students are also capable to engage in green practices within their existing built environments.

CEE 820 - Solid and Hazardous Waste Engineering**Credits:** 3

A thorough examination of the problems which exist in hazardous and solid waste management will be presented in terms of the current regulations and engineering approaches used to develop solutions. Topics will include risk-based decision making, transport and fate of contaminants, and the fundamental physical, chemical and biological concepts which make up the basis for technological solutions to these waste management problems. Case studies will be used throughout the course to highlight key concepts and provide real-world examples.

CEE 822 - Introduction to Marine Pollution and Control**Credits:** 4

Introduction to the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: CEE 620 or permission.

CEE 823 - Environmental Water Chemistry**Credits:** 4

Emphasizes the use of chemical equilibrium principles and theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling is presented. Prereq: general chemistry or equivalent.

CEE 824 - Environmental Engineering Microbiology**Credits: 4**

Concepts of environmental engineering microbiology including microbial metabolism, growth kinetics, bioremediation applications, mass transfer kinetics and effects of environmental parameters. Coursework includes reading and discussion of the microbial literature. Laboratories cover microbiological monitoring and biological treatment experiments. Prereq: CEE 620 or permission. Lab.

CEE 830 - Public Health Engineering for Rural and Developing Communities**Credits: 3**

The design principles are to impart to the student specific information that can be used to design public health control facilities such as small water treatment systems and on-site wastewater disposal systems. The engineering control methods taught are particularly applicable to rural areas and developing countries. Prereq: permission..

CEE 832 - Solid and Hazardous Waste Design**Credits: 4**

Selection, design, and evaluation of unit processes employed in the treatment of solid wastes and hazardous wastes will be studied. Topics include design of materials recovery facilities, landfills, waste-to-energy facilities and hazardous waste site remedial technologies. A group term project taken from a real-world project will be required. An oral presentation by the group and preparation of a final written engineering report including alternative evaluation, permits, scheduling and economic analysis will be required from each group. Prereq: CEE 720. permission.

CEE 833 - Public Infrastructure Asset Management**Credits: 4**

The course provides a thorough examination of the growing engineering field of Public Infrastructure Assess Management (IAM). The course enables the student to design an IAM system. It touches upon all types of public infrastructure with a particular focus on water infrastructure for the semester design project. Students build upon their engineering economics and project engineering skills and use simple IAM software along with GIS applications. Practice leaders from the industry provide guest lectures throughout the semester. A focus on triple bottom line or the Societal, Environmental and Economic aspects of IAM are included. The format is a modified team base design learning experience providing practice in processing of technical lecture material, personal performance evaluation (frequent quizzes) and team based performance evaluation. Student groups will present their design to the class and provide a written engineering report. Pre- or Coreq: CEE 502 and CEE 620.

CEE 835 - Properties and Production of Concrete**Credits: 3**

Basic properties of hydraulic cements and mineral aggregates and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CEE 635 or permission.

CEE 836 - Asphalt Mixtures and Construction**Credits: 3**

Specification of asphalt cements, aggregates and proportioning of mixture constituents for paving applications. Asphalt mixture design methods, production, construction, and quality control are discussed. Current and new material production and construction technologies are introduced. Prereq: CEE 635 or permission.

CEE 848 - Pavement Design Project**Credits: 1**

Semester long design project accompanying CEE 849 Pavement Design Analysis. The design project will require weekly meetings (either online or in person) for the duration of the semester. Meeting times will be arranged based on student schedules.

Co-requisite: CEE 849**CEE 849 - Pavement Design Analysis****Credits: 3**

Introduction to flexible and rigid pavement design and analysis for highways and airports. Examines design inputs, materials, analysis methods, design tools, and maintenance treatments. Prereq: CEE 635 and CEE 665.

CEE 850 - Ecohydrology**Credits: 3**

Introduction to ecohydrological concepts in terrestrial and riverine systems. Topics include the historical practices, resources management impacts, hydrologic variability and the relationships among water and ecology, vegetation, biology, geomorphology, and water quality. Prereq: CEE 854 or ESCI 805; or permission.

CEE 851 - Open Channel Flow**Credits: 3**

Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady flow concepts and dam failure studies. Modeling with HEC programs. Prereq: CEE 650 or permission.

CEE 854 - Engineering Hydrology**Credits: 3**

Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water flow, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, HEC-HMS, multipurpose projects.

CEE 855 - Design of Pressurized Water Transmission Systems**Credits: 4**

Theory developed for individual components to large complex systems. Analysis and designs of components and systems. Topics include steady and unsteady closed conduit flow, valves and meters, pump requirements, pump selection, system planning and layout, water hammer, and system operation and maintenance. Pressure system modeling with program EPANET. Prereq: Fluid mechanics, or permission.

CEE 857 - Coastal Engineering and Processes**Credits: 3**

Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Design of coastal structures. Introduction to mathematical and physical modeling. Prereq: CEE 650 or permission. (Also offered as ME 857 and OE 857.)

CEE 858 - Stormwater Management Designs**Credits: 3**

Historic review of stormwater management leading up to the current regulatory framework. Overview of stormwater management strategies, strategy selection and the targeting of specific contaminants, contaminant removal efficiencies, construction and site selection, and system maintenance. Hydrologic concepts including watershed and storm characteristics, design hydrology (peak flows, storm and treatment volumes), hydrograph routing, and critical review of hydrology and drainage reports. Design and sizing of treatment systems including conventional BMPs, low impact development, and manufactured devices. Rainfall runoff calculations with US SCS TR55 model. Prereq: Fluid mechanics or permission.

CEE 859 - Stream Restoration**Credits: 4**

Explores the assessment, planning, design, engineering, and monitoring of stream and watershed practices intended to protect and restore the quality and quantity of flowing and surface waters and stream corridors. Lecture material covers hydrology, geomorphology, and ecosystems, with the intent of understanding the variables associated with stream systems and their interplay. Students measure field variables and then are challenged with actual designs. Examples of stream restoration issues include in-stream flow, dam removal, induced recharge, improvements to fish habitat, and channel stabilization. Prereq: CEE 650.

CEE 865 - Engineering Behavior of Soils**Credits: 4**

Review of stress and strain in soil. Introduction to continuum mechanics. Development of engineering soil properties. Application of soil mechanics to shear strength and stress-strain behavior of soils. Failure states and residual strength. Application of stress paths in engineering problems. Unsaturated soil mechanics. Laboratory exercises using the direct shear test, triaxial test, and soil-water retention measurements. Prereq: Foundation design or equivalent or permission.

CEE 866 - Introduction to Geotechnical Earthquake Engineering**Credits: 3**

Overview of earthquake source mechanisms; magnitude and intensity; seismicity of the U.S.A. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CEE 878 or permission.

CEE 867 - Geological Engineering**Credits: 3**

Functional classification of rocks and rock masses. Stereographic projection. Engineering properties of rocks. Rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: ESCI 401 or permission.

CEE 868 - Geo-Environmental Engineering**Credits: 3**

Soil composition and structure; hydrogeology; attenuation and contaminant transport; containment design including landfills, geosynthetics for liners and covers, leachate collection systems, vertical cutoff walls, and stability analyses; geo-environmental site characterization and investigation using geotechnical and geophysical methods; ground water, soil and gas monitoring, and sampling; remediation including in-situ and ex-situ techniques and treatment methods. Prereq: CEE 665 or permission.

CEE 878 - Foundation Design I**Credits: 4**

Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Use of consolidation theory and bearing capacity theory for the design of shallow foundations, including footings and rafts. Basic design of pile foundations. Earth pressure theory applied to design of retaining walls. Slope stability theory and applications. Prereq: CEE 665 or permission.

CEE 879 - Foundation Design II**Credits: 3**

Advanced pile and pier design under vertical and lateral loads. Slope stability by circular and noncircular arc methods. Design of flexible bulkhead walls and mechanically stabilized walls. Excavation and dewatering. Soil and site improvement. Prereq: CEE 878 or permission.

CEE 880 - Matrix Structural Analysis and Modeling**Credits: 3**

Modeling and analysis of determinate and indeterminate structures by matrix computer methods. Creation of matrix elements using compatibility, equilibrium, and consecutive relationships. Plane trusses, beams, frames, and space trusses. Prereq: CEE 680 or permission.

CEE 881 - Dynamics of Structures**Credits: 3**

Dynamics of single- and multi-story buildings. Response due to earthquakes, blasting, traffic, and mechanical equipment. Analysis in the time domain and through the Fourier Transform. Fundamentals of structural vibration measurement. Prereq: CEE 880, permission.

CEE 889 - Timber Design**Credits: 3**

Introduction to the design of timber structures. Structural properties of wood. Determination of horizontal and vertical loads. Horizontal and vertical load-resisting systems. Design of horizontal diaphragms, shear walls, beams, and columns. Bolted, screwed, and nailed connections. Prereq: CEE 680 or permission.

CEE 890 - Structural Design in Masonry**Credits: 3**

Introduces the design of reinforced masonry structural members by the stress and strength method and considering deflection and other serviceability performance criteria. Includes development of wind and seismic load, curtain wall, shear wall, lintels and columns. Prereq: CIE 635, 680; or permission.

CEE 891 - Reinforced Concrete Design**Credits: 4**

Introduction to the design of reinforced concrete structural members by the strength method and considering deflection performance. Includes loads, approximate analysis, slabs, beams, and columns. Prereq: CEE 635, 680; or permission.

CEE 892 - Pre-stressed Concrete**Credits: 3**

Analysis and design of pre-stressed and post-tensioned concrete sections in flexure and shear. Strength, deflection, and losses in flexural members. Optimization of section and pre-stressing force selection. Prereq: CEE 891 or permission.

CEE 893 - Structural Design in Steel**Credits: 4**

Introduction to steel member design, including horizontal and vertical members for design and analysis of buildings. Examines design inputs, material choice, analysis methods and design and construction methodologies. Prereq: CEE 635 and CEE 680.

CEE 894 - LRFD Bridge Design**Credits:** 3

AASHTO LRFD Bridge Design Specifications using SI units. Design objectives, loads, load case analysis and selection, load distributions, static analysis, and design for axial loads, flexure, and shear. Design of slender columns, composite beams, and plate girders. Prereq: senior-level structural design course or permission.

CEE 895 - Independent Study**Credits:** 1-4

A limited number of qualified graduate students will be permitted to pursue independent studies under faculty guidance. May be repeated.

CEE 896 - Special Topics**Credits:** 1-4

Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission. Special Fee.

CEE 897 - Masters Student Seminar**Credits:** 1

Topics of interest to graduate students and staff; reports of research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Course held simultaneously with CEE 997.

CEE 898 - Master's Project Paper**Credits:** 3

Concluding project paper required of Master's level students who utilize the non-thesis option. Prereq: permission. CEE majors only.

CEE 899 - Master's Thesis**Credits:** 1-6

May be repeated up to maximum of 6 credits. Cr/F.

CEE 931 - Advanced Physicochemical Treatment Design**Credits:** 4

Selection, design, and evaluation of advanced unit processes employed in physicochemical treatment of waters, wastewaters, and hazardous wastes. Discussion on preparation of alternative designs and economic analysis. Emphasis on treatment schemes based on experimental laboratory or pilot studies. Prereq: undergraduate-level course in water and waste water engineering or water chemistry, or permission. Lab.

CEE 934 - Advanced Bioenvironmental Engineering Design**Credits:** 4

Theoretical and experimental examination of the fundamental parameters used in selection, design, and operation of biological treatment processes for waters, wastewaters, and hazardous wastes. Topics include design and evaluation of aerobic and anaerobic processes, suspended and fixed-film processes, and advanced biological water and wastewater treatment processes. Prereq: environmental engineering microbiology course, or permission.

CEE 936 - Advanced Asphalt Materials**Credits:** 3

Examination of chemical composition of asphalt cements, current technologies for modification, and inclusion of recycled materials to meet desired physical properties. Advanced characterization of asphalt materials, modelling, advanced mixture design tools. Prereq: CEE 836 or permission.

CEE 949 - Advanced Pavement Design and Analysis**Credits:** 3

Advanced flexible pavement design and analysis including rehabilitation/overlay design. Includes development of mechanistic-empirical methods, advanced pavement structural analysis, and advanced material characterization. Prereq: CEE 849 or permission.

CEE 951 - Statistical Hydrology**Credits:** 3

Course examines statistical methods used to address water resources planning and management problems involving uncertainty objectives and hydrologic inputs. Application of statistics and probability to uncertainty in the description, measurement, and analysis of hydrologic variables and processes, including extreme events, error models, simulation, and sampling. Prereq: A hydrology course, basic statistics, or permission.

CEE 954 - Advanced Groundwater Topics**Credits:** 3

Review of Darcy's Law for confined and unconfined aquifers, linearization techniques, draw down computations under varying boundary conditions, solutions to the inverse problem, drainage theory, recharge theory, two-phase flow, succession of steady states modeling, and borehole geophysics. Prereq: ESCI 810.

CEE 955 - Advanced Surface Water Hydrology**Credits:** 3

Occurrence and distribution of water by natural processes including atmospheric thermodynamics, precipitation, runoff, infiltration, water losses, flood routing and catchment characteristics, analysis, and methods of runoff prediction. This course builds from a foundation of fluid mechanics in the environment to address essentials of modern hydrology. An emphasis is placed on fundamental concepts, first principles, and the scientific basis of approximations. Prereq: Calculus and Fluid Mechanics.

CEE 959 - Advanced Stream Restoration Topics**Credits:** 3

Course focuses on: stream crossing analysis and design, dam removal, and designs for aquatic species passage. Pre- or Coreq: CEE 759 or equivalent.

CEE 965 - Advanced Soil Mechanics**Credits:** 4

Numerical and physical modeling of the mechanical behavior of soils. Cam-clay and other predictive models. Laboratory studies of mechanical behavior and measurement of input parameters to soil models. Prediction of soil behavior based on laboratory results. Applications to numerical modeling of soil masses. Prereq: soil mechanics, and foundation design, or permission.

CEE 966 - Laboratory Geotechnical Testing**Credits:** 4

Introduction to geotechnical modeling, soil constitutive modeling, introduction to numerical modeling and applications, physical modeling, centrifuge modeling, and theoretical modeling. Prereq: CEE 665, CEE 778, or equivalent, or permission.

CEE 967 - In Situ Geotechnical Testing**Credits:** 3

In situ geotechnical testing methods for site characterization; theory and practice. Geotechnical testing methods include the piezocone, the pressuremeter, the flat plate dilatometer, the field vane, and the standard penetration test. Includes sampling techniques, geophysical exploration, and recent innovations in site and soil characterization. Prereq: CEE 965 or equivalent.

CEE 968 - Soil-Structure-Interaction**Credits:** 3

Introduction to soil-structure-interaction, elastic and plastic analyses, serviceability calculations, relative foundation stiffness, Pile-soil-interaction, flexible retaining walls, tunnel lining, bridge abutments, dynamic soil-structure-interaction, case studies, and modeling techniques. Prereq: CEE 665 and 778; or permission.

CEE 980 - Nonlinear Structural Analysis**Credits:** 3

This course deals with the theory, implementation, and application of methods of geometric and material nonlinear analysis. Geometric nonlinear analysis entails solving for equilibrium on the deformed configuration on the structure. Material nonlinear analysis involves inelastic behavior of materials. Practical design implications include problems of structural stability and inelastic static/dynamic analysis. Emphasis is on methods applied to frame structures comprised of line-type elements; however, the basic concepts also apply to general finite element methods. Prereq: CEE 780/CEE 880 or equivalent.

CEE 993 - Advanced Structural Steel Design**Credits:** 3

Advanced design of structural steel elements according to the AISC Load and Resistance Factor Method as applied to advanced topics in steel design. Emphasis will be placed on theory involved in the development of the design code requirements. Course design project will expand on these topics and include experimental work as appropriate. Prereq: CEE 793/CEE 893 or permission.

CEE 995 - Problems**Credits:** 2-4

The study and investigation of problems selected to meet the needs of the students.

CEE 997 - Doctoral Student Seminar**Credits:** 1

Topics of interest to graduate students, faculty, and staff; requires two presentations from doctoral students on their research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Course held simultaneously with CEE 897.

CEE 999 - Doctoral Research**Credits:** 0

Cr/F.

Communication Sciences & Disorders (COMM)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

COMM 825 - Cued Speech**Credits:** 3

This course covers the fundamentals of the Cued Speech system, its applications and research as well as its relevance to other communication options for children who are deaf or hard of hearing. Various topics are covered, including CS and language development, reading, auditory and speech skill development, auditory processing, bilingualism, Down Syndrome, Autism, cochlear implants and transliteration.

COMM 875 - Advanced Language Acquisition**Credits:** 3

Careful examination of theoretical perspectives and landmark studies provides the foundation for the exploration of advanced topics in language acquisition. Current approaches to child language research guide students to approach the course context from a scientific perspective. Prereq: COMM 522.

COMM 876 - Ethical and Professional Issues in Communication Sciences and Disorders I**Credits:** 1

Introduction to ethical and professional issues that professionals will encounter in various work settings including regulatory, billing practices, service delivery models, and the role of advocacy for client services.

COMM 880 - Principles of Assessment**Credits:** 2

Principles and practice for diagnosis of speech and language disorders; examination procedures and measurement techniques.

COMM 890 - Advanced Audiology for Speech-Language Pathologists**Credits:** 3

A clinical foundation in diagnostic and rehabilitative information. This course covers foundation materials that apply to both children and adults, and includes recent academic, clinical, and ethical developments in the profession of audiology that impact speech-language pathologists. Prereq: COMM 521, COMM 704, COMM 705, introduction to speech science, and introduction to hearing science. CSD majors only.

COMM 891 - Applied Neurology for Speech-Language Pathology**Credits:** 3

A foundation in the basic neuroanatomy and physiology of human communication and swallowing. Includes a review of gross anatomy of the central nervous system, sensory, and motor systems, with emphasis on cranial nerves, functional organization of human communication and behavior, and the relationship between CNS dysfunction and disorders of communication, cognition, and swallowing.

COMM 895 - Special Topics**Credits:** 1-3

Advanced study in specific areas; involves an independent project. Prereq: permission. May be repeated.

COMM 899 - Master's Thesis**Credits:** 1-6

Prereq: permission. May be repeated for a maximum of 6 credits. Cr/F.

COMM 900 - Articulatory and Phonological Disorders in Children**Credits:** 3

Phonological theories as they relate to analysis and remediation of phonological disorders. Prereq: COMM 524 Clinical Phonetics.

COMM 901 - Dysphagia**Credits:** 3

This course addresses swallowing problems occurring in the preparatory, oral, and pharyngeal stages of the swallow. Assessment and treatment are discussed. Permission required.

COMM 902 - Stuttering**Credits:** 3

Theoretical and therapeutic considerations of the stuttering syndrome; emphasis on clinical management.

COMM 903 - Therapy Process**Credits:** 2

An introduction to the clinical process. Part I emphasizes the theory and practice of intervention. Part II addresses oral and written communication involved in the clinical process, the importance of clinical writing, and common reports/documents. CSD majors only.

COMM 904 - Aphasia in Adults**Credits:** 3

Principles concerning etiologies, evaluation, classification, and methods of clinical management including the team approach to rehabilitation of aphasia in adults. Prereq: a course in neuro-anatomy or permission.

COMM 905 - Motor Speech Disorders**Credits:** 3

Neurological bases, diagnosis, and treatment of motor speech disorders including cerebral palsy, acquired dysarthria, and apraxia of speech. Prereq: a course in neuro-anatomy or permission.

COMM 906 - Voice Disorders**Credits:** 2

Types, causes, and characteristics of functional and organic voice disorders. Specific evaluation of deviant vocal characteristics; treatment techniques for children and adults.

COMM 907 - Advanced Seminar in Aural Rehabilitation**Credits:** 3

Current issues in therapeutic techniques and management considerations for the hard-of-hearing child. Speech perception by the hearing impaired, use of amplification systems, counseling approaches, and modification of the listening environment and language considerations, and the development of IEPs. Prereq: basic audiology, introduction to auditory perception and aural rehabilitation, speech and hearing science, or equivalent.

COMM 908 - Disorders of Language and Literacy I**Credits:** 3

Examination of language-based learning disabilities; relation between language and learning; current assessment and treatment strategies. Prereq: permission.

COMM 909 - Disorders of Language and Literacy II**Credits:** 3

The writing problems commonly observed in children with language disorders are reviewed from the perspective of language: writing relationships, meta-cognition, and memory. Current diagnostic and instructional approaches are discussed. Prereq: permission.

COMM 910 - Clinical Practicum**Credits:** 1-3

On-campus practicum provides graduate students with the opportunity to apply advanced theoretical knowledge in clinical setting with clients demonstrating speech, language, hearing, and/or swallowing disorders. Students acquire therapy and diagnostic experience under supervision. A minimum of 3 credits is required for the M.S. degree. May be repeated up to 3 times for a maximum of 3 credits. Variable 1-2 credits. Special fee.

COMM 911 - Externship**Credits:** 1-4

Application of advanced theoretical knowledge through clinical work in an off-campus clinical setting. Prereq: COMM 910, Clinical Practicum with a grade of "B" or above. A maximum of total of 8 credits required.

COMM 912 - Language Disorders Birth to Five**Credits:** 3

Trans-disciplinary examination of interrelationships between early language, social, and cognitive development, with emphasis on collaborative models of assessment and intervention. Reviews implications for special populations (e.g., mentally retarded, autistic, sensory impaired, and limited English proficiency.)

COMM 913 - Cognitive Communication Disorders**Credits:** 3

This course addresses the nature of cognitive-communicative impairments in children and adults with acquired brain injury and links theory and practice to community reintegration. Prereq: a course in neuro-anatomy.

COMM 914 - Augmentative and Alternative Communication**Credits:** 3-4

An overview of how augmentative and alternative communication systems can be used to foster the participation, interaction, and inclusion of children and adults for whom speech is not a primary mode of communication. Students are exposed to a broad variety of assessment and intervention techniques, some of which involve the use of assistive technology.

COMM 915 - Counseling Clients and Families with Communication Disorders**Credits:** 2

Course enables learners to understand essential elements of interaction with other human beings with whom they are working, and to apply therapeutic principles in clinical settings with people who have speech, language, and hearing difficulties. Learners are also able to identify which areas of counseling are outside their scope of practice. More specifically, this course is intended to: provide the learner with a broad overview of contemporary counseling approaches and issues; and apply these issues to the speech and hearing clinician. In addition we touch upon family systems and how they are affected by the presence of a communication disorder. The course involves formal lectures and group discussion. The course also offers unstructured time for the class members to use as they see fit. Only open to CSD, CSD: Lang&LitDisabilities, CSD:EarlyChild Intervention majors.

COMM 916 - Autism Spectrum Disorders**Credits:** 3

This seminar provides an overview of autism spectrum disorders (ASD) from multiple points of view. Participants become acquainted with the perspectives of individuals and their families' through first-hand accounts. Current practices related to the early identification, screening, diagnosis, and possible etiology of autism spectrum disorders, including an overview of medical considerations, are discussed. Evidence-based practices across the age-span are critically reviewed in the areas of behavior, communication, play, social interactions, sensory-motor, academics, and transition to adult life. Teaming approaches and person-centered planning to support a high quality of life for the individual are presented. Only open to CSD, CSD: Lang&LitDisabilities, CSD:EarlyChild Intervention majors.

COMM 917 - Research Mthds Comm Sci Dis**Credits:** 3

This course introduces students to concepts, procedures, and application of research methods in communication sciences and disorders. The course covers group, single subject, experimental, quasi-experimental, correlational, and qualitative designs with an emphasis on clinical application. Only open to CSD, CSD: Lang&LitDisabilities, CSD:EarlyChild Intervention majors.

COMM 920 - Graduate Seminar**Credits:** 1-6

Current topics, recent investigations, and library research. May be repeated up to 9 credits barring duplication of subject matter. A minimum of 2 credits is required for M.S. degree.

Computer Science (CS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

CS 800 - Internship**Credits:** 1

Provides an opportunity to apply academic experience in settings associated with future professional employment. A written proposal for the internship must be approved by the department chair. The proposal must specify what the student will learn from the internship, why the student is properly prepared for the internship, and what supervision will be available to the student during the internship. A mid-semester report and a final report are required. Permission required. Computer Science majors only. May be repeated up to a maximum of 3 credits. Cr/F.

CS 812 - Compiler Design**Credits:** 3

Formal languages and formal techniques for syntax analysis and parsing; organization of the compiler and its data structures; code generation. LL and LR parsing; automatic generation of scanners and parsers from high-level descriptions. Implementation of features from imperative and object-oriented languages. Students are required to design and implement a compiler for a simple language. Prereq: Machine Organization.

CS 819 - Advanced Programming with Object-Oriented Design**Credits:** 3

Advanced problem solving using software design, development and testing techniques that follow the software development life cycle. Object-oriented programming and design. Advanced data structures and algorithm analysis. Prereq: strong prog. skills, exp. with C/C++, match org.

CS #820 - Operating System Programming**Credits:** 3

Detailed discussion of operating system concepts and features. Practical examples and exercises that utilize advanced operating system features, including inter-process communication, synchronization, client-server communication, shared memory, threads, remote procedure calls, and device-level I/O. Discussion of POSIX 1003.1 Part I Standards. Prereq: operating system fundamentals or equivalent.

CS 823 - Performance Evaluation of Computer Systems**Credits:** 3

This class introduces the main concepts, techniques, and tools needed to evaluate the performance of computer systems under various configurations and workloads. The techniques allow one to perform capacity planning based on quality of service requirements of users and workload characteristics. The course is mainly based on the use of analytic queuing network models of computer systems. The performance techniques are applied to study the performance of centralized, distributed, parallel, and client/server systems. The course also discusses performance measuring tools for operating systems such as Unix and Windows NT. Prereq: operating systems fundamentals or equivalent.

CS 825 - Computer Networks**Credits:** 3

Introduction to fundamental concepts of computer networks and exploration of widely-used networking technologies. Topics include principles of congestion and error control; network routing; local, wireless and access networks; application protocol design; and network programming. In-depth discussion of the Internet suite of protocols.

CS 830 - Introduction to Artificial Intelligence**Credits:** 3

In-depth introduction to artificial intelligence concentrating on aspects of intelligent problem-solving. Topics include situated agents, advanced search techniques, knowledge representations, logical reasoning techniques, reasoning under uncertainty, advanced planning and control, and learning. Prereq: data structures.

CS 833 - Mobile Robotics**Credits:** 3

An introduction to the foundational theory and practices in mobile robotics. Topics include Kinematics of wheeled mobile robots. Seniors for mobile robots, robot navigation and perception, robot vision, localization and mapping of mobile robots. Hands-on experience directed towards implementation with a real robot. Prereq: Programming or permission of instructor.

CS 835 - Introduction to Parallel and Distributed Programming**Credits:** 3

Programming with multiple processes and threads on distributed and parallel computer systems. Introduces programming tools and techniques for building applications on such platforms. Course requirements consist primarily of programming assignments. Prereq: Undergraduate course in operating systems fundamentals and computer organization; or permission.

CS 845 - Formal Specification and Verification of Software Systems**Credits:** 3

Course focuses on the formal specification and verification of reactive systems, most notably concurrent and distributed systems. Topics relevant to these systems, such as non-determinism, safety and liveness properties, asynchronous communication or compositional reasoning, are discussed. We rely on a notation (T LA+, the Temporal Logic of Actions) and a support tool (TLC, the TLA+ Model Checker). Prereq: Students are expected to be knowledgeable in logic and to be able to write symbolic proofs in predicate calculus. A basic understanding of the notions of assertion, precondition, and post-condition is also assumed.

CS 850 - Machine Learning**Credits:** 3

An introduction to fundamental concepts and common methods in machine learning. In addition to theoretical topics, the course involves hands-on experience in making predictions using synthetic and real-world datasets. Prereq: Statistics, Programming or permission of instructor.

CS 853 - Information Retrieval**Credits:** 3

Fundamental algorithms and techniques for text processing and text-based information retrieval systems. Topics include how to build an end-to-end information retrieval system, such as a Web search engine. Prereq: Data Structures.

CS #854 - System/Software Test and Evaluation**Credits:** 3

This course identifies an integrated software test and evaluation process framework that emphasizes a "systems engineering" approach: the validation and viability of customer/user needs statements, verification of system design, full exercise of developmental testing, system integration/test dovetailing on the prior validations, plus evaluation of system quality attributes. This system engineering approach is intended to contain major problems, including interface issues, to phases preceding system test.

CS 857 - Mathematical Optimization for Applications**Credits:** 3

This course introduces the foundations of mathematical optimization and reinforces them via applications. The content includes convex optimization, first and second-order methods, constrained problems, duality, linear and quadratic programming, as well as discrete and non-convex optimization. Applications will focus on machine learning methods but also include problems from engineering and operations research. Prereq: MATH 426; Programming proficiency in MATLAB, R, Java, C, Python, or equivalent.

CS 858 - Algorithms**Credits:** 3

An introduction to important concepts in the design and analysis of algorithms and data structures, including implementation, complexity, analysis, and proofs of correctness. Prereq: understanding of basic data structures, familiarity with proof methods and basic concepts from discrete mathematics and the ability to program with recursion.

CS 860 - Introduction to Human-Computer Interaction**Credits:** 3

Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. Prereq: operating systems fundamentals.

CS #867 - Interactive Data Visualization**Credits:** 3

Detailed discussion of how an understanding of human perception can help us design better interactive displays of data. Topics include: color, space perception, object perception and interactive techniques. Students write interactive programs, give presentations and undertake a project designing and evaluating a novel display technique. Prereq: Introductory level C or C++ programming course. (Also listed as OE 867.)

CS 870 - Computer Graphics**Credits:** 3

Input-output and representation of pictures from hardware and software points of view; interactive techniques and their applications; three-dimensional image synthesis techniques. Prereq: data structures.

CS 871 - Web Programming Paradigms**Credits:** 3

In this course you will learn languages to program the Web. Languages integrated into browsers, like Javascript, and languages invoked on the server, like Ruby. You will also learn about frameworks, like Rails, and various techniques used to support the programming process. In addition, you will learn languages you will need to create, modify and process Web documents. Although we will learn how to read and write in these languages, our primary goal will be on understanding how the design of these multi-paradigm dynamic languages support the process of developing Web applications. Prereq: programming language concepts or permission.

CS 875 - Database Systems**Credits:** 3

Database analysis, design, and implementation. Focus on the relational model. Data description and manipulation languages, schema design and normalization, file and index organizations, data integrity and reliability. Usage of selected DBMS. Prereq: data structures; mathematical proof.

CS 880 - Topics**Credits:** 1-4

Material not normally covered in regular course offerings. May be repeated.

CS 898 - Master's Project**Credits:** 3**CS 899 - Master's Thesis****Credits:** 1-6

May be repeated up to a maximum of 6 credits. Cr/F.

CS 900 - Graduate Seminar**Credits:** 1

Regularly scheduled seminars presented by outside speakers, UNH faculty, and graduate students. Topics include reports of research ideas, progress, and results. Cr/F.

CS 920 - Advanced Operating Systems**Credits:** 3

This course covers techniques for formally analyzing various fundamental concepts and mechanisms which form the basis of the design of advanced operating systems, including distributed, database, and multiprocessor operating systems. Topics covered include synchronization, mutual exclusion, distributed algorithms, security, fault-tolerance, and distributed resource management. Prereq: operating system fundamentals or equivalent.

CS 925 - Advanced Computer Networks**Credits:** 3

Design and analysis of computer networks. Modeling and performance evaluation, queuing theory applied to computer networks. Traffic flow management and error control. Routing algorithms and protocols. Switch and router architectures. Selected issues in high-speed network design. Optical networks. Prereq: CS 825 or equivalent.

CS 933 - Human Robot Interaction**Credits:** 3

Human robot interaction (HRI) is a multidisciplinary research domain that investigates the issues involved with smooth integration of robots in the human society. This course will discuss the evolution of HRI research over the past two decades with an emphasis on HRI algorithms that promote safe, meaningful, and goal-oriented human-robot interactions. Topics also include experimental design methodologies commonly used in HRI studies. Prereq: CS 830 or CS 833 or CS 850 or instructor's permission.

CS 950 - Advanced Machine Learning**Credits:** 3

Course covers advanced machine learning techniques for making good decisions driven by data. The main focus areas are reinforcement learning, exploration-exploitation trade-off, mathematical optimization methods, and practical applications. Group-based Project on a selected topic. Prereq: instructor's permission.

CS 953 - Data Science for Knowledge Graphs and Text**Credits:** 3

This course covers basic and advanced algorithms and techniques for data science with knowledge graph and text data. This includes a wide range of algorithms for graph processing, text processing, and information retrieval with a focus of knowledge graphs and text from knowledge articles. Prereq: CS 853 or Permission of Instructor.

CS 980 - Advanced Topics**Credits:** 3**CS 981 - Advanced Topics in Database Systems****Credits:** 3**CS 986 - Advanced Topics in Formal Specification and Verification****Credits:** 3

This course explores more thoroughly some of the material introduced in CS 845. It focuses on concurrent and reactive systems and on temporal logics. Topics include safety and liveness properties, asynchronous communication, and compositional reasoning. Support tools, like interactive theorem provers and model-checkers, are presented and used in class. Prereq: introduction to formal specification and verification. May be repeated up to a maximum of 6 credits.

CS 988 - Advanced Topics in Computer Graphics**Credits:** 3**CS 989 - Advanced Topics in Algorithms****Credits:** 3**CS 998 - Independent Study****Credits:** 1-6**CS 999 - Doctoral Research****Credits:** 0

Cr/F.

Computing Technology (COMP)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

COMP 805 - Web Application Development**Credits:** 3

Students work in teams and implement, test, document, demonstrate, and deploy web systems that solve organizational needs expressed by real clients. Emphasis is on advanced server-side and client-side programming and integration of web applications with database and web server applications. Free and open source development and communication tools are used to carry out the course project.

COMP 815 - Information Security**Credits:** 3

Topics include general security principles and practices, network and system security, access control methodology, and cryptography. Students develop a basic cryptographic system based on sound mathematical principles, elaborate on its features and refine it, and experiment with various ways to attack it. Some programming required.

COMP 820 - Database Systems and Technologies**Credits:** 3

This is a project course that provides practical experience with database systems and technologies. Topics include data modeling, database design, system development and integration, database administration, and configuration and project management. The course emphasizes communication and collaboration with online tools. Project artifacts and activities are supported by current version control and database development and administration tools.

COMP 821 - Big Data for Data Engineers**Credits:** 3

In this course students gain practical experience developing data-oriented applications in modern infrastructure frameworks, also known as cloud data solutions. Guided by what a data scientist profile is, students become familiar with the use cases of data oriented applications. They will apply key data modeling and data design concepts to meet business requirements. Students will also apply modern software development to iteratively construct solutions using established reference architectures. Project work will be based in Google Cloud Platform and Amazon Web Services. Special fee.

COMP 825 - Programming Languages**Credits:** 3

Explores the main features of modern, high-level, general purpose programming languages from the user point of view. Provides students with an opportunity to use non-imperative programming paradigms, such as object-oriented, functional, and visual, and to learn how specific features of such languages can be used efficiently in solving problems. The purpose is to gain knowledge regarding the languages studied as well as providing the basis to conduct analysis related to comparisons and divergence in capabilities. Prereq: COMP 425 or equivalent. No credit earned if credit received for ET #647, COMP 725, CIS 698 Adv Perspectives on Programming, or COMP 698 Adv Perspectives on Programming.

COMP 830 - Object-Oriented Software Development**Credits:** 3

Presents an iterative methodology for developing software systems. Development activities include requirements elicitation and analysis, system and object design, implementation and testing, project and configuration management, infrastructure maintenance, and system deployment to the end user. Students work in teams, assume developer roles, build models of a real-world system, and produce proof-of-concepts, prototypes, or system upgrades.

COMP 835 - Networking Technologies**Credits:** 3

Introduces advanced topics in computer networks. The focus is on principles, architectures, and protocols used in modern networked systems, such as routing, quality of service, wireless and mobile networks, large-scale peer-to-peer systems, virtualization, and cloud computing. Students analyze tradeoffs in large and complex networks and design and evaluate networked systems. Concrete experiences of these learning activities are provided through lab and online exercises.

COMP 840 - Machine Learning Applications and Tools**Credits:** 3

Introduces students to practical approaches of machine learning. The course is an exploration of creative applications of artificial intelligence using modern machine learning components and tools, including deep learning techniques. Different application domains are considered, such as computer vision, natural language processing, and cyber security. Students learn to evaluate the effectiveness of machine learning systems as well as their potential prediction problems.

COMP 850 - Neural Networks**Credits:** 3

Artificial neural networks power the recent advances in computer vision, speech recognition, and machine translation. This is a first course on neural networks with a focus on applications in computer vision and natural language processing. Topics will include generic feedforward neural networks, convolutional neural networks for computer vision tasks, and recurrent neural networks with application to natural language processing, with other topics to be selected based on the interests of the instructor and the class. Prereq: MATH 425, MATH 545 or 645, or COMP 490.

COMP 851 - System Integration and Architecture**Credits:** 3

Students work in teams to explore and practice various system integration techniques to address requirements, software and hardware acquisitions, integration issues, and acceptance testing. Specific focus is given to diagnosing and troubleshooting systems interoperability and interface integration issues. Students develop project plans and study the influence of business processes and culture on system architecture decisions. Studied techniques are compared and contrasted to derive lessons learned, best practices, and critical success factors.

COMP 860 - Data Visualization & Comm**Credits:** 3

Through hand-on experience with a leading data-visualization tool, the course introduces the concepts of data visualization to allow students to communicate and analyze data effectively using visual techniques.

COMP 880 - Topics**Credits:** 1-3

This course includes topics and emerging areas in computing. Barring duplication of subject the course may be repeated for credit.

COMP 890 - Internship**Credits:** 1-3

The internship experience enhances the student's academic achievements with real-world, professional IT projects through placement at business, industry, and other sponsoring organizations. The student is expected to apply knowledge and skills acquired through other coursework in the major to address and solve new, authentic problems identified by the internship employer. Under the direction of a faculty advisor and workplace supervisor, the student is expected to contribute to the information technology products, processes, or services of the organization. May be repeated for a maximum of 6 credits. Permission required. Cr/F.

COMP 895 - Independent Study**Credits:** 1-3

Advanced individual study under the direction of a faculty mentor. Content area to be determined in consultation with faculty mentor. Prereq: permission. May be repeated.

COMP 898 - Master's Project**Credits:** 3

Guided project on a topic which has been approved as a suitable subject for a master's project. Supervision and advising by faculty in the Computing Technology program. Completion of 24 credits in the major.

COMP 899 - Master's Thesis**Credits:** 1-6

Guided research on a topic which has been approved as a suitable subject for a master's thesis. Supervision and advising by faculty of the Computing Technology program. Cr/F.

Cybersecurity Policy & Risk Management (CPRM)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

CPRM 810 - Foundations of Cybersecurity Policy**Credits:** 3

Examine the societal and organizational impacts of cybersecurity policy in our interconnected world that is increasingly dependent on advanced technologies and systems for communications and control. Explore the components of information systems and control systems and review the history and development of cybersecurity. Gain an appreciation of policy as one tool for managing risk, and start to consider the challenges of cybersecurity policy-making.

CPRM 820 - Policy Development and Communication**Credits:** 3

Discover the fundamental concepts and practices for developing and drafting organizational policy, including related documents to support implementation. Explore how to communicate policies to internal and external audiences (in both written and oral communications). Learn how to incorporate organizational priorities and mandates into managerial policies. Case studies are primarily based in security studies, but other professional fields are welcomed.

CPRM 830 - Security Measures I**Credits:** 3

This course introduces common technological and organizational measures for cybersecurity, with a focus on protection concepts. Students assess the organizational impacts of security measures, and explore how best practices, standards, and organizational policy can help manage such measures. Topics include identity management, authentication, access control, data and system security and availability, encryption, integrity mechanisms, system maintenance, and continuity of operations. Note that we do not focus on how to technically implement these security systems. Prereq: CPRM 810.

CPRM 840 - Cybersecurity Standards, Regulations, and Laws**Credits:** 3

We survey laws, regulations, and standards for cybersecurity in the United States, including "soft law" and self-regulation. Topics include the pros and cons of regulatory solutions and market solutions; the different approach to data protection regulation in the European Union; and cybersecurity concerns and regulatory authorities in various U.S. industries and sectors. Students become familiar with key standards bodies involved in cybersecurity, and explore organizational processes for remaining current with industry best practices.

CPRM 850 - Security Measures II**Credits:** 3

This course continues surveying common technological and organizational measures for cybersecurity, with a focus on detection and organizational relationships. Topics include auditing and log records; monitoring and testing for threat detection; vulnerability scans; and the security of external services (e.g., cloud providers) and supply chains. We do not focus on how to technically implement these measures. Students assess organizational impacts and explore how best practices and standards can help manage such measures. Pre- or Co-req: CPRM 830.

CPRM 860 - Incident Response and Investigation**Credits:** 3

This course fosters cybersecurity incident response and investigative knowledge, from both the organizational and system perspective. Material includes laws, standards, codes of behavior and best practices for incident response, including the management of relationships (e.g., regulators, clients, vendors). Case studies are presented and discusses in light of organizational resource limitations, legal mandates, and jurisdictional boundaries. Prereq: CPRM 830. Pre- or Co-req: CPRM 850.

CPRM 870 - Cybersecurity Risk Management**Credits:** 3

This course establishes foundations for addressing cybersecurity as a risk management concept and process, and as a component of overall risk management within an organization. Students will become familiar with theories of risk and methods of risk management, as well as frameworks/models for applying these theories and methods to cybersecurity. Prereq: CPRM 840 and CPRM 860.

CPRM 879 - Research Methods**Credits:** 3

This course helps students understand and apply research methods and planning processes for accomplishing a graduate-level thesis. Students will survey a variety of research approaches and select those most applicable to each student's research project. Within those approaches, students will explore planning and management skills as well as academic components (e.g., literature review, critical analyses) in preparation for applying these skills and knowledge in a Capstone: Thesis Option course.

CPRM 880 - Cybersecurity Metrics and Evaluation**Credits:** 3

This course provides an overview of analytical techniques for the documentation and evaluation of cybersecurity metrics, and the incorporation of such assessments in organizational risk management. Students will become familiar with methods for cybersecurity evaluation and the translational impacts to function and mission success of an organization (business, public administration, homeland security, etc.); as well as processes for security measurements, comparisons, and reassessments for purposes of risk management. Pre- or Co-req: CPRM 870.

CPRM 890 - Organizations, Change Management, and Leadership**Credits:** 3

This course examines both private and public institutions as systems whose effectiveness depends on how an organization adapts to opportunities, threats, and demands (external and internal). Students explore the design and leadership of ethical and socially responsible organizations. In course examples and exercises, students will apply this knowledge to their respective research interests (e.g., cybersecurity, analytics, criminal justice, public health, etc.).

CPRM 895 - Independent Study**Credits:** 3

This course allows students to complete a graduate-level course in Cybersecurity Policy and Risk Management program via independent study if they were unable to take the course when it was offered. This course can substitute for a required course.

CPRM 898 - Capstone: Non-Thesis Option**Credits:** 3

This capstone integrates all disciplines and competencies that have been learned in this degree program, plus the student's past experiences, areas of specialization, and professional goals, into a single work-based project, internship experience, or other appropriate activity. In consultation with an advisor, each student develops a project plan, establishes goals and objectives; collects and analyzes information; and prepares and delivers a final project agreed upon by the student and advisor. Prereq: CPRM 720 / CPRM 820 and CPRM 880. Pre- or Co-req: CPRM 790 / CPRM 890.

CPRM 899 - Capstone: Thesis Option**Credits:** 6

Students synthesize, evaluate, and integrate past experiences, new research, and the cross-disciplinary knowledge constructed during this degree program to create a publishable quality, graduate-level thesis. In continuation with an advisor, each student develops a project plan; establishes goals and objectives; collects and analyzes information; and prepares and delivers a final product agreed upon by the student and advisor. Prereq: CPRM 720 / CPRM 820, CPRM 870 & (CPRM 879 or EDUC 882). Pre- or Co-req: CPRM 790 / CPRM 890.

Development Policy & Practice (DPP)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

DPP 901 - Integrative Approaches to Development Policy and Practice**Credits:** 3

This course aims to provide students with a general introduction to the basic core competencies and practical skills required of a "generalist" development practitioner and serves as the foundation course for the curriculum. Case studies will be used to demonstrate the interconnectedness of natural sciences and engineering, social science, health sciences, and management, especially as they relate to communities.

DPP 902 - Economic Analysis for Development**Credits:** 3

This course provides the practitioner with tools of economic analysis that are necessary for effective community development practice. Drawing upon principles of macroeconomics, the course explores how markets, property rights, political institutions, government policies, environmental conditions and cultural values interact to produce development outcomes.

DPP 903 - Global Health**Credits:** 3

An analysis of the public process, the development of public health policy in developing countries, and a discussion of specific public health policy issues with cross-country comparisons. This course begins with an analytical framework for analyzing a public health system and process. It is followed by a general introduction to effective health policies in developing countries with examples of specific policies and programs that have been effective.

DPP 904 - Environmental Sustainability and Development**Credits:** 3

Provides students working at a graduate level but lacking specific background in ecology with an applied perspective on challenges at the interface of rural development and environmental science. By the end of the course, students should be conversant in the languages of large-scale ecosystem, ecology, and conservation biology, and should have a basic working knowledge of the science of carbon and climate change, land use change and deforestation, and the impacts of land use on biodiversity and water quantity/quality.

DPP 905 - Fiscal Management for Development Organizations**Credits:** 3

Budgeting, goal setting, financial planning and financial analysis for development organizations.

DPP 906 - Organizational Management and Leadership**Credits:** 3

Combines theory and practical information for students to learn traditional and contemporary organizational and leadership theories and apply them to their experience in organizations particularly non-profit institutions, non-governmental organizations. The course will focus on personal and inter-personal development such as self-awareness, stress and problem solving, interpersonal skills such as supportive communication, power and influence, motivation and conflict management: group skills such as delegation and team building; and leadership. Permission required.

DPP #907 - Sustainable Engineering for Development Practice**Credits:** 3

This course begins with the exploration of the precept that we live in a world where we must design and engineer products with a finite supply of natural resources, and with limited life support capacity. Tools for sustainability engineering related to development practice (e.g., health, energy, housing) are the major focus of the course, which include life cycle analysis and life cycle impact analysis, the metrics and mass and energy flow analysis used in the field of industrial ecology, and environmental management systems.

DPP 908 - Policy Seminar**Credits:** 3

This seminar will reinforce the multidisciplinary breadth and trans-disciplinary perspective of the master's program, providing students with the opportunity to sharpen critical policy analysis skills. The goal of the course is to help students understand the sources of public policy, that is, why we have various public policies and how to produce professional policy analysis.

DPP #909 - Environmental Sciences and Infrastructure for Sustainable Communities and Development**Credits:** 3

Achieving sustainability requires that consideration be given to meeting present and future human needs and respecting "triple bottom line" economic, social, and environmental goals. In this course, we provide the necessary background in the environmental sciences so that community development practitioners can understand the environmental consequences of development, and moreover, how environmental services directly support human needs. Since communities also need constructed facilities, known as infrastructure, that support and shelter human activities, the course also provides a review of several important types of infrastructure systems, their interactions with the social, economic, natural environments, and how they can be designed and managed to support sustainable development and communities.

DPP 910 - Leadership and Development**Credits:** 2

Leadership and Development emphasizes issues relevant to managing organizations in diverse cultural, socio-economic and political settings. Topics on board governance, resource development, organizational options and communication skills such as marketing, public relations, organizing and conducting meetings will be explored. Permission required.

DPP 911 - Environmental Factors in Development Practice**Credits:** 1

Students will learn key themes in the integration of environmental, social, and economic systems in community development and consider how to incorporate these themes into their master's community project.

DPP 950 - Current Issues in Microfinance and Microenterprise Development**Credits:** 3

Microfinance (m-f) and micro enterprise (m-e) development are powerful instruments, but they are in many ways only rather distantly connected with one another, and microfinance in particular is the victim of exaggerated expectations. This course is designed critically to examine certain vital questions about these two topics, to temper wishful thinking, to identify problems and to generate remedies for them. Prereq: Project Design.

DPP 951 - Nuts and Bolts of Microfinance**Credits:** 3

This course is designed to provide the participant with an overall understanding of the microfinance institutions including management, planning and monitoring strategies, tools, and systems. Sessions will seek to develop skills and capacity to examine various areas, such as competition, expansion, product development, service delivery and human resource, marketing, and information management systems. Prereq: Project Design.

DPP #952 - Balancing Resource Management, Land Use, and Development**Credits:** 3

In this course, we explore how land use, resource management, and development are balanced within the context of three case studies: Africa, Central America, and New England, USA. Students apply the methods and concepts learned in the class to develop a local New Hampshire case study/policy analysis.

DPP 953 - Community Medicine and Epidemiology**Credits:** 3

Surveys the fundamental principles of epidemiology and its importance as an analytical tool in the fields of public health and policy development to assure the health of populations in the developing world. Emphasis is placed on providing the student with a firm foundation of epidemiological concepts via a historical perspective of the field, measures of disease occurrence and association, practical applications to policy, data sources, and study designs to reduce community health problems. In order for the student to be able to utilize epidemiology as a health management tool, special emphasis will be placed on understanding and applying descriptive and analytical epidemiologic techniques to assess the health of diverse communities. The student will gain an appreciation for the role epidemiology plays in helping to produce and maintain healthy populations on both a local and global scale.

DPP 954 - Sustainable Agriculture and Food Systems**Credits: 3**

Reviews the historical, ecological, economic, social and political aspects of agricultural sustainability principles and practices. Examines the sustainability of various agricultural systems and practices. Examines specific commodity chains - vegetables, grains, meat - in comparative global context. Reviews general concepts governing the functioning of tropical agro-ecosystems in relation to resource availability, ecological sustainability, and socio-economic viability.

DPP 956 - Housing Development**Credits: 3**

This course examines housing development with a focus in emerging economies of the South and parallel contexts from the North. It surveys connections between and among issues related to land, design, finance, legal and regulatory frameworks, construction materials, and state interventions in housing delivery; analyzes the informal land and housing markets and slum upgrade strategies; and examines global housing challenges with reviews of demographic, technological, socio-economic, cultural, legislative, financial and political variables that are responsible for glaring disparities in the quantity and quality of housing stocks in nations of the South and North. Permission required.

DPP #957 - Negotiation Strategies**Credits: 3**

Course goals are: 1) To review and understand theories related to negotiations, and 2) To develop and sharpen negotiating skills through practice (case studies) and debriefing of the cases. This course helps participants develop a "method" for preparing and carrying out negotiations across a range of community development situations. This course also examines important negotiation issues for the community development practitioner such as: valuing non-financial assets; negotiating with larger, more powerful entities; and, dealing with uncooperative parties. The course focuses on case studies and debriefing as the primary learning technique. Participants examine their assumptions about negotiations and work to improve their negotiating skills. Permission required.

DPP 958 - Financing Development**Credits: 3**

This course examines the problems faced by development practitioners in financing development activities. The course first focuses on financial markets and the financial needs of development projects and ventures. It will then look at the institutional structures capable of providing development capital in appropriate ways for various development projects. In evaluating institutional structures we focus on a wide variety of institutional management issues including risk assessment, non-traditional underwriting standards, interest rate structure, portfolio management and managing loan delinquency. The final sessions of the course focus on the critical policy issues in the field of development finance. Permission required.

DPP 959 - Workforce Development**Credits: 3**

This course examines changing the global and national economic patterns, restructuring labor markets and institutions, and evolving regional/local workforce development initiatives and intermediaries. The course emphasizes the national and regional public policy implications of these transformations, with a focus on existing and emergent workforce development approaches in the United States. Among the themes to be explored are relationships between workforce development and economic development; opportunities for skills upgrading and life-long learning; and challenges for workers with barriers to employment. The course uses a mixture of readings, lectures, written assignments, seminar-style discussions, guest lectures, and individual/group exercises.

DPP 960 - Social Enterprise**Credits: 3**

This course examines innovative organizations that are created to improve people's lives and that contribute to improved social, economic and environmental conditions. These organizations adapt various aspects of the market model emphasizing both financial viability and social (including environmental) goals - measuring achievement in all of the areas. Social enterprises are often launched to address problems where government, the private sector and the traditional non-profit sector fail to provide a public good. The course emphasis is on how such organizations are started, the business models they develop, and how they are sustained. We will have a wide range of social entrepreneurs presenting in the class. Permission required.

DPP 961 - Community Development Finance**Credits: 3**

This course examines the historic, theoretical, and applied foundations of community development lending and investment. The course critically examines what works, what doesn't work, and how community development financial institutions, investors, government agencies, private donors, and the capital markets have all contributed to the field of community development finance. The course also covers which methodologies, strategies, products, services, organizational models, and evaluation and reporting protocols have the greatest efficacy towards building and improving the industry.

DPP 962 - Public Safety and Community Development**Credits: 3**

This course will use a multidisciplinary approach to examine the underpinnings of creating the safe, just and predictable communities that are necessary for sustainable development. Various models of government legitimacy will be examined, particularly in light of the rule of law movement. The purposes of criminal justice systems (punishment, rehabilitation, and/or restoration) and the significance of procedural justice will be explored. The latter part of the course will focus specifically on public safety as a precursor to, or component of community development. The effects of collective efficacy, community cohesion, social capital and community level trauma on crime patterns and community engagement will be highlighted. Finally strategies for promoting public safety and engaging vulnerable populations (minorities, women, youth, poor) will be explored, models that join public safety with community development will be highlighted.

DPP 980 - Project Design**Credits: 3**

During the first semester, students will identify a community problem or issue, research and analyze the issue in consultation with colleagues and community stakeholders, and design a project. A preliminary design will be submitted at the end of the first semester.

DPP 981 - Project Implementation**Credits:** 3

Students will begin implementation activities in field placement communities. Regular progress reports and online postings will be required. Prereq: Project Design.

DPP 982 - Project Management**Credits:** 3

Studies how project plan inputs are accurately gathered, integrated, documented and managed; the tools and techniques used in project management; and the outputs of a project plan to viable stakeholders. Considers the development of project scope, work breakdown structures, and the importance of quality, risk, and contingency management in planning development. Prereq: Project Design.

DPP 983 - Project Monitoring and Evaluation**Credits:** 3

This semester students will conduct an evaluation of their project and manage closure processes. At the end students will submit a final written report and present it to the faculty and peers. This final project and the final report detailing the project will serve as the capstone course of the program. Prereq: Project Design.

DPP 990 - Independent Study**Credits:** 1-4

In order to earn the MACDPP degree, students must complete fourteen courses (equivalent to 39 credits). Eleven of the fourteen courses are required courses, while the remaining three are elective courses. A maximum of two elective courses may be completed as independent studies, which allow students to study a unique topic in-depth that is not offered as a traditional course.

Earth Sciences (ESCI)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ESCI 801 - Quantitative Methods in Earth Sciences**Credits:** 4

Introduces quantitative tools necessary for upper level Earth Science courses. Includes basic statistical descriptions of spatially and temporally varying data, curve fitting, and time-series analysis with emphasis on atmospheric, oceanic and terrestrial data sets. Students learn to construct simple numerical models of Earth Systems. Instruction in data and analysis and modeling in Matlab. Prereq: Calculus and at least one 500 or 600 level undergraduate Earth Science course; or permission.

ESCI 805 - Principles of Hydrology**Credits:** 4

Physical principles important in the land phase of the hydrologic cycle, including precipitation, snow melt, infiltration and soil physics, and surface and subsurface flow to streams. Problems of measurement and aspects of statistical treatment of hydrologic data. Field trips. Transportation fee. Prereq: two semesters of calculus required; statistics recommended. Special fee. Lab.

ESCI 810 - Groundwater Hydrology**Credits:** 4

Principles for fluid flow in porous media with emphasis on occurrence, location, and development of groundwater, but with consideration of groundwater as a transporting medium. Major topics include well hydraulics, regional groundwater flow, exploration techniques, and groundwater modeling. Laboratory exercises involve use of fluid, electrical, and digital computer models to illustrate key concepts. Prereq: ESCI 654 or equivalent or permission. Special fee. Lab.

ESCI 826 - Igneous and Metamorphic Petrology**Credits:** 4

This course focuses on the origin and evolution of igneous and metamorphic rocks from field, petrographic mineral chemistry, experimental, and theoretical studies. Igneous systems include volcanic and plutonic suites, with emphasis on mineralogic records of magma chamber systematics. Metamorphic systems include pelitic, mafic, and calc silicate rocks, with special emphasis on closed- and open-system reactions, multi-systems, reaction space, and pressure-temperature-time paths. Prereq: ESCI 614; adequate calculus, chemistry, and physics. Field trips. Special fee. Lab.

ESCI #831 - Geodynamics**Credits:** 4

Application of quantitative methods to geologically motivated problems, focusing on lithospheric deformation, topography, and fluid flow. Students acquire geophysical and geochemical techniques used to address dynamics in the Earth system. Includes biweekly recitation sessions for working through problemsets and facilitating discussions of relevant papers from the literature. Prereq: one year each of physics, calculus, chemistry or permission.

ESCI 834 - Geophysics**Credits:** 4

The structure of the solid Earth, including the continental and oceanic lithosphere and the deep interior as revealed by investigations of seismic waves, the Earth's gravitational and magnetic fields, heat flow, and earthquakes. Prereq: ESCI 401; one year of calculus; one year of college physics; or permission. Special fee. Lab.

ESCI 835 - Earthquakes and Faulting**Credits:** 4

This course provides an introduction to the principles of brittle faulting and earthquake mechanics. We discuss classic theory and current topics in earthquake science based on observations from laboratory experiments, seismology, geodesy, and geology (exhumed faults). Prereq: Structural geology or permission.

ESCI 841 - Geochemistry**Credits:** 4

Course focuses on the application of chemical principles to solve problems in the Earth sciences. Students learn the chemical tools of thermodynamics and kinetics, element partitioning, conservation of mass, and isotope geochemistry. Explore geochemical properties/processes in the deep Earth and the Earth surface, atmosphere and marine systems, and cosmo-chemistry and investigate the interactions between these components of the Earth system. Lab. Prereq: one year each chemistry, calculus.

ESCI 845 - Isotope Geochemistry**Credits:** 4

Course focuses on the application of radiogenic, radioactive and stable isotopes to improve students' knowledge about the processes and timescales relevant to the formation of the planet and solar system, the evolution of the Earth system and interactions in the hydrosphere and biosphere. Topics include geochronology, tracer applications, Earth surface applications, as well as applications in the hydrosphere and biosphere. Systems discussed include the classic radiogenic systems (K-Ar, Rb-Sr, Sm-Nd, Lu-Hf and U-Th-Pb), traditional (H, C, N, O) as well as nontraditional (e.g., Mg, Ca, Fe) stable isotope systems, and radioactive isotopes (e.g., radiocarbon). Course consists of lecture, where students are exposed to these applications, and a lab section to work through any questions on the homework assignments, discuss relevant papers from the literature, and carry out a project. Special fee. Lab. Prereq: one year each chemistry and calculus.

ESCI 847 - Aqueous Geochemistry**Credits: 4**

The chemical processes that determine the composition of aquatic systems such as rivers, lakes, groundwater and the ocean. The goal is to quantitatively understand the behavior of inorganic species such as carbon dioxide, nutrients, trace metals and inorganic pollutants in natural waters. Topics include, acid-based equilibria, carbonate chemistry, reduction-oxidation reactions, organic complexation and mineral precipitation and dissolution. Lab. Prereq: 1 year of college calculus and chemistry or geochemistry.

ESCI 850 - Biological Oceanography**Credits: 4**

Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. Field trips on R/V Gulf Challenger and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. (Also offered as ZOOL 850, EOS 850.) Special fee. Lab. (Not offered every year.)

ESCI 852 - Chemical Oceanography**Credits: 3**

This course investigates the physical and biogeochemical processes that determine the composition of seawater. Topics include biological effects on chemistry, ocean nutrient cycles, air-sea gas exchange, radiogenic and stable isotopes as tracers of ocean processes, sediment and trace-metal chemistry. Prereq: one year of college chemistry and calculus or permission.

ESCI 854 - Sedimentology**Credits: 4**

This course focuses on modern sedimentary processes and ancient sedimentary records through the examination, identification, and interpretation of sediments and sedimentary rocks. Topics such as sediment transport mechanisms, depositional environments, and time in sedimentary records will provide a strong framework for any student studying Earth processes and sedimentary systems. Special fee.

ESCI 856 - Geotectonics**Credits: 3**

The geological record of plate tectonics past and present. The first part of the course focuses on modern tectonic settings with an emphasis on plate geometries, geodynamical processes, and sedimentary products. The second part of the course focuses on reconstructing ancient tectonic settings with an emphasis on methodology (paleomagnetism, basin analysis, provenance) and case studies (e.g. India-Asia collision). Field trip. Prereq: ESCI 614 or ESCI 631 or permission. Special fee.

ESCI 858 - Introduction to Physical Oceanography**Credits: 3**

Descriptive treatment of atmosphere-ocean interaction; general wind-driven and thermo-haline ocean circulation; waves and tides; continental shelf and near-shore processes; instrumentation and methods used in ocean research. Simplified conceptual models demonstrate the important principles. Prereq: calculus based physics, introduction to oceanography; or permission.

ESCI 859 - Geological Oceanography**Credits: 4**

Major geological features and processes of the ocean floor; geological and geophysical methods; composition of the earth, sedimentary processes, plate tectonics and paleoceanography.

ESCI 860 - Paleoceanography**Credits: 3**

This course introduces the basic principles of paleoceanography, such as the preservation of ocean history in sediment archives and the analysis/interpretation of paleoceanographic data. The course focuses on the capabilities and limitations of paleoceanographic techniques, and empowers students to critically assess the strengths and weaknesses of results presented in scientific journals. Topics include Milankovitch cycles, faunal assemblages, temperature and circulation proxies, linear and non-linear responses to climate forcings, abrupt climate events atmospheric teleconnections and monsoons. Prereq: Introductory Chemistry, Introductory Geology.

ESCI 862 - Glacial Geology**Credits: 4**

Course provides a survey of glacier dynamics and processes, with an emphasis on understanding the origin and significance of glacial deposits and landforms. The first half of the course examines the physics of glaciers, and the second half focuses on glacial geologic processes. Lectures discuss glaciers and ice sheets as key agents of large-scale geomorphic change, as well as their central role in the Earth's past and present climate system. Labs involve analysis of glaciological data, glacial-geologic map interpretation, and short field exercises. Course incorporates one mandatory weekend field trip that explores the glacial landscapes of New England. Special fee. Lab.

ESCI 864 - Spectral Analysis of Geophysical Time Series Data**Credits: 4**

This course considers basic exploratory techniques and in-depth spectral analysis for estimation with geophysical time series data, including calculations of confidence intervals and significance testing. This course prepares students for interpreting time series data with science and engineering applications. Topics include sampling theory, filtering, statistics, probability, spectral analysis, and empirical orthogonal functions. Students gain experience in code-writing for the analysis of time series data. Prereq: Calculus.

ESCI 865 - Paleoclimatology**Credits: 3**

Course reviews the study of past changes in the Earth's climate system. Main discussion topics include astronomical theories of ice ages, Quaternary dating methods, Antarctic and Greenland ice core records, greenhouse gases, marine-based climate proxies, glacial mega-floods, and linkages between ocean circulation and abrupt climate change. Emphasis on climate variability during the Quaternary period (the last approximately 1.8 million years), a time interval dominated by cycles of global glaciation. Lectures include discussion of recent and emerging scientific papers in order to keep pace with the latest findings in paleoclimatic research.

ESCI 866 - Volcanology**Credits: 4**

Provides a comprehensive overview of volcanic processes and their influences on planetary evolution and modern-day Earth systems. Lectures discuss the generation and properties of magma, tectonic setting of volcanism, eruption styles, volcanic landforms and products, monitoring of active volcanoes, volcanic hazards, and volcanism on other planets. Laboratory topics include modeling volcanic processes, hand-sample observation, topographic map interpretation, volcanographical data analysis, and two afternoon field trips. As volcanology is a rapidly developing field of active research, the course incorporates discussions of recent and emerging scientific papers from the literature and student-led updates of ongoing volcanic activity. Prereq: on year of calculus and one Earth Science course or permission. Special fee. Lab.

ESCI 871 - Geodesy and Positioning for Ocean Mapping**Credits: 4**

The science and technology of acquiring, managing, and displaying geographically-referenced information; the size and shape of the earth, datums and projections; determination of precise positioning of points on the earth and the sea, including classical terrestrial-based methods and satellite-based methods; shoreline mapping, nautical charting and electronic charts. Prereq: one year of calculus and one year of college physics. (Also offered as OE 871.)

ESCI 872 - Applied Tools for Ocean Mapping**Credits: 2**

A review course on research tools commonly used in ocean mapping. The course focuses on teaching problem solving skills, not merely the application of tools. The course consists of modules addressing the use of: IVS Fledermaus; GeoMappApp, GIS, Google Earth, Matlab as well as the effective library research and use of Wikis. Prereq: two terms of single variable calculus. Cr/F.

ESCI 874 - Integrated Seabed Mapping Systems**Credits: 4**

Overview of typical applications that involve mapping the sediment-water interface in the ocean and adjacent waters. Emphasis on defining the task-specific resolution and accuracy requirements. Fundamentals of acoustics relevant to seabed mapping. Progressions through typical configurations involving single beam, sidescan, phase differing and multibeam systems. Integration of asynchronous 3D position, orientation and sound speed measurements with sonar relative acoustic travel times and angles. Analysis of impact of offsets, mis-alignments and latency in all integrated sensors. Prereq: two terms each of college calculus and physics. Pre- or Co-req: MATH 831 or equivalent material.

ESCI 875 - Fundamentals of Ocean Mapping II**Credits: 4**

The second of two courses covering the principles and practices of hydrography and ocean mapping. In this course the following topics are covered: Ancillary Sensor Integration, System Calibration, Verification and Field QA/QC, Water Levels (Tides); Mapping Standards; Survey Planning, Execution and Reporting; Terrain Analysis; Optical Remote Sensing; Data Presentation; Seafloor Characterization; Electronic Navigational Charts; Hydrography for Nautical Charting, Product Liability and contracts; and the United Nations Common Law of the Sea (UNCLOS). Prereq: OE 874/ESCI 874, two terms each of college calculus and physics. Pre or Co-req: MATH 831 or equivalent material.

ESCI 877 - GIS for Earth & Environmental Sciences**Credits: 4**

Geospatial technologies provide insight into spatial and temporal aspects of environmental and earth systems. Students will master basic skills of a geographical information system. Weekly laboratory exercises will build upon a foundation of conceptual knowledge and data processing skills. Focus on applied research questions and projects will be addressed. The course will use the open source program QGIS. Additional work will develop programming skills using the python language. Programming background is not required but beneficial. Prereq: Undergraduate Science Course.

ESCI 878 - Remote Sensing Earth & Environmental Sciences**Credits: 4**

Remote sensing provides insight to spatial and temporal aspects of environmental and Earth systems. Students will examine digital image processing techniques, different sensor and platform technologies, and new trends and frontiers in remote sensing science. Weekly laboratory exercises build upon conceptual knowledge, data processing skills, and development of programming skills. Applied research questions and projects will use Google Earth Engine. Hyperspectral, lidar, and unmanned aerial systems will be presented. Prereq: Undergraduate Science Course.

ESCI 895 - Topics**Credits: 1-4**

Study on an individual or group basis in geologic, hydrologic, or oceanographic problems, under members of the graduate staff. Topics include: geochemistry, geomorphology, geophysics; glaciology; groundwater, structural, and regional geology; crystallography, mineralogy; petrology; thermodynamics; ore deposits; earth resource policy; paleontology; sedimentation; stratigraphy; water resources management; chemical, physical, and geological oceanography; earth systems; earth science teaching methods. Prereq: permission of staff concerned. May be repeated.

ESCI 896 - Topics**Credits: 1-4**

Study on an individual or group basis in geologic, hydrologic, or oceanographic problems, under members of the graduate staff. Topics include: geochemistry, geomorphology, geophysics; glaciology; groundwater, structural, and regional geology; crystallography, mineralogy; petrology; thermodynamics; ore deposits; earth resource policy; paleontology; sedimentation; stratigraphy; water resources management; chemical, physical, and geological oceanography; earth systems; earth science teaching methods. Prereq: permission of staff concerned. May be repeated. Special fee on some topics.

ESCI 897 - Colloquium**Credits: 0**

Presentation of recent research in the earth sciences by guest speakers and department faculty. May be taken four times. Cr/F.

ESCI 898 - Directed Research**Credits: 2**

Research project on a specified topic in the Earth Sciences, guided by a faculty member. Cr/F.

ESCI 899 - Master's Thesis**Credits: 1-6**

May be repeated up to a maximum of 6 credits. Cr/F.

ESCI 906 - Advanced Fate and Transport in the Environment**Credits: 3**

Mathematically rigorous introduction and analysis of the basic processes controlling the migration and transformation of chemicals in the environment at sub-geophysical scales, including advection, diffusion, dispersion, and retardation. Examples are drawn from surface water, groundwater, oceans, and the atmosphere, with a focus on rivers and streams. Prereq: Multidimensional calculus.

ESCI 972 - Hydrographic Field Course**Credits:** 4

A lecture, lab, and field course on the methods and procedures for the acquisition and processing of hydrographic and ocean mapping data. Practical experience in planning and conducting hydrographic surveys. Includes significant time underway (day trips and possible multi-day cruises) aboard survey vessel(s). Prereq: Introduction to Ocean Mapping; Geodesy and Positioning for Ocean Mapping; or permission. (Also listed as OE 972.)

ESCI 973 - Seafloor Characterization**Credits:** 3

Remote characterization of seafloor properties using acoustic (echo sounders, sub-bottom profilers, side-scan, multi-beam and interferometric sonars) and optical (video and laser linescanner) methods. Models of sound interaction with the seafloor will be explored as well as a range of possible geologic, geotechnical, morphologic, acoustic, and biologic descriptors. Prereq: permission. (Also listed as OE 973.)

ESCI 993 - Advanced Seminar**Credits:** 1

Focused seminar in a discipline of earth sciences: earth, ocean, atmosphere, or hydrology. May be repeated up to a maximum of 4 credits.

ESCI 994 - Advanced Seminar**Credits:** 1

Focused seminar in a discipline of earth sciences: earth, ocean, atmosphere, or hydrology. May be repeated up to a maximum of 4 credits.

ESCI 995 - Advanced Topics**Credits:** 1-4

Advanced work on an individual or group basis. Prereq: permission. May be repeated.

ESCI 996 - Advanced Topics**Credits:** 1-4

Advanced work on an individual or group basis. Prereq: permission. May be repeated.

ESCI 997 - Seminar in Earth Sciences**Credits:** 1

Readings, discussion, and presentation of recent investigations in the earth sciences. Required of all M.S. students in Earth Sciences. Cr/F.

ESCI 998 - Proposal Development**Credits:** 1

Introduction to research in the earth sciences and development of thesis and directed research proposals. Required of all M.S. students in Earth Sciences.

ESCI 999 - Doctoral Research**Credits:** 0

Cr/F.

Earth, Oceans, & Space (EOS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

EOS 810 - Introduction to Astrophysics**Credits:** 4

Review of the sun, stars, Milky Way, external galaxies, and expansion of the universe. Recent discoveries of radio galaxies, quasi-stellar objects, cosmic black-body radiation, x rays, and gamma rays precede a discussion of Newtonian and general relativistic cosmological models, steady-state big-bang theories, and matter-antimatter models. (Also offered as PHYS 810.) (Alternate years only.) Cr/F.

EOS #844 - Biogeochemistry**Credits:** 4

Examines the influence of biological and physical processes on elemental cycling and geochemical transformations from the molecular to the global scale, involving microorganisms, higher plants and animals and whole ecosystems; factors that regulate element cycles including soils, climate, disturbance and human activities; interactions among the biosphere, hydrosphere, lithosphere, and atmosphere; transformations of C, N, S, and trace elements. Prereq: one semester each of biology and chemistry. (Also offered as NR 844.)

EOS 895 - Topics**Credits:** 1-4

Study on an individual or group basis of topics not covered by the other listed courses. Topics may include any area relevant to interest in Earth, ocean, atmospheric, and space studies. (May be repeated.) Lab.

EOS 896 - Topics**Credits:** 1-4

Study on an individual or group basis of topics not covered by the other listed courses. Topics may include any area relevant to interest in Earth, ocean, atmospheric, and space studies. (May be repeated.) Lab.

EOS 901 - Seminar**Credits:** 1

Introduction to the fundamental components of the Earth system, such as the biosphere, cryosphere, hydrosphere, and its environment in space. Basic concepts are presented in a lecture format by selected EOS faculty according to their research specialization. To familiarize the student with the literature in earth, oceans, and space science and engineering, students are expected to contribute to a discussion of current topics of interest in the literature. Cr/F.

EOS #954 - Heliospheric Physics**Credits:** 3

The solar wind and its effects on cosmic rays. The basic equations of the solar wind: mass, momentum, angular momentum, and energy balance. Transport processes. Waves, shocks, and instabilities in the solar wind. The basic equations of energetic particle transport. Solar modulation of solar and galactic cosmic rays. Interaction of energetic particles with shock waves. Salient data are reviewed. (Normally offered every other year.) Also offered as PHYS 954.

EOS 995 - Special Topics**Credits:** 1-4**EOS 996 - Special Topics****Credits:** 3-4

See description for EOS 995.

Economics (ECON)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ECON 825 - Mathematical Economics**Credits:** 3

Principal mathematical techniques and their application in economics. Topics covered: matrix algebra, derivatives, unconstrained and constrained optimization, linear and nonlinear programming, game theory, elements of integral calculus.

ECON #847 - Multinational Enterprises**Credits:** 3

The internationalization of economies. Growth and implications of the multinational corporation at the level of systems. Theories of imperialism, international unity/rivalry; theories of direct investment; the exercise of influence and conflict, technology transfer, bargaining with host country; effects on U.S. economy.

ECON 868 - Seminar in Economic Development**Credits:** 3

An advanced reading seminar. Topics include methodologies underlying economic development theory, industrialization and post-import substitution, state capitalist development, stabilization policies, appropriate technologies, the capital goods sector, agricultural modernization schemes, and attempts at transition to socialism.

ECON 898 - Economic Problems**Credits:** 1-3

Special topics; may be repeated. Prereq: permission of adviser and instructor.

ECON 908 - Environmental Economics: Theory and Policy**Credits:** 3

Applies microeconomic tools to issues in environmental economics. Considers the role of government, externalities, public goods, property rights, and market failure. Identifies and compares different policy instruments such as administrative regulation, marketable permits, tax incentives, and direct subsidies, along with consideration of complicating factors such as information, uncertainty and risk. These tools are applied to various policy issues such as air pollution, solid waste management, and recycling. Prereq: ECON 926 and ECON 976.

ECON 909 - Environmental Valuation**Credits:** 3

Focuses on the theory and methods for estimating the economic values of environmental resources and public goods (such as clean air and water, preservation of wetlands or coastal resources, etc.) many of which are not exchanged in established markets and therefore do not have prices associated with them. The valuation of environmental resources is an important component in benefit-cost analyses which are used in policy making. Provides a blend of theory and hands-on applications of methods and real data sets. Prereq: ECON 926, ECON 927, ECON 976.

ECON 926 - Econometrics I**Credits:** 3

Application and theory of statistical and econometric methods to problems in economics. Topics: basic statistical theory, simple and multiple regression, violations of the basic assumptions, generalized least squares, and introduction to simultaneous equation models. Prereq: undergraduate statistics course.

ECON 927 - Econometrics II**Credits:** 3

Asymptotic theory, likelihood estimation, simultaneous equations, panel data analysis, binary and multiple choice models, count data analysis, selection models, survival analysis. Prereq: ECON 926.

ECON 928 - Econometrics III**Credits:** 3

Basic and advanced time series models with up-to-date empirical techniques with emphasis on the application of econometric tools to economic issues. Selected topics include stationary ARMA models, unit roots and cointegration, VAR, ARCH dynamic panel data models, structural break models, and non-linear time series models. Prereq: ECON 926 and ECON 927 or equivalents.

ECON 941 - Survey of Health Economics**Credits:** 3

An Introduction to the health care sector of the economy designated to provide students with: an overview of the scope of issues covered in the field; a basic analytical and empirical "tool kit" that will enable them to ask and answer questions as a health economist; and an understanding of the most important institutional features of the United States health care system. Topics include market failures in health care, demand for health, public and private insurance programs, health behaviors, and the relationship between health, income, and inequality. Prereq: ECON 926 and ECON 976 (ECON 927 recommended).

ECON 942 - Selected Topics in Health Economics**Credits:** 3

Covers broad range of health-care-related issues and analytical tools with the aim of helping students to successfully compete for career opportunities in health care education, research, and policy and to initiate possible dissertation essays. Topics vary each year in response to specific student interests and current events may include cost-benefit and cost-effectiveness analysis, comparative health systems (international institutions) and pharmaeconomics. Prereq: ECON 926 and ECON 976 (ECON 927 recommended).

ECON 945 - International Trade**Credits:** 3

Contemporary issues in international economic theory and policy. Analysis of trade theory, dynamics of world trade and exchange, and international commercial policy.

ECON 946 - International Finance**Credits:** 3

Topics include the macroeconomics of open economics, balance of payments, international financial markets, exchange rate fluctuations and puzzles, currency crises, and exchange rate policy.

ECON 957 - History of Economic Thought**Credits:** 3

Traces the development of economic thought, with careful examination and critical appraisal of the contributions made by important figures and schools of thought.

ECON 958 - Topics in Economic Thought and Methodology**Credits:** 3

Advanced seminar in a selected topic in economic thought or methodology.

ECON 970 - Advanced Economic Theory**Credits:** 3

Advanced topics in both microeconomic and macroeconomic theory. Topics covered may include cooperative and non-cooperative game theory, general equilibrium models, and dynamic optimization. Prereq: ECON 972 and ECON 976.

ECON 972 - Macroeconomics I**Credits:** 3

Development of the major macro models and approaches to macroeconomics: classical, Keynes' "General Theory," Keynesian, Monetarists, New Classical, and New Keynesian models and views. Introduction to open economy macro and growth models.

ECON 973 - Macroeconomics II**Credits:** 3

Theory, empirical specification, and tests of macroeconomic functions. National econometric models. Theories and empirical models of the business cycle and economic growth. Use of models for policy analysis and forecasting. Prereq: ECON 926 and ECON 972.

ECON 976 - Microeconomics I**Credits:** 3

Survey and applications of modern microeconomic theory. Analysis of households, firms, product and resource markets, and behavior under uncertainty.

ECON 977 - Microeconomics II**Credits:** 3

Analysis of stability, cooperative and non-cooperative game theory, information economics, exhaustible resources, disequilibrium, public goods, public choice, and input-output analysis. Prereq: ECON 976.

ECON 978 - Teaching Economics**Credits:** 4

This seminar-style course helps prepare graduate students to become effective teachers of economics at the college level. Emphasis is on teaching at the principles level. Students study and discuss key issues, including the learning process, the objectives of principles classes and of the economic major, heterogeneous learning styles, chalk and talk, vs. active learning, testing and the testing effect, homework, and the role of textbooks. Students also write teaching philosophies, lead discussion sessions, present research on teaching, and deliver short lectures to the class on specific topics at the principles level.

ECON 979 - Research Skills**Credits:** 3

Aids students in completing their master's paper for which they conduct research on a particular economic problem or issue using the knowledge and skills they have gained from their other classes. While the use of data and econometric analysis are encouraged, students may choose a topic that contains neither, such as a paper on the history of thought or on economic theory. Students meet regularly with their faculty advisor throughout the term. They also present their work at various stages of completion. Presentations of students' topics and final papers are made to the faculty. Prereq: ECON 926, ECON 972 and ECON 976.

ECON 988 - Graduate Economics Seminar**Credits:** 2-12

Attend weekly graduate economics seminars; write reviews and critiques of seminar papers; participate in discussion at seminars. May be repeated up to a maximum of 6 credits for Masters students and up to 12 credits for Ph.D. students.

ECON 992 - Field Workshop**Credits:** 3

Provides a platform for students to become well read in their chosen major field. Students receive a field-specific reading list at the beginning of the term, which they are expected to work through independently. Students present papers and chapters from their reading lists in class. They also write a literature review on a topic in their chosen field and present this research at various stages of completion. Presentations of students' final papers are made to the faculty. Prereq: One approved field class.

ECON 995 - Independent Study**Credits:** 1-6

Prereq: permission of adviser and instructor.

ECON 996 - Research Workshop**Credits:** 2

Present research papers in the graduate economics seminar series; serve as a discussant for seminar presentations; write reviews and critiques of seminar papers; participate in discussion at seminars. May be repeated up to a maximum of 4 credits for Ph.D. students. Cr/F.

ECON 999 - Doctoral Research**Credits:** 0

Cr/F.

Education (EDUC)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

EDUC 800 - Educational Structure and Change**Credits:** 4

To assume leadership roles, beginning teachers need to develop an informed understanding of how they can operate effectively as decision-makers and agents of change within educational institutions. Such understanding entails knowledge of the politics, history, organization, and function of schools from a variety of viewpoints: historical, political, and cross-cultural. This course focuses on the structure of public education, on the nature of educational change, and the teacher's role in the change process.

EDUC 801 - Human Development and Learning: Educational Psychology**Credits:** 4

Child development through adolescence, theories of learning (including Piaget, information processing, and Vygotsky), conceptions of intelligence, moral education, research in teaching and teacher effectiveness, cross-cultural variability, gender and sexual orientation, management and discipline, and assessment and grading -- all applied to problems of classroom and individual teaching and learning.

EDUC 803C - Classroom Management: Creating Positive Learning Environments**Credits:** 4

This course is designed to help prospective and current teachers create and maintain caring, respectful classroom communities in which learners feel safe, valued, cared for, valued, and empowered. The course includes a strong emphasis on developing knowledge about the culture and backgrounds of children and families in order to establish positive interactions within the classroom community. The course addresses the challenges and opportunities in creating community in the increasingly diverse student populations in US schools. We will consider what it means to be culturally responsive in order to establish a classroom in which all students can succeed academically and socially.

EDUC 803D - Social Studies Methods for Middle and High School Teachers**Credits:** 4

The social studies theory and methods course begins with an overview of the varied and, at times, competing goals and visions of the profession. Students examine these goals and their underlying rationales, and then develop their own philosophy of social studies teaching and learning. Students also examine state and national scope and sequence frameworks for the social studies, as well as the language arts Common Core standards. A variety of classroom strategies and methods are explored during the remainder of the course, including unit design, leading class discussions, how to approach controversial issues, teaching concepts and generalizations, increasing student engagement and empathy with the past, incorporating technology and the arts, management and discipline, and formats for assessment and grading.

EDUC 803F - Teaching Elementary School Science**Credits:** 4

This course is designed to increase pre-service teachers' pedagogical content knowledge and enthusiasm with respect to teaching science at the elementary level. Throughout this course, students will familiarize themselves with reform-based approaches to elementary science instruction through inquiry, readings, and class discussions. Science will be explored not only as an important element of elementary education, but also as a means by which to support a diverse class of elementary students in literacy and mathematics learning. 803F has a special fee when taught in Manchester. Pre-req: EDUC 500.

EDUC 803M - Teaching Elementary Social Studies**Credits:** 4

Social Studies Methods explores practical teaching models, techniques of implementation, and relationships to curricula in elementary classroom instruction. The New Hampshire Social Studies Frameworks and Common Core Curriculum Standards for instruction are identified and implemented in creating lesson plans for a mini unit. Pre or Co-req: EDUC 500.

EDUC 805 - Contemporary Educational Perspectives**Credits:** 4

Students formulate, develop, and evaluate their own educational principles, standards, and priorities.

EDUC 806 - Introduction to Reading in the Elementary School**Credits:** 4

Methods in reading and writing instruction; current procedures and materials; diagnostic techniques. Course satisfies reading/language arts requirement for prospective elementary teachers in the five year teacher education program. Special fee.

EDUC 807 - Teaching Reading through the Content Areas**Credits:** 2

Approaches and methods for teaching reading through content materials; coursework includes practical applications through development of instructional strategies and materials. Required for candidates seeking licensure in art, biology, chemistry, earth science, general science, home economics, physical education, physics, or social studies.

EDUC 808 - Literacy Assessment for Elementary Classroom Teachers**Credits:** 4

This course is the first of a 2-course sequence to be taken by students earning an M.Ed. in Elementary Education during their internship year. It prepares teachers to better understand individual readers in elementary classrooms in order to provide effective supports for them. The course integrates research, tools, and practical applications of elementary literacy assessments. Interns apply their learning with students in their internship classrooms and internship school site. Pre-req: EDUC 706 or EDUC 806.

Co-requisite: EDUC 900**EDUC 809 - Supporting Readers in Elementary Classrooms****Credits:** 4

This course is the second of a 2-course sequence to be taken by students earning an M.Ed. in Elementary Education during the internship year. It prepares teachers to support individual students' reading development in the context of the elementary classroom. The course integrates research, tools, and practical applications of elementary literacy intervention strategies. Interns apply their learning through one:one tutoring with students in their internship site. Pre-req: EDUC 706 or EDUC 806, and EDUC 808.

Co-requisite: EDUC 901**EDUC #810A - Concepts of Adult and Occupational Education****Credits:** 4

Development of occupational education in the U.S.; socio-economic influences responsible for its establishment; federal and state requirements for secondary and postsecondary schools. Coordination of programs with general education and vocational fields. Focus on selected concepts relevant to adult education. Special attention on the adult as a learner, volunteer management, evaluation and accountability, experiential learning, and adult education. Required of all degree candidates in AOE concentrations.

EDUC 810F - Investigations**Credits:** 1-4

Topics may include career education, secondary education, post-secondary education, adult education, extension education, exemplary education, cooperative education, disadvantaged and handicapped education, international agriculture, or teaching experience. Student-selected in one of the areas listed. Elective after consultation with instructor. Hours arranged. May be repeated.

EDUC 810G - Seminar in Adult and Occupational Education**Credits:** 1-2

Discussion of current issues, problems, and research and development in vocational/technical and adult education. Students, faculty, and other personnel serve as discussion leaders. Required of departmental graduate students. (Fall semester only.)

EDUC 812 - Teaching Multilingual Learners**Credits:** 4

This course is for people interested in teaching English to speakers of other languages (ESOL) in schools and communities in NH and the U.S. Topics include: theories of first and second language acquisition, policies and laws affecting language minority students, strategies for teaching academic content in the mainstream classroom, creating classroom/school cultures that invite all students into learning, and the role of advocacy and professional collaboration in ESOL.

EDUC 817 - Growing up Male in America**Credits:** 4

An integrative view of growing up male in the American culture from birth through adulthood. Analysis of major perspectives on male development and the implications in parenting with specific emphasis on male education. Participants are expected to develop awareness of their own development as a male or alongside males, using current male development perspectives as a guide. They will also create an awareness of how this will affect their behavior toward boys in their classrooms.

EDUC 818 - Critical Social Justice in and Beyond Education**Credits:** 4

Students will become familiar with key concepts and principles of critical theory, critical pedagogy, and social justice education so that they may use this body of work to inform their teaching, leadership, and scholarship. We will examine the role of a) schools in providing equity of educational access and outcomes, b) teacher agency to change unjust conditions, and c) micro experiences within schools and the macro layers of context (i.e., history, politics economics, culture).

EDUC 820 - Integrating Technology into the Classroom**Credits: 4**

Participants gain practical experience that takes specific advantage of technology to enhance and extend student learning. State academic standards and national technology standards are used to make decisions about curriculum content and to plan technology-based activities. Participants use electronic management tools such as iMovie, Powerpoint, podcast, webcast, Comic Life, Audacity, and Garage Band are featured in this hands-on course.

EDUC 833 - Teaching Writing in the 21st Century**Credits: 4**

An examination of the challenges to teaching writing in the present age of high stakes testing and audit culture. Course questions include 'best practices' for teaching writing in a complex society that values a range of expressive forms, including digital technologies, social media, film and video. Special emphasis on multi-modal literacies in K-12 classrooms. Exploration of language diversity, the relationship between reading, writing, and literacy development in content-specific areas, student centered assessments, and integrating the arts into the reading and writing workshop.

EDUC 834 - Children's Literature**Credits: 4**

Interpretive and critical study of literature for children in preschool and elementary settings. Methods of using literature with children.

EDUC 841 - Exploring Mathematics with Young Children**Credits: 4**

A laboratory course offering those who teach young children mathematics, and who are interested in children's discovery learning and creative thinking; offers chance to experience exploratory activities with concrete materials, as well as mathematical investigations, on an adult level, that develop the ability to provide children a mathematically rich environment, to ask problem-posing questions, and to establish a rationale for doing so. Prereq: MATH 601 or MATH 801.

EDUC 845 - Math with Technology in Early Education**Credits: 2**

The primary goal of this course is that students gain knowledge of learning standards and teaching methods for the instruction of mathematics in early education settings with infants through 3rd grade. In addition, participants gain experience in applying their newfound knowledge in the areas of mathematics with technology through a combination of teaching and digital experiences. On-line course; no campus visits required. Please note the minimal technical requirements for a UNH e-course.

EDUC 850 - Introduction to Exceptionality**Credits: 4**

A life span perspective of the social, psychological, and physical characteristics of individuals with exceptionalities including intellectual, sensory, motor, health, and communication impairments. Includes implications for educational and human service delivery.

EDUC 851A - Educating Exceptional Learners: Elementary**Credits: 4**

Foundations of special education and an introduction to a variety of service delivery models with an emphasis on educating all learners in heterogeneous classrooms. Instructional strategies and supports for all students, particularly those with mild and moderate disabilities, will be the primary focus.

EDUC 851B - Educating Exceptional Learners: Secondary**Credits: 4**

Foundations of special education and an introduction to a variety of service delivery models with an emphasis on educating all learners in heterogeneous classrooms. Instructional strategies and supports for all students, particularly those with mild and moderate disabilities, will be the primary focus. Preparation for students' transitions to post-secondary life will be included.

EDUC 851C - Educating Exceptional Learners: Related Services**Credits: 4**

An overview of special education and related services in an educational setting. Focus on support services provided to general education and special education teachers, including laws relating to special populations, how related services interact with classroom and special educators, IEPs, and other topics that impact services provided to students with special needs.

EDUC 852 - Contemporary Issues in Learning Disabilities**Credits: 4**

Critical analysis of current and historical conceptions of learning disability in the areas of definition, supporting theories, assessment practice, and teaching methodologies. Focus will be on contemporary issues in the field that relate to working with students labeled as learning disabled at both elementary and secondary levels.

EDUC #853 - Contemporary Issues in Behavioral Disabilities**Credits: 4**

Nature and scope of emotional and behavioral disabilities in students from elementary through secondary levels. Theoretical perspectives, characteristics, assessment and educational intervention strategies will be included.

EDUC #854 - Contemporary Issues of Developmental Disabilities**Credits: 4**

The casual factors, physical and psychological characteristics, and educational and therapeutic implications of mental retardation, cerebral palsy, epilepsy, autism, and related conditions. A life span perspective will be included, with major emphasis on the school age population.

EDUC #855 - Facilitating Social Understanding and Relationships for Students with Disabilities**Credits: 2**

The course will focus on the classroom and individual supports needed by students with intellectual and other developmental disabilities, including autism spectrum disorders, in order to have a wide variety of satisfying social relationships. Participants identify the factors that (a) are essential to the development of shared social understanding between students with and without disabilities; (b) promote reciprocal social relationships; and (c) how to recognize and mitigate barriers to reciprocal relationships.

EDUC 856 - Supporting Families of Individuals with Exceptionalities**Credits: 4**

An introduction to family system theory and the implications for families having members with exceptionalities. Issues addressed include diagnosis and prognosis, coping strategies, communication and team collaboration, cross-cultural competence, and agency and school delivery of services. Emphasis is on proactive collaboration with family members.

EDUC 857 - Contemporary Issues in Autism Spectrum Disorders**Credits: 4**

The goal of this course is to enhance students understanding of contemporary issues related to educating students with autism spectrum disorders (ASD). The course is grounded in a theoretical foundation that values the perspectives of individuals with ASD in academic, research, policy, and clinical endeavors. Learning outcomes focus on strategies for identifying opportunities for learning, communication, literacy, and social relationships in a variety of inclusive environments.

EDUC 860 - Introduction to Young Children with Special Needs**Credits: 4**

The needs of children (birth to eight years) with developmental problems or who are at risk for disabilities. Strengths and special needs of such children; causes, identification, and treatment; current legislation; parent and family concerns; program models.

EDUC 861 - Inclusive Curriculum for Young Children with Special Needs**Credits: 4**

Classroom applications of constructivist theory. Curriculum planning and implementation; overview of research and theory related to teaching and learning of specific content areas, with emphasis on integrated approach to early childhood curriculum. Stresses the reciprocal nature of student-teacher relationship. Prereq: permission.

EDUC 862 - Curriculum for Young Children with Special Needs: Evaluation and Program Design**Credits: 4**

Overview of evaluation and intervention issues relevant to early childhood special education, focusing on ages three through eight. Norm-referenced and criterion-referenced assessment tools. Judgment-based evaluation and observation skills. Translation of evaluation information into goals and objectives for individual education programs. Developing appropriate programs in inclusive settings.

EDUC 867 - Students, Teachers, and the Law**Credits: 4**

Our public schools play a vital role in our society. What shall be taught and who shall teach our children are perennial questions. This course explores how the law impacts the educational lives of students and teachers, including issues of church-state relations, free speech, dress codes, and search and seizure. (Also offered as JUST 867.)

EDUC 876 - Reading for Learners with Special Needs**Credits: 4**

Techniques and procedures for teaching reading to learners with special needs. Emphasis is placed on reading instruction in the least restrictive alternative.

EDUC #880 - Belize/New Hampshire Teacher Program**Credits: 4**

International course involving teams of teachers from Belize and New England. The program will offer teachers in both countries the opportunity to work collaboratively on developing effective teaching practices, develop an understanding of each other's cultural and educational perspectives, extend the experience to other teachers and students upon return. Special fee.

Co-requisite: INCO 589**EDUC 881 - Introduction to Statistics: Inquiry, Analysis, and Decision Making****Credits: 4**

An applied statistics course that covers introductory level approaches to examining quantitative information. Students spend about half of class time in the computer lab analyzing real data from the behavioral and social sciences. An emphasis is placed on the role of statistics in making empirically-based policy decisions.

EDUC 882 - Introduction to Research Methods**Credits: 4**

This course provides an introduction to research methods in education and the social sciences. Issues from a wide variety of perspectives on research are covered, including the formal procedures employed by experimental psychologists, qualitative perspectives, and techniques used by researchers involved in exploratory investigations in schools and other real-life settings. The design and implementation of research studies is contextualized in current educational and social science issues.

EDUC 884 - Educators as Researchers**Credits: 4**

With the guidance and support of the instructor, program participants will select an issue in education to explore in detail. They will articulate question (s) for inquiry, conduct a literature review related to their question (s), design and undertake their research study, and report their findings. Program participants will present their work within the context of the course. This course should be taken towards the end of your studies.

EDUC 885 - Introduction to Assessment**Credits: 4**

In this course, we examine educational assessment within three different paradigms. First we study the bases for assessment. Next we learn how one designs and administers assessment tasks within the classroom setting. Finally, we examine how one should interpret and utilize the results from standardized tests. We work to become intelligent readers, critics, and consumers of educational assessments. The topics covered in this course are relevant to several other fields including (but not limited to) psychology, social work, family studies, and nonprofit management.

EDUC 886 - Issues in Assessment: Historical Contexts, Perennial Dilemmas, Current Trends**Credits: 4**

This course examines educational assessment, broadly defined, from historical, practical, and critical perspectives and explores definitions, theories, and current issues in assessment. Through this course, students will look at assessment not only as a continual process for the teacher and administrator, but also a discrete process for measurement professionals. Students will analyze current research on and practices of classroom assessment, and will critique current educational assessment programs, policies, and issues that arise from No Child Left Behind, Race to the Top, Common Core State Standards, the achievement gap, competency-based assessment, and the assessment of teacher quality. Students will also explore alternative approaches to these policies with implications for evaluation and assessment, and generate ways to discuss with their communities the financial and human costs and benefits of these programs and policies.

EDUC 891 - Methods of Teaching Secondary Science**Credits:** 4

This course is designed to provide experiences and resources that will support individuals who are planning to teach middle or high school science. Through interactive activities, readings, and class discussions, the class explores key elements and challenges of secondary science teaching and provide a foundation for continued growth and reflection throughout the students' teaching careers. Some of the main topics discussed in this course are national and state science standards, reform-based approaches to instruction, the use of technology in science teaching, laboratory safety, curriculum evaluation, and assessment.

EDUC 894 - Pro-seminar in Teacher Leadership**Credits:** 2

This course will help experienced teachers to establish a framework for collaboration and inquiry focused on questions about teaching, learning, and school reform. Students will develop an academic and research agenda tied to their professional development as educators. Coursework will emphasize approaches to action research and the teacher-as-researcher.

EDUC 897 - Special Topics in Education**Credits:** 1-4

An experimental course for the purpose of introducing a new course or teaching a special topic for a semester in an area of specialization in Education.

EDUC 899 - Master's Thesis**Credits:** 1-10

Prereq: permission of the department. May be repeated up to a maximum of 10 credits. Cr/F.

EDUC 900A - Internship and Seminar in Teaching**Credits:** 3-6

A two semester, full-time, supervised internship consisting of less-than-full-time teaching responsibility in selected educational settings and programs. Weekly seminars and occasional workshops held concurrently with internship. Special fee. Permission required. Cr/F.

EDUC 900B - Internship and Seminar in Early Childhood Education**Credits:** 3 or 4

A two semester, supervised internship with a bi-weekly seminar. Admission by Application. Special fee. Permission required. Cr/F.

EDUC 900C - Internship and Seminar in Special Education**Credits:** 3 or 6

A two semester, supervised internship with a weekly seminar. Admission by application. Special fee. Cr/F.

EDUC 900D - Internship and Seminar in Adult and Occupational Education**Credits:** 3-6

Internship in a field of vocational/technical and adult education either in methodology of teaching or in technical subject matter. Students may elect internship only after completing the qualifying examinations for the master's degree, with permission of their major adviser. May be repeated up to 6 credits. Cr/F.

EDUC 901A - Internship and Seminar in Teaching**Credits:** 3-6

A two semester, full-time, supervised internship consisting of less-than-full-time teaching responsibility in selected educational settings and programs. Weekly seminars and occasional workshops held concurrently with internship. Special fee. Permission required. Cr/F.

EDUC 901B - Internship and Seminar in Early Childhood Education**Credits:** 3 or 4

A two semester, supervised internship with a bi-weekly seminar. Admission by Application. Special fee. Permission required. Cr/F.

EDUC 901C - Internship and Seminar in Special Education**Credits:** 3 or 6

A two semester, supervised internship with a weekly seminar. Admission by application. Special fee. Cr/F.

EDUC 902 - Doctoral Pro-seminar**Credits:** 4

Introduces students to the range of scholarly inquiry undertaken in doctoral programs. Students develop a broad understanding of educational studies and analyze various research paradigms in terms of assumptions, methods, and outcomes. Coursework includes developing a proposal. Matriculated doctoral students only.

EDUC #903 - Normative Inquiry in Education**Credits:** 4

Introduces the student to a critical study of some of the central ethical concepts, theories, and assumptions that shape contemporary educational theory, policy, and practice. Students read both classical and contemporary ethical theory and undertake to critically appraise these theories while using them to resolve moral problems. Prereq: EDUC 905 or permission.

EDUC 904 - Qualitative Inquiry in Education**Credits:** 4

Course will offer both a theoretical and practical background for conducting qualitative inquiry in education. Focused efforts toward understanding how the type or tradition of qualitative inquiry shapes the design of the study. Through comparative analysis of different qualitative traditions, students will be prepared to make informed decisions about what approaches to use in their studies and why they are using them. Prereq: permission.

EDUC 905 - Critical Inquiry in Education**Credits:** 4

Designed for advanced students to study philosophical methods needed for critical inquiry in education. Primary emphasis on practical mastery of: the construction and assessment of cogent argumentation; identification of common fallacies in reasoning; conceptual analysis; the appraisal of definitions, slogans, and metaphors in educational thought; and the disentangling of conceptual, factual, and normative claims associated with practical educational issues. Investigation of the difference between critique and criticism. Prereq: permission.

EDUC 906 - The Literature Review in Educational Research: Interdisciplinary Perspectives**Credits:** 4

This course introduces graduate students to the rhetorical and analytic skills necessary for writing a well-structured, soundly presented literature review. This course covers systematic topics selection, research analysis, how to limit your research topic and focus your literature search, how to appraise your sources, negotiate the range of books, periodicals and reports you collect about your study, and writing, revising and editing strategies. Upon completing the course, students will have produced a literature review using a minimum of 30 self-selected research articles, books and digital resources. The course is appropriate for master's and doctoral students who are writing course papers, dissertations or theses.

EDUC 907 - Foundations of Literacy Instruction**Credits: 4**

Overview of the nature of the reading/writing process and the continuum of instruction from emergent literacy through the primary and intermediate elementary grades. Emphasis is placed on validated instructional practices and issues of classroom organization and management of literacy instruction.

EDUC 910 - Reading and Writing Methods in the Middle/Secondary School**Credits: 4**

Overview of literacy programs in middle/secondary school with emphasis on (1) developing an integrated literacy curriculum and (2) planning and providing literacy instruction in the content areas to improve students' reading and writing skills across the curriculum.

EDUC 913 - Field Practicum in Reading**Credits: 4**

Field-based experience focusing on roles of the reading and writing specialist in organizing and managing literacy programs in school settings; weekly seminar. Prereq: permission.

EDUC 914 - Seminar in Reading Research**Credits: 4**

Analysis of qualitative and quantitative research paradigms as the basis for understanding and constructing research in reading and the related language arts. Topical study of current research base in emergent literacy, word analysis, comprehension, elementary and secondary/content reading, and diagnosis/remediation. Prereq: permission.

EDUC 918A - Seminar on Research in Literacy Instruction**Credits: 2**

The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 918B - Seminar on Research in Literacy Instruction**Credits: 2**

The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 918C - Seminar on Research in Literacy Instruction**Credits: 2**

The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 918D - Seminar on Research in Literacy Instruction**Credits: 2**

The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 919 - Counseling Practicum: Professional and Ethical Orientation**Credits: 4**

Introduction to the field of counseling and development of foundational counseling skills. Includes a skills-based practicum and seminars addressing contemporary professional issues. Legal and ethical responsibilities of counselors are examined.

EDUC 920 - Counseling Theory and Practice**Credits: 4**

Provides a survey of major contemporary theories and techniques of counseling. The counseling process, various theoretical approaches, and an introduction to professional issues in counseling diverse populations are examined.

EDUC 921 - Psychology of Career and Personal Development**Credits: 4**

Examines the interrelationship between career and personal development. An overview of theories, tools, and research that underlie career assessment is provided. Individual and group career counseling processes and skills are applied to career education models.

EDUC 922 - Assessment in Counseling**Credits: 4**

Surveys evaluative instruments and methods that have particular use in counseling. Explores systematic procedures for measuring human behavior and statistical concepts that underlie psychological testing. Assessment is viewed from the perspectives of its use in the counseling process as well as in providing accountability for diagnosis and treatment planning.

EDUC 923 - Group Counseling**Credits: 4**

Reviews theoretical and applied processes of group counseling. Class includes a laboratory experience to examine interactive behavior as a group member and facilitator. Pre- or Coreq: EDUC 919 or EDUC 920.

EDUC 924 - Psychological Disorders: Variations in Human Development**Credits: 4**

Examines the development of effective and ineffective human functioning. Behavior patterns that pose the most common problems encountered by counselors are reviewed, with an emphasis on the concepts and processes of adaptation. Pre- or Coreq: EDUC 920.

EDUC 925 - Counseling Internship I**Credits: 4**

Seminar accompanies supervised field experience at approved field site. Orientation to the diverse roles and functions of counselors in school and agency settings. Discussion and educational supervision of students' counseling and consultation activities at field site. Pre- or Coreq: EDUC 919, EDUC 920, EDUC 923, EDUC 924. Special fee.

EDUC 926 - Counseling Internship II**Credits: 4**

Seminar accompanies supervised field experience at approved internship site. Small group format uses audio-taped samples of counseling sessions, providing critiques and educational supervision of counseling and consulting activities. Prereq: EDUC 925. Special fee.

EDUC #927 - Human Growth & Development: Personality Theory**Credits: 4**

Examines the structure of personality and the dimensions along which individuals may vary. Considers implications of personality variables for the counseling process.

EDUC 929 - Advanced Counseling Internship**Credits: 4**

Seminar accompanies supervised field experience at approved internship site. Weekly critiques of audio-taped samples of counseling sessions emphasize self-awareness and the application of advanced skills in counseling and consultation. Students provide layered supervision to first year GPC graduates. Prereq: EDUC 926.

EDUC 930 - Research in Counseling**Credits: 4**

Provides an overview of research design and methodology in social and behavioral sciences. Emphasis on the responsibility of counselors as critical consumers of published research. Students develop research projects to enhance professional knowledge in educational or community settings. Prereq: EDUC 922.

EDUC 932 - Society and Culture: Contemporary Issues in Counseling**Credits: 4**

Examines the current social and cultural contexts of counseling. Emphasis on preparing counselors to address the needs of a pluralistic population characterized by diverse racial/ethnic membership as well as gender, sexual orientation, and physical ability.

EDUC 933 - Developmental Models of Comprehensive School Guidance**Credits: 4**

Course includes a supervised field experience. Provides a review of child and adolescent psychosocial development as a foundation for learning and high level functioning. Students are expected to develop awareness of their own psychosocial adaptations. State and national guidelines provide a framework for teaching pro-social skills models. Prereq: EDUC 919, EDUC 920, EDUC 925.

EDUC 935A - Seminar and Practicum in Teaching**Credits: 4**

For new graduate students admitted to the M.Ed. or M.A.T. program in the Department of Education. In-school experiences to develop introductory skills in observation and teaching. On-site seminars for analysis and evaluation. Assessment and advising related to teaching as a career. Prerequisite for further work toward a teacher licensure. Minimum of 7 hours a week, plus travel time, required. Prereq: permission. Special fee. Cr/F.

EDUC 935B - Seminar and Practicum in Teaching**Credits: 4**

An exploratory practicum, which is an integrated part of the Live, Learn, & Teach (LLT) Summer Program. Designed to explore teaching as a career and to prepare, eventually, for a teaching internship. LLT includes preparation in curriculum and instruction; practical and theoretical approaches to experiential education; interpersonal and group skill development, approaches to classroom management; and exploration of the many aspects of teaching and learning. Students develop and co-teach summer classes for children or adolescents with advisement from experienced educators. Prereq: admission to Live, Learn, and Teach Summer Program. Cr/F.

EDUC 938 - Advanced Seminar in Special Education**Credits: 4**

Weekly seminar on current and/or controversial topics related to special education services. Possible topics include service delivery systems, classification and labeling, assessment, instructional techniques, classroom management, consultation, and the special educator as researcher. Prereq: matriculated student or permission.

EDUC 939 - Assessment and Teaching of Children with Learning Difficulties**Credits: 4**

A two-semester course to develop teacher competency to analyze learners and learning environments; specify learner characteristics; and design, implement, and evaluate appropriate educational interventions in the areas of language, mathematics, reading, behavior, and social skills. Focus on children with mild and moderate learning difficulties in regular classrooms. Prereq: EDUC 850; 851 and permission.

EDUC 940 - Assessment and Teaching of Children with Learning Difficulties**Credits: 4**

A two-semester course to develop teacher competency to analyze learners and learning environments; specify learner characteristics; and design, implement, and evaluate appropriate educational interventions in the areas of language, mathematics, reading, behavior, and social skills. Focus on children with mild and moderate learning difficulties in regular classrooms. Prereq: EDUC 850; 851 and permission.

EDUC 941 - Diversity and Child Development**Credits: 4**

Focus on typical child development from birth to age eight. Considers theories of child development and assessment from historical and contemporary perspectives, with emphasis on observation during naturally occurring activities as a means of learning about child development. Includes child study. Prereq: permission.

EDUC 942 - Socio-cultural Perspectives on Teaching and Learning**Credits: 4**

Considers the growing body of knowledge on the role of play in children's development; includes examination of contemporary constructive theory. Organized around theme of teacher researcher. Assignments include research review and student-designed study of child development issue. Prereq: EDUC 941 or permission.

EDUC 948 - Leadership and Advocacy in Early Childhood Education**Credits: 4**

Examination of roles and responsibilities of early childhood professionals, with emphasis on action research skills, analysis of contemporary problems, strategies for advocacy, and program leadership skills.

EDUC 950 - Research in Culture, Behavior, and Development**Credits: 4**

Study of child development from comparative perspective, considering race, gender, and disabling conditions as dimensions of diversity. Cross-cultural research examined as challenge to contemporary theories of child development. Ethno-psychology of child development. Use of anthropological methods in study of child development. Implications for educational theory and practice. Prereq: permission.

EDUC 951 - Laws and Regulations Affecting the Education of Students with Disabilities**Credits: 4**

Analysis of current federal and state policies affecting students with disabilities. Focus on Section 504 and IDEA. The role of policy making and constitutional and ethical issues discussed.

EDUC #952 - Inclusive Assessment, Curriculum, Instruction, and Communication Supports**Credits: 4**

One of sequence of courses that leads to New Hampshire certification in Mental Retardation. Meets some of the requirements for certification of the Council for Exceptional Children. This advanced course provides knowledge and skills in assessment, curriculum development/modification, and instruction. It is also expected that graduate students will use their knowledge of alternative/augmentative communication in developing assessment and instructional activities for students with significant special needs.

EDUC 953 - Seminar in Curriculum Study**Credits: 4**

Analysis of recent trends in public school curriculum; structures, philosophy, development, change, and evaluation. Primarily for experienced teachers and administrators. Prereq: teaching experience.

EDUC 956 - Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors**Credits: 4**

One of a sequence of courses that leads to New Hampshire certification in Mental Retardation. Meets some of the requirements for certification of the Council for Exceptional Children. Behavioral challenges are the most frequent reason students with significant disabilities are excluded from inclusive settings in schools and communities. Course provides knowledge and skills in behavior as communication, utilization of functional assessments, and development of strategies to support students who experience challenging behaviors.

EDUC 957 - Collaborative Models of Teaching, Learning, and Leading**Credits: 4**

Building professional communities that nurture and support learning across the career span is a complex process that includes building productive relationships with co-workers who hold a variety of positions in schools: teachers, administrators, counselors, specialist, interns and paraprofessionals. This course examines a range of collaborative practices in schools including mentoring, co-teaching, and collaborative supervision. The central question is, "How do collaborative versus noncollaborative environments affect teaching and learning for students, teachers and administrators?"

EDUC 958 - Analysis of Teaching and Learning**Credits: 4**

Examination of and reflection on the nature of teaching will serve as the basis for analysis. A variety of strategies for analysis of teaching will be explored and implemented. Student-initiated inquiry into specific aspects of teaching will provide practical application of course material. Prereq: teaching experience.

EDUC 959 - Issues in Education**Credits: 4**

Emphasizes the development of understandings, dispositions, and skills necessary to effectively participate in P-12 reform discussion and decision-making. The course focuses on foundational issues related to a) the legitimacy of public education, b) accountability-based national reform efforts, and c) the goals and content of school curricula. This on-line course is required for the M.Ed. in Educational Studies or elective for other degrees.

EDUC 960 - Curriculum Development**Credits: 4**

Students learn how to develop the curriculum for schools and school districts. The course builds skills and infuses an understanding of the role that curriculum development plays. It explores how current curricular issues influence the development of curriculum.

EDUC #961 - Public School Administration**Credits: 4**

Introductory course to school leadership; major issues and trends in policy making, theories in school management, personnel, public relations, finance, decision making, ethics, and research in school administration.

EDUC 962 - Educational Finance and Business Management**Credits: 4**

Principles of financing education, budgetary procedures, computer simulations, and business management. Analysis of N.H. school funding system. Handling practical school finance problems is part of the project work.

EDUC 964 - Human Resources in Education**Credits: 4**

Problems arising from the communications process. Implications of group problem-solving processes. Interpersonal relations and group dynamics among students, faculty, staff, administration, and the community. Application of theories.

EDUC 965 - Educational Supervision and Evaluation**Credits: 4**

Theoretical foundations and practical applications of supervisory and instructional practices and procedures; consideration of observation instruments and techniques. Teacher evaluation and supervision reviewed. Each student conducts a field supervision project. Prereq: teaching experience or permission.

EDUC 967 - School Law**Credits: 4**

Relationship of law to public education. Emphasis on federal constitution, New Hampshire statutes, and case law related to public interests served by elementary and secondary education. Special topics: church-state relationship, due process, desegregation, teacher employment, discrimination, negotiations, student rights, tort liability.

EDUC 968 - Collective Bargaining in Public Education**Credits: 4**

An examination of collective bargaining as practiced by school boards, administrators, and teacher organizations. Consideration is given to collective bargaining statutes, case law, employee relations boards, unit determinations, exclusive representation, union security provisions, scope of bargaining, good faith, grievance procedures, bargaining strategies, strikes, public interest, mediation, fact finding, arbitration, and the administration of the negotiated contract.

EDUC 969 - Practicum in Educational Administration**Credits: 4**

Supervised practical experience in planning and implementing graduate student-initiated field projects in school administration. Prereq: all core requirements.

EDUC 970 - Foundations for Leadership in Higher Education**Credits: 4**

Seminar for master's and doctoral level students in education and related fields. Focus on the organization, structure, function, and dynamics of institutions of higher education, and the corollary roles and responsibilities of leaders in academic and student affairs. Intended for those currently in or planning to enter into leadership roles in a college or university.

EDUC #971 - School Facilities Management**Credits: 4**

Techniques and procedures involved in the long-range planning of school facilities: for example, school population projections, characteristics of the present and future educational programs, space requirements, evaluation of existing facilities, future use of existing buildings, analysis of financial resources available, identification of reasonable alternatives, and an examination of the probable consequences of such alternatives.

EDUC 972 - Introduction to Educational Evaluation**Credits: 4**

This is a graduate level course that provides a broad overview of evaluation methods that influence K-12 education, as well as the nonprofit sector. While educational assessments include a full range of procedures used to gain information about student learning (e.g., observations and paper-and-pencil tests), educational evaluation is the process of determining something about the merit, worth, or significance of that information. Therefore, the goal of this course is to provide students with an introduction to educational evaluation from both a practitioner and a programmatic perspective. To meet this goal students explore the importance of evaluation across educational contexts; evaluate student achievement; develop a program logic model; and conduct an evaluability assessment.

EDUC 973 - Policy, Politics, and Planning in Education**Credits: 4**

Policy systems and fundamental values shaping the development and enactment of education policy at the federal, state, and local levels.

EDUC 974 - Educational Administrative Internship**Credits: 4**

This course is a field-based internship for students enrolled in a variety of graduate programs including masters, education specialist, doctorate, and educational credential programs. Students can intern in educational settings including schools, school/districts, educational agencies, centers, and in a higher education. Supervision is provided by university faculty and a cooperating administrator or other appropriate official from the internship site.

EDUC 975 - Advanced Education Field Project**Credits: 4**

This course is field based. The student will work with an educational institution (e.g., school, school district, higher education) or agency (e.g., Department of Education, educational center, higher education) with a cooperating administrator/appropriate educator and a university supervisor. The field project will address a problem of practice of an educational institution, serve as a pilot study, or consist of an action research project.

EDUC 976 - Policy and Governance in Higher Education**Credits: 4**

Seminar for master's and doctoral level students in Education and related fields. Examination of federal and state policies and regulations affecting two-year and four-year colleges and universities, and governance practices necessary to achieve institutional mission. Consideration of rationales for public oversight and financing of higher education, controversial topics (e.g., affirmative action, accreditation, proprietary institutions, distance learning), and strategies for effective shared governance are included.

EDUC 977 - Leadership: The District Level Administrator**Credits: 4**

Examines the school superintendency and other district level positions of leadership that comprise the administrative team, focusing on the complexity of the current role and relationships, the critical issues facing school leaders, and the skills necessary for success as an educational leader in today's climate. Students analyze contemporary issues of school governance and examine problems of practice to understand the role of school superintendent and other district level administrators from a theoretical, political, and contemporary perspective.

EDUC 978 - Applied Regression Analysis in Educational Research**Credits: 4**

This course introduces students to simple and multiple regression analysis, specifically as the methods are applied to research questions in educational research. Students learn about the linear regression model and its assumptions, how to use SPSS to fit the model to data, and how to interpret results. Students will also learn how to: evaluate the tenability of the model's assumptions; conduct thoughtful model building; model the effects of categorical predictors and statistical interactions; and handle multi-collinearity. The use of statistical techniques are modeled in class and then students apply these new techniques to datasets of educational relevance from a variety of sources, including educational surveys, observational studies, and randomized experiments. Students learn how to interpret the outcomes of their analyses thoughtfully and meaningfully and are asked to communicate these interpretations clearly and concisely in writing. Prereq: EDUC 881 or equivalent.

EDUC 979 - Applied Multilevel Modeling**Credits: 4**

This applied course in multilevel modeling is designed for graduate students in education and the social sciences who are interested in conducting statistical analysis to answer questions about (1) contextual effects on individual outcomes, and (2) individual change over time. Topics addressed include exploratory analyses of multilevel data, conditional and unconditional models, fixed and random effects, model assumptions, model fit, non-linear change, discontinuous change, time-varying predictors, unequally spaced measurement occasions, and three-level multilevel models. Prereq: EDUC 978 or the equivalent.

EDUC 980 - Research in the Teaching of Writing**Credits: 4**

Review of research in writing instruction, focusing on trends in design, research procedures, the contributions of linguistics, cognitive and developmental psychology, with a view to the conduct of research by participants. Prereq: permission.

EDUC 981 - Quantitative Inquiry: Methods and Techniques of Educational Research**Credits: 4**

Conceptual aspects and practical realities of the research process applied to problems in education and human service disciplines. Develops skills necessary to use, as well as conduct, research.

EDUC #982 - Issues and Methods in Ethnographic Research in Education**Credits:** 4

Provides theoretical grounding and field experience in ethnography as a deliberate inquiry process. Examines the application of ethnographic fieldwork to educational research.

EDUC 983 - Advanced Psychology of Human Learning**Credits:** 4

Review and integration of learning theory, teacher effectiveness, motivation theory, and development through adolescence; application of these to teaching generally and to the areas of specialization of the participants. Prereq: EDUC 801 or equivalent.

EDUC 985 - Contemporary Issues and Theories in Human Learning and Development**Credits:** 4

This course explores the human drive to know one's world. Although the primary focus is on traditional school-aged learners, views of the learner both in and out of school and across the life-span are considered as well. Theoretical positions will include: cognitive developmental theory; an analysis of positions implicit in traditional and innovative schooling practices; and theories about the social organization of knowledge. Attention will be given to educational applications of recent advances in contemporary theories of learning and development, as well as changes in pedagogy and assessment. Prereq: EDUC 801, or equivalent introduction to human development and/or educational psychology; or permission.

EDUC 986 - Philosophy of Education**Credits:** 4

Seminar in comparative analysis of educational theories and the philosophical foundations upon which they are based. Application of theoretical criteria for evaluating educational practices and for developing one's own philosophy of education. Prereq: permission.

EDUC #990 - Developmental Perspectives on Adulthood**Credits:** 4

Research and theory about critical life issues; developmental tasks of the life cycle; periods of transition; stages of intellectual, moral, and personality development of the adult; and the design of significant learning experiences for adults within a variety of educational settings and institutions. Prereq: permission.

EDUC 991 - Curriculum Theory I**Credits:** 4

Explores models of curriculum theorizing, the relationship between curriculum and theory and society and school practice, and current curriculum issues and reform initiatives.

EDUC 992 - Curriculum Theory II**Credits:** 4

The purpose of this course is (a.) to critically examine the various methodological approaches for conducting educational research within the broader field of transnational curriculum studies and (b.) to appraise the tension between a range of disciplinary frameworks that inform curriculum theory, government policy, and its respective implementation both inside and outside the classroom. Studies include analysis of alternative curricular arrangements within global, national, and local contexts. Curriculum Theory I is recommended, but not required.

EDUC 995 - Independent Study**Credits:** 1-4

Opportunity for intensive investigation of a special problem or issue in the field of education. Prereq: permission. May be repeated to a maximum of 8 credits.

EDUC 998 - Special Topics**Credits:** 1-4

Study of a particular theoretical, methodological, or policy issue. May be offered off campus as professional development.

EDUC 999 - Doctoral Research**Credits:** 0

Cr/F.

Electrical & Computer Engineering (ECE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ECE 804 - Electromagnetic Fields and Waves II**Credits:** 4

Provides an overview of electromagnetics modeling by covering commonly-used numerical solutions to electromagnetics problems. Computational approaches to be covered include the Method of Moments (MoM) for both static and dynamic fields, iterative solutions to Laplace's equations, Finite Element Methods, high-frequency solutions, and the Finite-Difference, Time-Domain techniques (FDTD).

ECE 811 - Digital Systems**Credits:** 4

Principles and procedures and tools related to the design, implementation and testing of microprocessor-based embedded systems. Students prototype a complete embedded system using CAD tools, application specific integrated circuits, printed circuit board technology, and modern diagnostic/testing procedures and tools. Projects are designed to introduce diverse digital technologies. Lab.

ECE 814 - Introduction to Digital Signal Processing**Credits:** 4

Introduction to digital signal processing theory and practice, including coverage of discrete time signals and systems, frequency domain transforms and practical spectral analysis, digital filter terminology and design, and sampling and reconstruction of continuous time signals. Laboratory component providing an introduction to DSP design tools and real-time algorithm implementation. Lab.

ECE 815 - Introduction to VLSI**Credits:** 4

Principles of VLSI (Very Large Integration) systems at the physical level. CMOS circuit and logic design, CAD tools, CMOS systems case studies. Students exercise the whole development cycle of a VLSI chip: design, layout, and testing. Design and layout performed during semester I. The chips are fabricated off campus and returned during semester II, when they are tested by students. An IA (continuous grading) grade is given at the end of semester I.

ECE 817 - Introduction to Digital Image Processing**Credits:** 4

Digital image representation; elements of digital processing systems; multidimensional sampling and quantization; image perception by humans, image transformations including the Fourier, the Walsh, and the Hough Transforms; image enhancement techniques including image smoothing, sharpening, histogram equalization, and pseudo color processing; image restoration fundamentals; image compression techniques, image segmentation and use of descriptors for image representation and classification. Lab.

ECE 824 - Ubiquitous Computing Fundamentals**Credits: 4**

Ubiquitous computing, or ubicomp, explores embedded, interconnected computing devices that are part of everyday objects and activities. This course takes an interdisciplinary look at the foundations of ubiquitous computing. Topics include software and hardware for ubicomp, human-computer interaction in ubicomp, and issues related to privacy and security in ubicomp. Students undertake a research project inspired by the material.

ECE #834 - Network Data Communications**Credits: 4**

Introduces the basic concepts related to data transmission equipment and physical interfaces, data communication protocols, and the Open Systems Interconnection (OSI) Reference Model. Course material focuses on the physical, layer hardware, signaling schemes, protocol packets, computer interfaces, error detection, and signal integrity. Data transmission protocols relative to both wired and wireless networks. An introduction to both local and wide-area networks, and how a networking system is constructed, tested, and managed. Network design and testing exercises reinforce the material presented in course lectures. Lab.

ECE 857 - Fundamentals of Communication Systems**Credits: 4**

Spectra of deterministic and random signals, baseband and bandpass digital and analog signaling techniques, transmitter and receiver architectures, performing analysis of digital and analog signaling in additive noise channels, carrier and symbol timing synchronization methods. Lab.

ECE 858 - Communication System Design**Credits: 4**

System and circuit level design and implementation of communication hardware including: mixers, RF amplifiers, filters, oscillators and frequency synthesizers, modulators and detectors, carrier and symbol timing recovery subsystems. Issues in software-defined radio transmitter and receiver implementation. Communication link engineering including antenna selection and channel impairment effects. Lab.

ECE #860 - Introduction to Fiber Optics**Credits: 4**

Basic physical and geometric optics; solution of Maxwell's equations for slab waveguides and cylindrical waveguides, of both step index and graded index profiles; modes of propagation and cutoff; polarization effects; ground and phase velocity; ray analysis; losses; fabrication; sources; detectors; couplers; splicing; cabling; applications; system design. Lab.

ECE 872 - Control Systems**Credits: 4**

Development of advanced control system design concepts such as Nyquist analysis, lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to non-linear and modern control. Includes interactive computer-aided design and real-time digital control. (Also offered as ME 872.) Lab.

ECE 875 - Applications of Integrated Circuits**Credits: 4**

Design and construction of linear and nonlinear electronic circuits using existing integrated circuits. Limitations and use of operational amplifiers. Laboratory course in practical applications of non-digital integrated circuit devices. Lab.

ECE 884 - Biomedical Instrumentation**Credits: 4**

Principles of physiological and biological instrumentation design including transducers, signal conditioning, recording equipment, and patient safety. Laboratory includes the design and use of instrumentation for monitoring of electrocardiogram, electromyogram, electroencephalogram, pulse, and temperature. Current research topics, such as biotelemetry, ultrasonic diagnosis, and computer applications. Lab.

ECE 896 - Special Topics in Electrical or Computer Engineering**Credits: 1-4**

New or specialized courses and/or independent study. Some sections may use credit/fail grading.

ECE 899 - Master's Thesis**Credits: 1-6**

May be repeated up to a maximum of 6 credits. Cr/F.

ECE 900A - Research and Development from Concept to Communication I**Credits: 2**

The course will introduce students to the general tools of scientific research and technical development. The course will also introduce students to tools and practices for reading, writing and reviewing documents that describe completed or proposed scientific research and technical development, as well as tools and practices for giving oral presentations about such documents to different types of audiences. Part one of a two course sequence.

ECE 900B - Research and Development from Concept to Communication 2**Credits: 2**

The course will introduce students to the general tools of scientific research and technical development. The course will also introduce students to tools and practices for reading, writing and reviewing documents that describe completed or proposed scientific research and technical development, as well as tools and practices for giving oral presentations about such documents to different types of audiences. Part two of a two course sequence.

ECE 901 - Electromagnetic Wave Theory I**Credits: 3**

Maxwell's equations; plane wave propagation; reflection and refraction; guided wave propagation; waveguides; simple resonators; elements of microwave circuits, linear and aperture antennas, arrays of dipoles; receiving antennas.

ECE 903 - Antennas**Credits: 3**

This course covers the fundamentals of antenna theory, and how to use and understand a contemporary computer modeling tool to analyze and design antennas or other types of microwave devices. Participants in the class are expected to complete a radiation-related project, whether it be a modeling project or a project involving the construction and analysis of an actual antenna (team efforts are encouraged as well).

ECE 915 - Advanced Active Circuits**Credits: 3**

Investigation of devices and techniques used in advanced circuit design using discrete solid-state devices and integrated circuits. Oscillators, phase-lock systems, low noise techniques, etc.

ECE 920 - Wireless Communication Systems**Credits:** 3

Principles of wireless communication systems including analysis of radio wave propagation and modeling, large scale and small scale signal fading, cellular communication architectures, multi-access systems, advanced modulation techniques, signal diversity systems, multiple antenna communications, cognitive radio, and software defined radio.

ECE 924 - Ubiquitous Computing**Credits:** 3

Ubiquitous computing, or ubicomp, explores embedded, interconnected computing devices that are part of everyday objects and activities. This course takes an interdisciplinary look at the ubiquitous computing through the review of recent research literature. Topics include the visions of ubicomp and some of its applications, software and hardware for ubicomp, human-computer interaction, context awareness, privacy, and security. Students undertake a ubicomp research project inspired by the literature review.

ECE 939 - Statistical Theory of Communications**Credits:** 3

Introduction to probability theory and random waveforms leading to a discussion of optimum receiver principles. Topics include random variables, random processes, correlation, power spectral density, sampling theory, and optimum decision rules.

ECE 940 - Information Theory**Credits:** 3

Introduction to information theory concepts. Topics include message sources, entropy, channel capacity, fundamentals of encoding, Shannon's theorems. Prereq: ECE 939 or permission.

ECE 941 - Digital Signal Processing**Credits:** 3

Discrete-time stochastic signals, signal modeling, parameter estimation, optimal filtering and decision making, with application to adaptive filters, echo cancellation, channel equalization and parametric spectral estimation. Requires prior coursework in discrete-time LTI systems, analysis and design of recursive and non-recursive linear digital filters, and Fourier based spectral estimation.

ECE 944 - Nonlinear Control Systems**Credits:** 4

Analysis and design of nonlinear control systems from the classical and modern viewpoints. Liapunov's stability theory, phase space methods, linearization techniques, simulation, frequency response methods, generalized describing functions, transient analysis utilizing functional analysis, and decoupling of multivariable systems. (Also offered as ME 944.)

ECE 951 - Advanced Control Systems I**Credits:** 3

State-space representation of multivariable systems, analysis using state transition matrix. Controllability and observability, pole placement using state and output feedback, Luenberger observers. Introduction to computer-controlled systems (sampling, discrete state representation, hybrid systems), nonlinear analysis (Liapunov, Popov, describing function). (Also offered as ME 951.)

ECE 952 - Advanced Control Systems II**Credits:** 3

Special topics in control theory: continuous and discrete systems; optimal control systems, including calculus of variations, maximum principle, dynamic programming, Weiner and Kalman filtering techniques, stochastic systems, and adaptive control systems. (Also offered as ME 952.)

ECE 960 - Computer Architecture**Credits:** 3

Advanced topics in computer organization. Parallel and pipeline processing, associative and stack computers, microprogramming, virtual memory, current topics.

ECE #961 - Test Engineering and Testable Design**Credits:** 3

Circuit failures, fault models, test pattern generation, logic and fault simulation. Parametric, structural, and functional characterization of components and subsystems. Test methods, strategies, planning, and economics. Design for testability, scan design, test interfaces, design for built-in self-test (BIST), and design for manufacturability. Test equipment hardware and software. Lab.

ECE 965 - Introduction to Pattern Recognition**Credits:** 3

Machine classification of data, feature space representation, multispectral feature extraction, Bayes decision theory, linear discrimination functions, parameter estimation, supervised and unsupervised learning, clustering, scene analysis, associative memory techniques, and syntactic methods of recognition.

ECE 966 - Robust Integrated Circuit Design and Verification**Credits:** 3

This course covers the typical hardware failure causes, error control coding theories and their application in integrated circuit designs, fault tolerance techniques, hardware Trojan detection methods, and the principles of secure chip design. Prereq: Digital Circuits, Computer Organization.

ECE 992 - Advanced Topics in Electrical Engineering**Credits:** 1-3

Example of a recent topic: analog VLSI design. May be repeated.

ECE 993 - Advanced Topics in Computer Engineering**Credits:** 1-3

Example of recent topic: wireless communication networks. May be repeated.

ECE 994 - Advanced Topics in Systems Engineering**Credits:** 1-3

Examples of recent topics: neural networks, advanced digital telecommunications. May be repeated.

ECE 998 - Independent Study**Credits:** 1-3

Independent theoretical and/or experimental investigation of an electrical engineering problem under the guidance of a faculty member.

ECE 999 - Doctoral Research**Credits:** 0

Cr/F.

English (ENGL)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ENGL 800 - Studies in Literature**Credits: 4**

Students in the MAT, MEd, and MST programs, as well as non-degree students, can register for graduate course work in English under this number. The precise topics and focus of each section vary. Topics include Old English Literature, Medieval Literature, 16th century, 17th century, 18th century, English Romantic Period, Victorian Period, 20th and 21st Century, Drama, Novel, Poetry, Fiction, Nonfiction, A Literary Problem, Literature of the Renaissance, Postcolonial Literature, 20th to 21st Century American Literature. Barring duplication of subject, may be repeated for credit. Note: Students in the MA and PhD programs in English may not take English 800 for credit toward their degrees. English 800 will only be offered on the Manchester campus.

ENGL 803 - Travel Writing**Credits: 4**

A graduate workshop devoted to reading and writing narratives of place. Travel writing requires the author to research and reflect, exploring both the external—the place—and the internal—the author's experience. Students write multiple travel pieces and read widely essays of place by writers such as Tom Bissell, John Steinbeck, Pico Iyer, Stephanie Grist, and Eliza Griswold. Course may be repeated for credit with permission.

ENGL 803T - Travel Writing**Credits: 4**

A graduate workshop devoted to reading and writing narratives of place. Travel writing requires the author to research and reflect, exploring both the external—the place—and the internal—the author's experience. Students write multiple travel pieces and read widely essays of place by writers such as Tom Bissell, John Steinbeck, Pico Iyer, Stephanie Grist, and Eliza Griswold. Course may be repeated for credit with permission.

Co-requisite: INCO 589

ENGL 804 - Advanced Nonfiction Writing**Credits: 4**

This workshop embraces all forms of narrative nonfiction, including essays, memoir, literary journalism, and travel writing. Students write multiple pieces that serve as the heart of class discussion. In addition, the class discusses elements of craft and a myriad of selected readings that reflect the genre's range. May be repeated for credit with approval of the MFA director.

ENGL 805 - Advanced Poetry Workshop**Credits: 4**

Workshop discussion of advanced writing problems and submitted poems. Individual conferences with instructor. Prereq: writing poetry or equivalent. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 806 - The Art of Research for Creative Writers**Credits: 4**

Many writers think that the heart of creative nonfiction is style, but in truth, the genre's soul is in its content. This course covers tools such as intimate reporting, periodicals, the Internet, and first-hand observation to research people, places, issues, and history. The skills learned will serve graduate students of all kinds of writing, from fiction to academic. Permission of instructor required. Special fee.

ENGL 807 - Fiction: Form and Technique**Credits: 4**

A writer's view of the forms, techniques, and theories of fiction. The novels, short stories, and works of criticism studied vary, depending on the instructor.

ENGL 808 - Nonfiction: Form and Technique**Credits: 4**

A writer's view of contemporary nonfiction, emphasizing the choices the writer faces in the process of research and writing.

ENGL 809 - Poetry: Form and Technique**Credits: 4**

A writer's view of the problems, traditions, and structures of poetry.

ENGL 810 - Teaching Writing**Credits: 1-6**

An introduction to various methods of teaching writing. Combines a review of theories, methods, and texts with direct observation of teaching practice.

ENGL 812 - Writing the Creative Nonfiction Book**Credits: 4**

In this course, students learn to flesh out an idea for a book of creative nonfiction, which could either be literary journalism - a tale based on reportage - or memoir. Students focus on pulling multiple themes together in a strong narrative. By semester's end, students have written a book proposal and a first chapter. Students are asked to arrive at the first class with a topic researched enough to begin the book process. Permission of instructor required. May be repeated for credit up to 8 credits.

ENGL 814 - Literary Theory**Credits: 4**

Major theoretical approaches to literature and its contexts; a range of works from ancient Greece to the present. Questions addressed include: What is literature? What methods might one use to analyze literary texts? What role might cultural and social conditions play in our understanding of literature? How have traditional answers to these and other questions about literature been contested? Lecture-discussion format.

ENGL 815 - Teaching English as a Second Language: Theory and Methods**Credits: 4**

A course on the linguistic, psychological, and sociological theories that inform our understanding of language acquisition and current best practices in the teaching of ESOL. Provides an overview of first and second language acquisition, bilingualism, learner individual differences (e.g. age, motivation, aptitude, learning strategies), and sociocultural contexts of ESL teaching and learning.

ENGL 816 - Curriculum, Materials and Assessment in English as a Second Language**Credits: 4**

A hands-on approach to developing curriculum and course material for teaching English as a Second Language. Students work on lesson plan development (needs analysis, objective writing, task sequencing, assessment of proficiency and objectives). Conduct ESL classroom observations, and engage in teaching demonstrations.

ENGL 819 - Sociolinguistics Survey**Credits: 4**

How language varies according to the characteristics of its speakers: age, sex, ethnicity, attitude, time, and class. Quantitative analysis methods; relationship to theoretical linguistics. Focus is on English, but some other languages are examined. Prereq: introduction to linguistics or permission.

ENGL 827 - Issues in Second Language Writing**Credits:** 4

Study of various issues in second language writing theory, research, instruction and administration. Topics include the characteristics and needs of second language writers, second language writing processes, contrastive rhetoric, grammar instruction, teacher and peer feedback, assessment, course design and placement.

ENGL 829 - Spec Top/Composition Studies**Credits:** 4

Advanced course on a topic chosen by the instructor. Precise topics and methods of each section vary. Possible topics include: alternative discourses and rhetorics; contrastive rhetoric; electronic discourse and digital rhetoric; women's rhetorics and feminist pedagogies; Montaigne and the essay tradition; theories of literacy; theories of persuasive writing; theories of transactional writing; and written discourse analysis. Barring duplication of subject, may be repeated for credit. For details see the course descriptions available in the English Department.

ENGL 830 - Practicum in Teaching English and the Language Arts**Credits:** 1-6

A site-based course for practicing teachers that features in-class observations and demonstrations, individual consultation, and group meetings in the schools. Prereq: permission. May be repeated to a maximum of 8 credits.

ENGL 838 - Topics in Asian American Studies**Credits:** 4

Study of literature, history, scholarship, and current thought by and about Asian America. Representative works from among Japanese Americans, Chinese Americans, Korean Americans, Southeast Asian Americans, South Asian Americans.

ENGL 846 - Studies in American Drama**Credits:** 4

Topics vary from year to year. Examples: 20th-century American drama; contemporary playwrights; theatricality in American life. May be repeated for credit, barring duplication of topic. (Not offered every year.)

ENGL 847 - Studies in American Poetry**Credits:** 4

Topics vary from year to year. Examples: poets of the road; Pound and his followers; major American poets; contemporary American poetry. May be repeated for credit, barring duplication of topic. (Not offered every year.)

ENGL 848 - Studies in American Fiction**Credits:** 4

Topics vary from year to year. Examples: the romance in America; the short story; realism and naturalism; the city novel; fiction of the thirties. May be repeated for credit, barring duplication of topic. (Not offered every year.)

ENGL 850 - Special Studies in American Literature**Credits:** 4

Topics vary from year to year. Examples: the Puritan heritage; ethnic literatures in America; landscapes in American literature; five American lives; pragmatism; American humor; transcendentalism; women regionalists. May be repeated for credit, barring duplication of topic.

ENGL #851 - Medieval Epic and Romance**Credits:** 4

Two major types of medieval narrative; comparative study of works from England, France, Germany, and Iceland, including "Beowulf", "Song of Roland", "Nibelungenlied", Gottfried's "Tristan", Njal's "Saga", and Malory's "Morte d'Arthur". All works read in modern English translations. (Not offered every year.)

ENGL 852 - History of the English Language**Credits:** 4

Evolution of English from the Anglo-Saxon period to the present day. Relations between linguistic change and literary style.

ENGL #853 - Old English**Credits:** 4

Introduction to Old English language and literature through readings of selected poetry and prose.

ENGL 858 - Shakespeare**Credits:** 4

A few plays studied intensively. Live and filmed performances included as available.

ENGL #873 - British Literature of the 20th Century**Credits:** 4

Poets and novelists of the modernist and postmodernist periods. W.B. Yeats, James Joyce, Virginia Woolf, E.M. Forster, D.H. Lawrence, and other modernists. (Not offered every year.)

ENGL 879 - Linguistic Field Methods**Credits:** 4

Devoted to the study, with use of an informant, of some non-Indo-European language that is unfamiliar to both the students and the instructor at the beginning of the class. The primary aim of the course is to give students a practical introduction to linguistic analysis without the support of a text. Theoretical concepts are introduced as needed. Special fee.

ENGL #880 - English Drama to 1640**Credits:** 4

Development of the drama through the Renaissance, emphasizing the Elizabethan and Jacobean dramatists. (Not offered every year.)

ENGL #881 - English Drama from 1660 to 1800**Credits:** 4

Study of selected plays, their performance and their publication. Works by such figures as William Wycherley, Thomas Otway, Mary Pix, George Lillo, Susanna Centlivre, Richard Sheridan, and Elizabeth Inchbald. Special attention to the new prominence of women in the drama of this period, changes in theater architecture, forms of non-dramatic spectacle, and the political and social significance of drama. (Not offered every year.)

ENGL #883 - English Novel of the 18th Century**Credits:** 4

Study of the rise and development of the novel in the eighteenth century. Works by such figures as Daniel Defoe, Eliza Haywood, Samuel Richardson, Henry Fielding, Charlotte Lennox, Laurence Sterne, Frances Burney, and Jane Austen. Focus on writers who published their work in England but with examples from the colonial world and the continent (in translation) when appropriate. (Not offered every year.)

ENGL 885 - Major Women Writers**Credits:** 4

Intensive study of one or more women writers. Selections vary from year to year. May be repeated for credit, barring duplication of topic.

ENGL 889 - Special Topics in English Teaching**Credits:** 4

Advanced theories and practices course on English Teaching. Topics such as A) Teaching Young Adult Literature, C) Teaching English in Diverse Contexts, D) Teaching Drama, N) Teaching Nonfiction, R) English Teachers as Researchers, and T) Alternate Literacies and Teaching Technologies. Barring duplication of subject, course may be repeated for credit. For details see course descriptions available in the English department.

ENGL 890 - Special Topics in Linguistics**Credits: 4**

An advanced course on a topic to be chosen by the instructor. Inquire at the English department office for a full course description each time the course is offered. Topics such as word formation, dialectology, linguistic theory and language acquisition, language and culture, cross-disciplinary studies relating to linguistics. Barring duplication of subject, may be repeated for credit. (Not offered every year.)

ENGL 891 - English Grammar**Credits: 4**

An introduction to the terminology and major concepts in English grammar. Covers descriptive vs. prescriptive grammar, parts of speech, phrase structure, clause types, and basic sentence patterns. Useful for pre-service teachers seeking to acquire the background knowledge needed to make informed decisions about the teaching of English grammar.

ENGL 892 - Teaching Literature and Literacy**Credits: 4**

This course introduces theories and practices of teaching literature and literacy, including teaching reading and writing as well as teaching literary analysis at the secondary level. Students also learn to plan lessons, choose texts, and create learning activities for speaking, listening, and viewing in grade five through twelve. The course is designed for students who are interested in teaching as a possible career.

ENGL 893 - Phonetics and Phonology**Credits: 4**

The sounds and sound systems of English in the context of linguistic theory; comparisons of English to other languages. Prereq: a basic linguistic course or permission. (Not offered every year.)

ENGL 894 - Syntax**Credits: 4**

The relationship of grammar and meaning as viewed from the standpoint of modern linguistic theory. Emphasis on the syntax and semantics of English, with special attention to the construction of arguments for or against particular analyses. (Also offered as ENGL/LING 794). Prereq: a basic linguistic course or permission of the instructor.

ENGL 896 - The Internship Experience**Credits: 4**

Students will work with their peers to establish a personal definition of professionalism in their respective fields; they will read, critically analyze, and discuss articles covering a wide variety of topics, including writing at work, intended audiences, ethics in writing, navigating a difficult work environment or situation, and strategies for professional development. Class sessions in a discussion format, intended to be flexible and to directly support the changing needs of writing in the workplace. Students, along with their supervisors, will create their own learning objectives and evaluation tools. Students will write about their experiences at the end of term. Prereq: ENGL 419 and a minimum GPA of 3.00.

ENGL 897 - Special Studies in Literature**Credits: 4**

A) Old English Literature; B) Medieval Literature; C) 16th Century; D) 17th Century; E) 18th Century; F) English Romantic Period; G) Victorian Period; H) 20th Century; I) Drama; J) Novel; K) Poetry; L) Nonfiction; M) American Literature; N) A Literary Problem; O) Literature of the Renaissance. The precise topics and methods of each section vary. Barring duplication of subject, may be repeated for credit. For details, see the course descriptions available in the English department.

ENGL 898 - Special Studies in Creative Writing**Credits: 4**

Courses offered under this number focus on topics within creative writing, such as poetic influences, the short story form, and writing the novel. The precise topics and methods of each section vary. Barring duplication of subject, course may be repeated for credit. For details, see the course descriptions available in the English Department.

ENGL 899 - Master of Fine Arts in Writing Thesis**Credits: 1-8**

Eight credits required, that can be taken in any combination during the student's academic coursework. Maximum of 8 credits. IA (Continuous grading). Cr/F.

ENGL 901 - Advanced Writing of Fiction**Credits: 4**

Workshop discussion of advanced writing problems and readings of students' fiction. Individual conferences with instructor. Prereq: writing fiction or equivalent. Written permission of the instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 902 - Master Fiction Workshop**Credits: 4**

A fiction workshop for third-year M.F.A. students to refine the drafts of their book-length M.F.A. thesis. Completion drafts will be workshopped and revised. Various directed readings. May be repeated for credit up to 8 hours. Special fee.

ENGL #903 - Advanced Memoir Writing**Credits: 4**

Workshop of essays/chapters in memoir, and discussion of current models of the form. Individual conferences with instructor. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 910 - Practicum in Teaching College Composition**Credits: 6**

Seminar focuses on composition practical and theoretical issues of significance to the teaching writing to first-year students. A mentorship component creates opportunities for close supervision and support by experienced teachers in the writing program. Open only to teachers in the First-year Writing program.

ENGL 911 - Writing for Teachers**Credits: 4**

Opportunity for teachers of composition to work intensively on their writing, to read as writers, and to discover the principles appropriate to the writing genre they are teaching. Because of its special focus, this course may not be applied to the M.A. in English/writing option. Topics may vary.

ENGL 912 - Historical and Theoretical Studies in Rhetoric**Credits: 4**

The rhetorical tradition in Western culture, with a special focus on three critical periods: the classical period (Aristotle, Cicero, Quintillian), the eighteenth century (Blair and Campbell), and the modern era (Burke, Booth, Perelman, Ong, Weaver).

ENGL 913 - Theory and Practice of Composition**Credits: 4**

Examination of major theoretical and pedagogical works in the field of composition. To include works on the writing process, writing development, response to writing, and other topics.

ENGL 914 - Special Topics in Composition and Rhetoric**Credits: 4**

Topics chosen by instructor may include: A) Political, Philosophical, and Ethical Issues in Composition; B) Gender and Writing; C) Cognition and Composition; and D) Ethnographics of Literacy. May be repeated for credit, barring duplication of topic.

ENGL 916 - History of Composition**Credits: 4**

Composition teaching and theory in American colleges and academics from the 18th century to the present.

ENGL 918 - Research Methods in Composition**Credits: 4**

Overview of major research approaches including historical, case study, ethnographic, and textual; special emphasis on research design.

ENGL #919 - Teaching the Writing Process**Credits: 1-6**

Focus both on the writing of the participants and on the teaching of writing in grades K-12. Special attention is given to strategies for prewriting, revision, evaluation, and conducting writing conferences. May be repeated to a maximum of 8 credits.

ENGL 920 - Issues in Teaching English and the Language Arts**Credits: 1-6**

Special topics in the teaching of English and the language arts. Inquire at the English department to see what topics in the teaching of reading, writing, literature, or language arts may be scheduled. Open only to graduate students with a professional interest in teaching or to practicing teachers. 1-6 credits depending on the specific course.

ENGL 921 - Practicum in Teaching English and the Language Arts**Credits: 1-6**

A site-based course for practicing teachers that features in-class observations and demonstrations, individual consultation, and group meetings in the schools. Prereq: permission. May be repeated to a maximum of 8 credits.

ENGL 922 - Advanced Topics in Literacy Instruction**Credits: 1-6**

Specialized study of literacy topics that may include: A) Nature Journaling; B) Gender and Literacy; C) Digital Storytelling; D) Multigenre Writing; E) Assessment; F) Capstone Project; and G) Literacy Problem.

ENGL 923 - Advanced Essay Writing**Credits: 4**

Writing and reading course in which students are encouraged to experiment with a variety of styles and forms. Discusses outside reading by focusing on techniques that the student might want to apply to his or her own material. Prereq: permission.

ENGL 924 - Professional Preparation**Credits: 2**

This 2-credit course, offered in alternate years, is designed primarily to help doctoral students prepare to enter the profession. It takes up such topics as writing a resume or curriculum vitae, presenting a conference paper, submitting an article, applying for a job, and interviewing. Cr/F.

ENGL 925 - Graduate Study of Literature**Credits: 4**

Techniques, resources, and purposes of literary study: close reading; practical criticism; critical theories and their values; pertinence of intellectual and historical backgrounds. Approaches applied to a specific area of literary study, which varies from year to year.

ENGL 926 - Seminar: Literary Theory**Credits: 4**

Major questions and topics in the current theories about literature and contexts. What is literature? What method might one use to analyze literary texts? What role might cultural and social conditions play in our understanding of literature? How have traditional answers to these and other questions about literature been contested? May be repeated.

ENGL 927 - Seminar: Feminist Criticism Theory and Practice**Credits: 4**

May be repeated.

ENGL 932 - Seminar: Folklore and Folklife**Credits: 4**

May be repeated.

ENGL 935 - Seminar: Studies in American Literature**Credits: 4**

May be repeated.

ENGL 936 - Seminar: Literature of Early America**Credits: 4**

May be repeated.

ENGL 937 - Seminar: Studies in 19th Century American Literature**Credits: 4**

May be repeated.

ENGL 938 - Seminar: Studies in 20th Century American Literature**Credits: 4**

May be repeated.

ENGL 953 - Seminar: Studies in Old English**Credits: 4**

May be repeated.

ENGL 956 - Seminar: Studies in Medieval Literature**Credits: 4**

May be repeated.

ENGL 958 - Seminar: Studies in Shakespeare**Credits: 4**

May be repeated.

ENGL 959 - Seminar: Studies in Milton**Credits: 4**

May be repeated.

ENGL 960 - Seminar: Studies in English Drama**Credits: 4**

May be repeated.

ENGL 964 - Seminar: Studies in 16th Century Literature**Credits: 4**

May be repeated.

ENGL 965 - Seminar: Studies in Early 17th Century Literature**Credits: 4**

May be repeated.

ENGL 968 - Seminar: Studies in 18th Century Literature**Credits: 4**

May be repeated.

ENGL 970 - Seminar: Studies in the Romantic Period**Credits: 4**

May be repeated.

ENGL 971 - Seminar: Studies in the Victorian Period**Credits: 4**

May be repeated.

ENGL 974 - Seminar: Studies in 20th Century British Literature**Credits:** 4

May be repeated.

ENGL 981 - Seminar: Studies in Post-Colonial Literatures in English**Credits:** 4

May be repeated.

ENGL 990 - Seminar in Linguistics**Credits:** 4

May be repeated.

ENGL 994 - Practicum in Teaching English to Speakers of Other Languages**Credits:** 2-6

Students have an opportunity to observe and discuss ESL classes and to design and carry out their own lessons, with follow-up evaluation. Cr/F.

ENGL 995 - Independent Study**Credits:** 1-8

To be elected only with permission of the director of graduate studies and of the supervising faculty member.

ENGL 996 - Reading and Research**Credits:** 2-8

Cr/F.

ENGL 998 - Master's Paper**Credits:** 4

Cr/F. IA (Continuous grading).

ENGL 999 - Doctoral Research**Credits:** 0

Cr/F.

Environmental & Resource Economics (EREC)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

EREC 860 - Ecological-Economic Modeling for Decision Making**Credits:** 4

In this course, students will develop ecological-economic models and use them to inform economic decision making related to the management of natural resources. These models range from analytical models using algebra and calculus, to computational models using coding and simulations. The course will focus on spatial-dynamic computational bio-economic models because of their ability to capture economic decision making and ecological processes over time and space. Prereq: ECON 605 or equivalent; MATH 420, or equivalent.

Environmental Education (ENED)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ENED 890 - Environmental Education Summer Institute: Field Ecology, Human Communities, and Curriculum**Credits:** 8

An intensive, team-taught experience that immerses students in a process of inquiry explicitly designed to connect and integrate work in the Environmental Education Program's three focus areas: Pedagogy, Environmental Science, and Environmental Values, Policy, and Planning. A four week program, meeting four days/weeks for six-eight hours/day, with out-of-class assignments make it a full-time commitment for students. Classroom and field-based activities help students experience the interdisciplinary nature of environmental education firsthand, while giving students the opportunity to explore materials, research methods, and instructional approaches appropriate to their specific educational context. Prereq: a minimum of two prior life or physical science courses. Permission required.

ENED 900 - Seminar and Practicum in Environmental Education**Credits:** 4

This course is the capstone experience for students in the MA Program in Environmental Education. It combines a field placement in environment education with a Practicum Seminar to give students the opportunity to put what they have learned into practice in a context that is appropriate for their professional development and career goals. The Practicum also provides students with support in completing the Program Portfolio requirement for the master's degree.

Genetics (GEN)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

GEN 804 - Genetics of Prokaryotic Microbes**Credits:** 5

Maintenance, exchange, and expression of genetic material in bacteria and their viruses. Historical overview of the role microbial genetics played in development of modern molecular biology. Contemporary perspective on methods used to understand the function of genes and their applications to basic science, biomedical research, and biotechnology. Prereq: introductory microbiology with lab; introductory genetics; or permission. Lab. Special fee.

GEN 805 - Population and Quantitative Genetics**Credits:** 4

Exploration of the forces (mutation, selection, random drift, inbreeding, assortative mating) affecting the frequency and distribution of allelic variation in natural populations. Quantifying the structure of populations. Analysis of continuous variation in populations simultaneously at multiple loci. Interactions between genes and their environment underlying phenotypic variation. Methods of analysis for theoretical and practical applications. Prereq: introductory genetics; introductory statistics; one semester college calculus. Computer Lab.

GEN 806 - Human Genetics**Credits:** 4

Genetic basis of human traits and diseases including both traditional methods of diagnosis and contemporary molecular genetic approaches stemming from the human genome project. Case studies exemplify common practices in human genetic counseling and integrate the scientific basis of diagnosis with the special ethical implications of human genetic analysis. Prereq: introductory genetics or permission.

GEN 811 - Genomics and Bioinformatics**Credits:** 4

Methods, applications, and implications of genomics—the analysis of whole genomes. Microbial, plant and animal genomics are addressed. Medical, ethical and legal implications of genomic data. Computer lab provides exposure and experience in a range of bioinformatics approaches used in genome analysis. Prereq: introductory genetics. Computer lab.

GEN 812 - Programming for Bioinformatics**Credits:** 5

Development of programming skills that enable life science students to ask fundamental biological questions that require computers to automate repetitive tasks and handle query results efficiently. Topics include: computer values of important parameters of biological sequence data; pattern search and motif discovery scripts; accessing, querying, manipulating, retrieving, parsing, analyzing, and saving data from local and remote databases. Prereq: introductory genetics; introductory bioinformatics; or permission. Computer Lab.

GEN 813 - Microbial Ecology and Evolution**Credits:** 4

Evolutionary and ecological forces that generate the tremendous diversity of microbial life on Earth with emphasis on viruses, archaea and bacteria. Functional roles of microorganisms, their population dynamics and interactions, and their mechanisms of evolutionary change in a variety of environmental settings, including natural communities and laboratory microcosms. Prereq: introductory genetics; introductory microbiology and lab; or permission.

GEN 815 - Molecular Evolution**Credits:** 4

Rates and patterns of evolutionary change in biomolecules. Forces affecting the size and structure of genomes. Molecular mechanisms of organismal evolution. Emphasizes integrating evidence from biochemistry, molecular genetics and organismal studies. Methods for reconstructing phylogeny from molecular sequences. Prereq: introductory genetics. Some knowledge of statistics recommended. Computer lab.

GEN 817 - Molecular Microbiology**Credits:** 5

Fundamental physiological and metabolic processes of archaea bacteria and fungi with a strong emphasis on prokaryotes. Literature-based course with lab. Topics include regulation and coordination of microbial metabolism, bacterial cell cycle, global control of gene expression, signal transduction, and microbial cell differentiation. Prereq: introductory microbiology and lab; introductory genetics; or permission. Special fee. Lab.

GEN 821 - Comparative Genomics**Credits:** 4

Explores the central questions and themes in contemporary comparative genomics, including genome biology, phylogenomics, human origins, population genomics, and ecological genomics. Provides the conceptual framework required to evaluate new work in this fast-changing field. Prereq: introductory genetics.

GEN 871 - Molecular Genetics**Credits:** 4

Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic and epigenetic mechanisms of gene expression and its control; molecular genetic control of cell division and differentiation during development. Prereq: introductory genetics.

GEN 872 - Evolutionary Genetics of Plants**Credits:** 4

Mechanisms of genetic change in plant evolution, both in nature and under human influence. Topics include neo-Darwinian theory; speciation and hybridization; origins and co-evolution of nuclear and organelle genomes; gene and genome evolution; transposable elements; chromosome rearrangements; polyploidy; genetic modification. Lab introduces methods in information gathering, bioinformatics, genome analysis, plant breeding, and genetic manipulation. Prereq: introductory genetics. Lab. Special fee.

GEN 874 - Techniques in Plant Genetic Engineering and Biotechnology**Credits:** 4

Theory and hands-on experience with techniques used in plant genetic engineering, including cell and tissue culture, gene cloning, and analysis of foreign gene expression. Discussion of role of plant biotechnology in sustainable agriculture and climate change; modifying plants for better nutrition and stress response, environmental remediation, and for production of pharmaceuticals; controversies associated with this technology. Lab. Special fee. Prereq: introductory genetics or permission.

Geospatial Science (GSS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

GSS 800 - Elements of Geospatial Science**Credits:** 4

This on-line course lays the foundation for Geospatial Science (GSS) thinking by exploring the definition, methods, data types, data sources, software, and equipment used within the field of GSS. The importance and structure of the regional GSS industry is discussed with emphasis on how GSS is used across multiple disciplines. Course includes some guest lectures from industry professionals. Lectures and tests are conducted on-line. Students are required to download and install some software and data to complete assignments.

GSS 805 - Applied Geographic Information Systems for Research**Credits:** 4

This course teaches concepts and applied techniques of Geographic Information System tools and technologies to solve real world Geospatial Science problems across multiple disciplines. Technical topics covered include geospatial data collection, quality, conversion, management, analysis, visualization, and dissemination. Students hands-on-lab and independent exercises use the latest version of ArcGIS software. Development and implementation of a project proposal and an independent project are completed by students to forward individual interests.

GSS 807 - GIS for Earth and Environmental Science**Credits:** 4

This course teaches concepts and applied techniques of Geographic Information System tools and technologies to solve Geospatial Science problems for Earth Science and Environmental Engineering. Technical topics covered include geospatial data collection, quality, conversion, management, analysis, visualization, and dissemination. Students hands-on-lab and independent exercises use the latest version of ArcGIS and other GIS software. Development and implementation of a project proposal and an independent project are completed by students related to course topics.

GSS 809 - GIS for Water Resources**Credits:** 4

This course provides students the opportunity for application of emerging technologies with a focus on Geographic Information Systems and remote sensing in water resources engineering and hydrology. Topics may include digital mapping of water resources information, spatial coordinate systems, river and watershed networks, soil and land use mapping, flood/hydrology modeling and flood plain mapping, terrain analysis for hydrologic modeling, and integration of times series and geospatial data. Special fee.

GSS 817 - Remote Sensing for Earth and Environmental Science**Credits:** 4

Remote sensing provides insight into spatial and temporal aspects of environmental and earth systems. Students will learn digital image processing techniques, understand different sensor and platform technologies, and discuss new trends in remote sensing science. Focus on applied research questions and projects will be addressed. The course will include hyperspectral, lidar analysis, and unmanned aerial systems. Work will be done using ImageJ, Google Earth Engine and python. Programming background is not a requirement. Special fee.

GSS 896 - Special Topics**Credits:** 4

Special topics in geospatial technologies including but not limited to geographic information system, global positioning system, remote sensing, spatial analysis, statistics, crowdsourcing mapping, geodesy, and surveying.

GSS 996 - Geospatial Science Independent Study**Credits:** 1-4

May include research project, fieldwork or a relevant internship where students will build or apply GIS, Remote Sensing, GPS, or other Geospatial technologies. To be elected only with permission of program coordinator and with qualified supervision. Special fee.

Graduate School (GRAD)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

GRAD 800 - Continuing Enrollment**Credits:** 0

All continuing graduate students who are not enrolled for course credits, thesis credits, Doctoral Research (999) or Master's Continuing Research (GRAD 900), and are not in residence, are required to register for GRAD 800 each semester of the academic year (or each summer for students in MATH M.S.T., and English M.S.T. and College Teaching M.S.T. programs). Students registered for GRAD 800 are considered part-time. Not graded.

GRAD 885 - Graduate Foreign Exchange**Credits:** 9

Graduate students may spend a semester at participating institutions. Eligibility requirements include United States citizenship, good academic standing, and permission of their graduate program committee. For information contact the Center for International Education. Special fee. May be repeated up to a maximum of 9 credits. Cr/F.

Co-requisite: INCO 687**GRAD 890 - UNH Law Exchange****Credits:** 1-3

Graduate degree students may enroll for courses at the UNH School of Law that are not offered through the Graduate School and will normally fulfill elective degree requirements in the students major program. Eligibility requirements include good academic standing (3.0 or better), good financial standing, permission of the graduate program committee or advisor and permission of the graduate school. For information contact the Graduate School. May be repeated up to a maximum of 9 credits. Normally no more than one course can be taken at the law school in any one term.

GRAD 900 - Master's Continuing Research**Credits:** 0

Master's students who have completed all course requirements, registered for the maximum number of thesis or project credits, and are in residence completing their master's program must register for Master's Continuing Research. Students registered for GRAD 900 are considered full-time. Not graded.

GRAD 920 - Qualitative Institute**Credits:** 2

This course explores strategies for navigating crucial junctures in qualitative data analysis. Through focused applications including ethnographic, grounded theory, and/or case study approaches, we examine how the researcher's question(s), theoretical stance, unit of analysis, and case-specific of collective orientation shape analytic options and decisions. Students work with data already in the process of being generated and analyzed. Prior coursework or experience in qualitative research is required.

GRAD 930 - Ethics in Research and Scholarship**Credits:** 2 or 3

Individual, professional, institutional, and social issues related to the ethical conduct of research and scholarship. Uses case studies to demonstrate the application of pertinent regulations, policies, and guidelines. Cr/F.

GRAD 932 - Graduate Outreach Communication**Credits:** 2

Professional success in - and after - graduate school depends on the ability to communicate about one's research, not only by publishing in professional journals, but also by explaining its implications to a broad audience. This course covers a range of topics related to research communication, including audience, visual and oral presentation skills, and online forms such as websites, blogs, and social media (emphasis will vary depending on student interest). Open to students from all disciplines. Cr/F.

GRAD 935 - Intensive Grant Writing Seminar**Credits:** 2

The ability to find funding for one's research is an important skill. This course, open to graduate students in all disciplines, provides the expertise necessary to identify appropriate funding opportunities and write effective grant proposals. Students work alone or in small groups to write a grant proposal from start to finish. Guest speakers include successful grant writers from across campus, including faculty members and staff from Corporate and Foundation Relations and the Research Office.

GRAD #940 - Foundations in College Teaching**Credits:** 2

Formal consideration of effective teaching approaches. Topics include course design, presentation, and evaluation. Introduction to multiple pedagogies and their application in higher education.

GRAD 945 - Advanced Seminar in College Teaching**Credits:** 2

Capstone course for experienced faculty. The development and review of a course portfolio that demonstrates the knowledge and application of best teaching practices. Includes a formal examination on the scholarship of teaching and learning. Capstone course for experienced faculty. By permission only.

GRAD 950 - Issues in College Teaching**Credits:** 2

Issues faced within the classroom including evaluation methods, classroom climate and diversity, instructional approaches, teaching and learning resources, and student behavior. Case studies. Prereq: permission. Cr/F.

GRAD 951 - Teaching with Writing**Credits:** 2

Examination of the issues, principles, and practices of using writing to enhance learning. Appropriate for all fields and disciplines. Participants design and field test assignments. Seminar requires field work and independent research. Cr/F.

GRAD 952 - College Teaching Mentorship**Credits:** 1-2

Individual interaction with a senior professor to develop insights related to college-level teaching. Students observe and analyze instructional approaches based upon the professor's teaching philosophy and teaching traditions within a specific field or discipline. Micro teaching may be required. Prereq: permission. May be repeated for a maximum of 3 credits. Cr/F.

GRAD 959 - Advanced Issues in College Teaching**Credits:** 1

Advanced seminar examining issues involved in teaching and learning faced within the classroom. Examines the relationship between theory and practice. Prereq: GRAD 950 or permission. May be repeated barring duplication of subject matter. Cr/F.

GRAD 961 - Cognition, Teaching, and Learning**Credits:** 2

Cognitive theories and their application to classroom instruction. Examination of historical relation between cognition and education as well as current application of cognitive theory in the learning process. Cognitive skills involved in the learning process. Teaching strategies that enhance the use of cognitive skills and improve learning and teaching effectiveness. Prereq: permission.

GRAD #962 - Academic Citizenship**Credits:** 2

Issues facing professors as a group within today's academic world. Topics include: defining "higher education" in contemporary terms; the variety of American academic institutions, their diverse missions, and associated career paths; the academic ethic; and the status of academic freedom in today's climate. Examination of the rights and responsibilities of the contemporary professor. Prereq: permission.

GRAD #963 - College Students and the Undergraduate Culture**Credits:** 2

Examination of the cultures for learning and teaching, created by faculty members, administrators, and undergraduates. Consideration of recent research on the relationship of such cultures to the quality of teaching and learning. Content includes research on the learning needs of students, the importance of cultural artifacts in the classroom, and related topics.

GRAD 965 - Classroom Research and Assessment Methods**Credits:** 2

Examination of methods used in classroom assessment and classroom research. The focus is on the improvement of teaching and learning in a teacher's own classroom. Research project is required. Prereq: permission.

GRAD 970 - Special Topics in College Teaching**Credits:** 2-4

Formal courses in college teaching: A) field studies; B) disciplinary studies, C-Z other. Prereq: permission. May be repeated to a maximum of 10 credits.

GRAD 971 - Teaching and Learning in Science**Credits:** 3-4

Issues, activities, and research in science education, including history of curricula, student and teacher knowledge and beliefs, epistemological and cognitive bases of science learning, and related instructional approaches. Extensive reading, writing, discussion, and reflection are included. Not open to all students who have completed CHEM 971. Prereq: permission.

GRAD #978 - Teaching Economics**Credits:** 4

Analysis of the content, methodology, and pedagogy in college economics courses. Effects upon college students of economics. Exploration of relevance of other social sciences, the humanities, the natural sciences, and mathematics for undergraduate economic education. Not open to students who have taken ECON 898. Prereq: permission.

GRAD #980 - Preparing to Teach a Psychology Course**Credits:** 2

Preparation for teaching in psychology. Examination of issues and models involving course design and interaction with students. Products from the course will include a complete course syllabus, a preliminary statement of teaching philosophy, and the first three teaching models of a course. An IA (continuous grading) grade may be awarded.

GRAD 990 - College Teaching Praxis**Credits:** 3-4

Formal experience in teaching a college level course. Development of a teaching portfolio. Prereq: permission. May be repeated for a maximum of 12 credits.

GRAD 995 - Independent Study**Credits:** 1-4

Faculty supervised independent studies in college teaching. Prereq: permission. May be repeated to a maximum of 12 credits.

GRAD 998 - College Teaching Portfolio**Credits:** 1

An integrative experience for the cognate in college teaching, culminating in an electronic teaching portfolio submitted to the Center for Excellence in Teaching and Learning.

Health & Human Services (HHS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

HHS 898 - Special Topics**Credits:** 1-8

Special fee on some topics.

Health Management & Policy (HMP)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

HMP 812 - Health Analytics

Credits: 4

This course introduces students to the field of health analytics and data science. It expands upon introductory statistical and data manipulation methods to include data mining, predictive analytics, cluster analysis, trend and pattern recognition, and data visualization. It couples data skills with interpretive and communication skills. Students will also be exposed to basic statistical programming. There will be a graduate component of the course (812) where students will work on advanced concepts and complete a separate culminating project.

HMP 900 - Introduction to the Health Services Industry

Credits: 3

The course introduces students to the evolution, organization and structure of the health services industry. The course examines key components, including patients, providers, payers and suppliers, as well as assessing major issues confronting the system such as population health, evolving reimbursement models, health reform, assessment of quality and costs, epidemiological and demographic imperatives, and changing technology.

HMP 975 - Praxis

Credits: 1-3

An applied experience consisting of field study and the development of management or policy case studies and supporting analysis to explore the relationship between theory and professional practice. Cr/F. IA (Continuous grading).

HMP 995 - Independent Study

Credits: 1-3

Directed readings and other activities to explore a specific topic related to health management and policy. May be repeated to a maximum of 12 credits. Prereq: permission.

History (HIST)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

HIST 800 - Advanced Explorations

Credits: 1-4

Advanced explorations in one of the fields listed below: A) American History, B) European History, C) World History, D) Ancient History. Barring duplication of subject, may be repeated to a maximum of 12 credits.

HIST #802 - Holocaust: The War on Europe's Jews

Credits: 4

The attempted destruction of European Jewry during the Third Reich is one of the pivotal events in the history of modern Western Civilization. This course explores the circumstances and behavior of the Jews (as victims, resisters, survivors), the perpetrators (German and non-German), bystanders (German, European, and American), and rescuers (German and non-German). Attention is also given to such post-1945 matters as justice, compensation, and memory.

HIST 803 - European Conquest of North America

Credits: 4

European Conquest of America explores many of the major issues relating to the creation and development of colonial North America. We will focus particularly on the extraordinary heterogeneous mixture of peoples who lived in North America and the Caribbean, and on the complexity and consequences of their interactions. Throughout the semester we will continually evaluate arguments among historians about whether or not it makes sense to understand the colonial period in terms of a conquest, or whether Native Americans retained enough power and resistance throughout the colonial period to make such an interpretation inaccurate.

HIST #804 - History of Medicine in the United States

Credits: 4

Have you been a patient, a nurse, or a holder of insurance? Almost everyone in the United States has a role in health care. We study the growth and development of the field of American medicine from colonial times to the present, examining the changing relationships between patients, health care professionals, technology, government, and others. The focus will be shifts in responsibility and authority over time from patients, to doctors, and even to businesses.

HIST 805 - American Revolution, 1750-1800

Credits: 4

Examines the transformation of thirteen British colonies into the United States through the election of Thomas Jefferson as president in 1801. Topics include the revolution's origins, the social and political impact of war, the changing structure of the family, the role of religion, the drafting and ratification of the Constitution, and the revolution's consequences for Indians and African Americans.

HIST 806 - History of the Early Republic

Credits: 4

Explorations in the histories of people and institutions that transformed the new United States from a coastal republic of largely independent freeholders to a transcontinental democracy increasingly driven by class. Topics include slavery, the family, reform movements, and the formulations of national identity.

HIST 809 - United States Legal History Special Topics

Credits: 4

In-depth thematic exploration of the role of law in American life. Topics include Race and Equality in American Law; Community, Pluralism, and American Law; Property, Liberty, and Law; Gender and Law. May be repeated for credit with instructor's permission. Consult department listing for topics.

HIST 811 - Civil War Era

Credits: 4

A survey of the period from the presidency of Andrew Jackson to the end of the Reconstruction, focusing on the causes, course, and consequences of the Civil War. Topics include slavery in the Old South, antebellum reform movements, creation and breakdown of the Second Party System, social and economic (as well as military) events during the war, and major developments during Reconstruction after the war.

HIST 812 - Emergence of Industrial America**Credits: 4**

Investigates the economic transformation of 19th-century America from a rural, agricultural to an urban, industrial society. Explores the sweeping economic changes, focusing on such topics as changes in work and leisure, westward expansion and its effects on Native Americans, shifts in gender roles, growth of a consumer culture, rise of labor unions and populism, immigration, movements for reform and regulation, growth of American imperialism, and intellectual developments.

HIST 813 - American Ways of War**Credits: 4**

"Is there an American way of war?" This commonly asked question will be the focal point of the course. To answer that we will study the interactions of both war and society in the United States from the Civil War onwards, addressing such issues as the causes, courses, diplomacy, homefront, legacy, and the art of the great and small wars.

HIST 815 - The Rise of Modern United States, 1900-1945**Credits: 4**

By 1900, the United States had emerged as the world's leading industrial power and leading destination for millions of immigrants and had begun to become a major player in world affairs. Americans enjoyed unprecedented prosperity and became eager consumers of new inventions and popular culture: cars, radios, jazz records, and the "motion pictures." But they also experienced the worst depression the country had ever known and struggled to make sense of a world that went to war twice within a generation. Women, African Americans, immigrants - all struggled to carve out their place in the new political order. By World War II, the United States assumed many of its "modern" characteristics. Using novels, movies, photographs, sporting events, political speeches and political debates, we will explore both the domestic and the international aspects of the development of modern U.S.

HIST 816 - United States Since World War II**Credits: 4**

This course presents a framework for understanding American history from 1945 to the present. We explore major events and themes, beginning with the Cold War and the domestic anti-communism crusade, and continuing with the civil rights movement, the Vietnam War, and the women's movement. In our study of national politics, we chart the rise of liberalism – focusing on the presidencies of John F. Kennedy and Lyndon Johnson – as well as the conservative response, punctuated by the "Reagan Revolution." We conclude with a brief study of the 21st century.

HIST 818 - American Environmental History**Credits: 4**

This course examines how nature has been a factor in American history and how Americans have wrestled with the concepts of nature and culture. Topics include industrialization, evolution, conservationism, environmentalism, and environmental diplomacy.

HIST 819 - Foreign Relations of the United States**Credits: 4**

The history of American diplomacy from the colonial era to the present, with the dividing point at 1900. The focus will be on both the foreign and domestic influences that shaped American diplomacy.

HIST 820 - Foreign Relations of the United States**Credits: 4**

The history of American diplomacy from the colonial era to the present, with the dividing point at 1900. The focus will be on both the foreign and domestic influences that shaped American diplomacy.

HIST 821 - History of American Thought**Credits: 4**

This course introduces the subfields of American intellectual and cultural history by assessing the ideas of some of the brightest minds that thought about life on the land we know of as the United States of America before the middle of the nineteenth century. This course surveys more than two centuries of thinkers and their connection to America's plural and evolving popular culture. Ultimately, this course seeks to answer the question: What is the history of American thought?.

HIST 822 - History of American Thought**Credits: 4**

Influential thinkers and ideas have shaped American politics, society, economy, and culture since the Civil War. Among the topics explored are American Victorianism, Social Darwinism, Pragmatism, Modernism and its opponents, gender and identity politics and post modernism. Mark Twain, Elizabeth Cady Stanton, Thorstein Veblen, W.E.B. Dubois, John Dewey, F. Scott Fitzgerald, Hannah Arendt, Thomas Kuhn, Malcolm X, Susan Sontag and William F. Buckley Jr. will be among the thinkers explored.

HIST 824 - Topics in Modern US History**Credits: 4**

Advanced study of topics in U.S. history. Barring duplication of subject, may be repeated to a maximum of 8 credits. Course meets the History major requirement for Group I.

HIST #825 - Southern History and Literature since the Civil War**Credits: 4**

Equal focus on the history and literature of the South since the Civil War. Topics include reconstruction, the age of segregation, and the Civil Rights Movement. Literary focus is on the period since 1920, including the "Southern Renaissance"; authors include William Faulkner, Robert Penn Warren, Flannery O'Connor, and Zora Neale Hurston.

HIST 832 - Topics in Latin American History**Credits: 4**

Topics vary (see department listing for current semester). Seminar involves reading, discussion, and research on literature and documents related to the selected topic. It provides students with the opportunity to do research under close direction.

HIST 833 - Medieval England 800-1300**Credits: 4**

The purpose of this course is to provide students with an opportunity to gain an in-depth understanding of the history of medieval England from the beginning of the period of consolidation under the Wessex dynasty in the ninth-century through the end of the thirteenth century. In addition to obtaining a large corpus of information through the reading of significant monographs dealing with England during this period, students will be challenged to develop the critical analytical skills necessary for the thorough understanding and practice of historical methodologies, with a particular focus on the practice of historical method in writing medieval history. Finally, students will be given the opportunity to improve their communication skills through extensive class discussions dealing with the scholarly works read for this course, and in writing assignments.

HIST 834 - Medieval Empires**Credits: 4**

This course will explore the intellectual and political foundations of imperial rule in the Middle Ages with a particular focus on the Carolingian, German, and Byzantine empires of the early and high Middle Ages. The course will begin with the development of the idea of empire under Alexander the Great and then during the Roman empire. The course will then turn to an examination of how the rulers of the three great empires of the western Middle Ages adapted the classical ideas and practices of empire for their purposes. The course focuses on sources. Background material will be provided in short lectures.

HIST 840 - Holy War in the Holy Land: The Medieval Crusades**Credits: 4**

Survey of medieval military expeditions organized by Christians to secure the Holy Land during the 12th and 13th centuries. Topics considered include the formulation of a "just war" theory, political, intellectual, religious, and military interactions between Christians, Jews, and Muslims; the Crusader State of Jerusalem; and the histories of individual crusades.

HIST 841 - Europe After the Black Death**Credits: 4**

Explores the dramatic changes that characterized Western Europe as it rebounded in the fifteenth through the seventeenth centuries from the ravages of the Black Death of 1348. Examines the social, political, and artistic developments in late medieval and Renaissance Italy before "crossing the Alps" to trace the expansion of Renaissance culture in Northern Europe. Topics covered in the course include the humanist movement, new patterns of social organization, the revival of classical antiquity in the arts, architecture, religion and political theory, the effects on European society of the encounter with the "New World," shifting roles for men and women in early modern European societies, and religious war and conflict.

HIST 842 - Saints, Sinners, and Heretics: Europe in the Age of Religious Reform**Credits: 4**

Examines the history of Western Christendom from roughly 1400 to 1600, a period of tumultuous religious change throughout Europe. We begin in the Middle Ages where the seeds of religious division were sown. We then tackle Martin Luther's challenge to the Catholic church, trace the diffusion of his message throughout Europe, and address the Catholic response to the evangelizing movements that he inspired. Finally we investigate some of the regional varieties of Protestantism that developed in the latter half of the sixteenth century with a particular focus on Switzerland, Germany, England, Scotland, France, and the Netherlands.

HIST 844 - Victorian Britain**Credits: 4**

The Victorian Era was a time of contrasts. Queen Victoria, a monarch known for her moral strictness, sexual probity and rigid sense of decorum ruled over a vast world Empire. The streets of London, however, teemed with prostitutes, pickpockets and impoverished immigrants from Ireland, Europe and beyond, whose lives seemed untouched by either the prosperity or moral stringency that characterized the age. In this class we explore the varieties of Victorian experience both at home and in the global empire. We will examine the glittering lives of the rich as well as the abject poverty of the working poor and explore our own fascination with the dress, the homes, and the lives of the Victorians. Examining sources such as novels, decorative arts, corsets & bustles, Parliamentary debates, architecture, and scientific writings, we will attempt to uncover the many-faceted culture, society and political life of Victorian Britain.

HIST #845 - 19th Century European Great Powers - Diplomacy and International Law**Credits: 4**

In this course, we will study power in Europe during the apogee of that region's strength. The long nineteenth century is a period during which Europe avoided major continent-wide (and world-wide) wars, despite constant upheavals. That is a remarkable accomplishment when one compares the events of the nineteenth century with those of the twentieth, despite the fact that the former influenced the latter. Focus is on those who wielded power internationally, including dealmakers, deal-breakers, manipulators, and idealists. To express, test, restrain, or leverage power, actors engaged in wars and negotiations that led to a range of contracts from treaties, such as the Treaty of Fontainebleau ending Napoleon's reign; to alliances, like the Anglo-Japanese Naval Alliance ending Britain's "splendid isolation" from international partnerships; to conferences, including the Hague Conventions regulating wars. In addition, it is important to look at statutes influencing foreign policy, as did the Second German Naval Law of 1900 which increased European tensions before World War I. Examining the relations of powerful nineteenth century states, therefore, illuminates international law as well as more traditional elements of diplomacy. Students learn about 19th century great powers of Europe and important pieces of international legal relationships as well as develop critical thinking and communication skills.

HIST 849 - Comparative Topics in the History of Early Modern Europe**Credits: 4**

Topics will vary, but may include enlightenment and revolution; the peasantry; gender and the family; crime and deviance; science and society. May be repeated for a maximum of 8 credits.

HIST 851 - Topics in European Intellectual History**Credits: 4**

Explores major developments such as the Enlightenment, Russian intellectual history, ancient world views and cosmologies, and the relationship between gender and intellectual history. Includes topics up to the Scientific Revolution. Because topics may vary, students should check the department newsletter or office for course theme in any given term. May be repeated for credit as topics change.

HIST 852 - Topics in European Intellectual History**Credits: 4**

Explores major developments such as the Enlightenment, Russian intellectual history, ancient world views and cosmologies, and the relationship between gender and intellectual history. Includes topics since the Renaissance. Because topics vary, students should check the department newsletter or office for course themes in any given term. May be repeated for credit as topics change.

HIST 854 - Topics in History of Science**Credits: 4**

Study of a selected topic in the history of European science since the Renaissance.

HIST 856 - 20th Century Europe**Credits: 4**

Advanced study of 20th-century Europe. World War I, European totalitarianism, World War II, the loss of European primacy, and the search for a new Europe.

HIST 862 - England in the Tudor and Stuart Periods**Credits: 4**

Advanced study of England during the Tudor and Stuart periods. Political, religious, socioeconomic, and intellectual forces for change at work in England from the accession of Henry VII to the revolution of 1688-89.

HIST 864 - Russia: Modernization through Soviet Empire**Credits: 4**

The challenges of modernization; experience and legacy of Leninist and Stalinist revolutions; Soviet consolidation and decline through the Gorbachev era.

HIST 865 - Themes in Women's History**Credits: 4**

In-depth examination of a selected topic in women's history, such as women and health, women in modern European political theory, comparative history of women and revolution. See "Time and Room Schedule" or department for specific topic. May be repeated for credit with permission of instructor.

HIST #866 - Environmental History of Northwest Atlantic Commercial Fisheries**Credits: 4**

After centuries of ground-fishing humans have radically transformed the northwest Atlantic marine ecosystem, creating a tragedy for both fish and fisherman. This marine environmental history course considers the changing technology, ecology, and sociology of the commercial fishery off New England and the Canadian maritime from 1500 to the present.

HIST 869 - Germany from 1918 to Present**Credits: 4**

Begins with the revolution of 1918 and then explores the political, social, and intellectual character of the Weimar Republic, the rise and nature of Nazism, the Holocaust, the foundation of both the German Democratic Republic and Federal Republic and their evolution in the shadow of the Cold War, and concludes with the unification of Germany after the fall of the Berlin Wall in 1989.

HIST 871 - Museum Studies**Credits: 4**

Introduction to theory, methods, and practice of museum studies. Examination of various museum functions, as well as historical controversies. Prereq: graduate students only. May be repeated for up to 8 credits with departmental approval.

HIST 872 - Studies in Regional Material Culture**Credits: 4**

An introduction to the theory and methodology of material culture, that is, the study of history through the analysis of buildings, human-created landscapes, and artifacts made and used in the United States, particularly in New England. May be repeated for credit with the permission of the graduate director.

HIST 873 - Early History of Ancient Greece**Credits: 4**

Greek history from the Minoan and Mycenaean eras through the Persian Wars of the early fifth century. Emphasis on original sources including the Homeric epics, Plutarch, Sappho, and Herodotus. Examination of the distinctive developments of political systems in Sparta, Athens, as well as issues of colonization, diplomacy, religion, and culture. Through discussion of types of available evidence and their integration into historical understanding.

HIST 874 - Historiography**Credits: 4**

Analysis of ancient and modern historians. (Not offered every year.)

HIST 875 - Historical Methods**Credits: 4**

Introduction to contemporary historical methods. Required of all entering Ph.D. candidates; open to undergraduates with permission.

HIST 876 - Classical and Hellenistic Greek Worlds**Credits: 4**

Greek History from the Persian Wars of the early fifth century through the life of Alexander the Great and the creation of the Hellenistic world. Emphasis on original sources including Herodotus, Thucydides, the Athenian playwrights, and Plato. Examination of the transformation from city-state political organization to large Hellenistic kingdoms, as well as discussion of Greek historiography, intellectual life, and social theory. Thorough discussion of types of available evidence and their integration into historical understanding.

HIST 877 - Roman Republic**Credits: 4**

Covers pre-Roman Italy, the Etruscans, and the foundation of the Republic. Rome's expansion through the Punic Wars, and relations with the Hellenistic kingdoms. Disintegration and final collapse of the Republic. Includes discussion of Roman art, engineering, and political theory. Emphasis on Latin sources in philosophy, history, and literature.

HIST 878 - Roman Empire**Credits: 4**

Collapse of the Roman Republic and creation of the Augustan principate through the division of the empire, with discussion of the fall of Rome in the west, and the eastern empire through Justinian. Discussion of Roman art, literature, philosophy, religious developments such as the proliferation of mystery religions and the rise of Christianity.

HIST 879 - Workshop in History and Historical Methods**Credits: 1-6**

Workshop for teachers in History. Intensive work designed to introduce teachers to advanced current work in history. Topics vary. May be repeated with permission of the instructor or the graduate director in the history department.

HIST 880 - Special Topics in Museum Studies/Material Culture**Credits: 4**

Study of a selected topic related to museum studies or material culture. May be repeated for course credit with permission of the graduate director.

HIST 881 - Society and Culture in 20th-Century China**Credits: 4**

Explores major aspects of social and cultural transformation in China from the beginning of the century, when the Qing dynasty was replaced by a Republic, to the age of globalization. Themes included the rise of citizenship and civic activism, mass culture in print media, commercial culture in advertisement and consumerism, European and Russian influences on cultural and political changes, war of resistance, refugee and social dislocation, rural transformation shaped by socialism and global market.

HIST #884 - History of Southern Africa since 1652**Credits: 4**

Struggle for political and economic control in the only region of Africa where European groups remain in power. Impact of European imperialism, European nationalism, racial conflict, economic competition and industrialization, apartheid, and assimilation with special attention to the development of European hegemony.

HIST 890 - Seminar: Historical Expl**Credits:** 4

Seminar in one of the fields listed below: A) American History, B) Atlantic History, C) Canadian History, D) Latin American History, E) Medieval History, F) History, G) History of Islam, H) Ancient History, I) East Asian History, J) African History, K) Middle Eastern History, L) Historiography, M) Russian History, N) World History, O) British History, P) New Hampshire History, Q) Historical Methodology, R) Irish History, S) History of Science, T) Maritime History, U) Museum. May be repeated to a maximum of 8 credits.

HIST 892 - Seminar in the History of Science**Credits:** 4

In-depth examination of a selected topic in the history of science. Subjects vary. No special background in science required.

HIST 897 - Colloquium**Credits:** 4

Selected topics in American, European, and non-Western history. Required of history majors. Students must elect section in the department office at the time of registration. Prereq: Intro to Historical Thinking.

HIST 898 - Internship in Museum Studies**Credits:** 4

Supervised position with a museum, historical society, archive, or other history related site. May be repeated for a total of 16 credits. Prereq: permission. Credit/Fail.

HIST 899 - Master's Thesis**Credits:** 1-6

May be repeated up to a maximum of 6 credits. Permission required. Cr/F.

HIST 939 - Readings in Early American History**Credits:** 3

Introduces the chief themes and issues in the secondary literature of early American history from European settlement through the Early Republic. Students write a series of short analytical papers. Expected of all graduate students preparing a field in Early America. Permission required for those not enrolled in History Graduate Program.

HIST 940 - Readings in Modern American History**Credits:** 3

An introduction to major historians and historiographical issues in the history of the U.S. since 1820. Intended to serve as a foundation for research in the field and as preparation for graduate examinations. Permission required for those not enrolled in History Graduate Program.

HIST 949 - Colloquium in United States History**Credits:** 3

Topics include 1) Early American Society; 2) Early American Culture; 3) Revolutionary Period; 4) 19th Century; 5) 20th Century. Focuses on existing historical literature on a given topic, such as American slavery. Students normally read extensively, discuss major issues and the literature in class meetings, and write essays that examine the literature critically.

HIST 951 - Colloquium in European History**Credits:** 3

Topics include 1) Medieval; 2) Early Modern; and 3) Modern. The course focuses on the existing historical literature on a given topic, such as the French Revolution. Students normally read extensively, discuss major issues and the literature in class meetings, and write essays that examine the literature critically. May be repeated if a different topic is selected.

HIST 952 - Colloquium in Comparative History**Credits:** 3

Intensive reading in comparative studies of U.S. history. Compares the experience of the United States and that of some other area or nation. For example, comparing legal history of Britain and the U.S.; the impact of colonization on native peoples in North and South America; the nature of slavery in the U.S., the Caribbean, and Brazil; or the experience of women in Europe and America. Topics vary and may be repeated with permission.

HIST 953 - Colloquium in African, Asian, Latin American History**Credits:** 3

Topics include 1) African; 2) Asian; 3) Latin American; 4) Middle Eastern. Focuses on the existing scholarly historical literature on a given topic, such as nationalism or slavery. Students normally read extensively, discuss major issues and the literature in class meetings, and write essays that examine the literature critically.

HIST 970 - Graduate Seminar in Teaching History**Credits:** 1

Introduction of fundamental issues in the teaching of history at the college level. Topics include basic pedagogical issues, such as leading effective discussions, evaluating students' work, and lesson planning, and also concerns related to history teaching, e.g., developing students' historical consciousness, use of media, and so forth. Required of all entering Ph.D. students and applicable to the Cognate in College Teaching. Course to be taken in the Fall and then repeated in Spring for a total of two credits. (Also offered as GRAD 981.) Cr/F.

HIST 989 - Research Seminar in Early American History**Credits:** 3

Students will write a lengthy research paper in any aspect of early US history, to 1877. The course will also include professional preparation assignments. May be repeated with a different topic.

HIST 990 - Research Seminar in Modern American History**Credits:** 3

Students write a lengthy research paper in any aspect of modern US history, roughly 1865 to the present. The course also includes professional preparation assignments. May be repeated with a different topic. Permission required for those not enrolled in History Graduate Program.

HIST 991 - Research Seminar in European History**Credits:** 3

1) Medieval; 2) Early Modern; 3) Modern. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 992 - Research Seminar in Comparative History**Credits:** 3

Comparative studies of U.S. history, emphasizing primary research. Colloquium compares the experience of the United States and that of some other area or nation. For example, comparing the legal histories of Britain and the U.S.; the impact of colonization on native peoples in North and South America; the nature of slavery in the U.S., the Caribbean, and Brazil, or the experiences of women in Europe and America. Topics vary, and the course may be repeated for credit.

HIST 993 - Research Seminar in African, Asian, Latin American History**Credits:** 3

1) African; 2) Asian; 3) Latin American; 4) Middle East. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 994 - Research Seminar in African, Asian, Latin American History
Credits: 3

1) African; 2) Asian; 3) Latin American; 4) Middle East. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 995 - Tutorial Reading and Research**Credits: 1-6**

A) Early American History; B) American National History; C) Canada; D) Latin America; E) Medieval History; F) Early Modern Europe; G) Modern European History; H) Ancient History; I) East Asia; J) Near East and Africa; K) European Historiography; L) American Historiography; M) Russia; N) World History; O) English History; P) New Hampshire History; Q) Historical Methodology; R) Irish History; S) History of Science; T) Maritime; U) Museum Studies. May be repeated up to a maximum of 12 credits. Prereq: permission.

HIST 997 - Directed Readings in Early American History**Credits: 1-6**

Directed readings in Early American History. Supervised readings for students preparing for the Ph.D. examinations in Early American History. Cr/F. Permission required.

HIST 998 - Directed Readings in Modern United States History**Credits: 1-6**

Supervised readings for students preparing for Ph.D. examinations in Modern U.S. History. Cr/F.

HIST 999 - Doctoral Research**Credits: 0**

Cr/F.

Homeland Security (HLS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

HLS 908 - Quantitative Methods for Policy Research**Credits: 3**

Provides an overview of basic quantitative analysis techniques that are common in public policy analysis. Students will be trained to design high quality research and conduct statistical analyses. By the end of the course students will be able to carry out basic statistical analyses, evaluate the statistical analyses in research reports and journal articles, and communicate clearly the results of analyses to both professional and general audiences.

Human Development & Family Studies (HDFS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

HDFS 807 - Practicum**Credits: 1-6**

Supervised in-depth experience in teaching, research, or advocacy in a professional setting to increase the student's understanding of children and or families. Prereq: permission. Special fee. Cr/F.

HDFS 809 - Child Study and Development Center Internship**Credits: 1-6**

Supervised positions within the UNH Child Study and Development Center child care programs. A) videotape assistant; B) assessment assistant; C) infant assistant; D) toddler assistant; E) 3-5 year old assistant; F) kindergarten assistant; G) health issues assistant. May be repeated up to a total of 9 credits. Permission. Special fee. Cr/F.

HDFS 833 - Supervising Programs for Young Children**Credits: 4**

Philosophical bases and theoretical rationales of various programs for young children; program alternatives and resources; issues in administration including supervision, finances, and regulations. Prereq: permission. (Fall semester only.)

HDFS 834 - Curriculum for Young Children**Credits: 4**

Designing and implementing developmentally appropriate activities for young children; assessing the effectiveness of activities; evaluating materials and equipment. Permission. (Spring semester only.)

HDFS 841 - Marital and Family Therapy**Credits: 4**

Introduction to the theory and practice of marital and family therapy; major approaches to be examined include strategic, trans-generational, structural, experiential/humanistic, and behavioral. Permission.

HDFS 843 - Families, Schools, and Community**Credits: 4**

Emphasis on the critical value of effective family-school-community partnerships in enhancing the education of young children. The literature assessing the interactive nature of the parent and school resources with cultural influences examined. Current models of family-school-community partnerships explored. Students required to participate in parent/school/community activities within early childhood education centers and schools. Prereq: permission. (Fall semester only.)

HDFS 846 - Human Sexuality**Credits: 4**

Investigations of physiological, psychological, and sociological aspects of human sexuality. Particular attention to various social practices, policies, and programs that affect sexual attitudes and behaviors.

HDFS 857 - Race, Class, Gender, and Families**Credits: 4**

Explores the intersection of race, class, and gender in family life in the United States. Theory, research and other relevant literature used to examine the variety of family configurations in our society today and the diverse experiences that families have as the result of existing social, political, and economic institutions. The strengths various family types considered, as well as the particular challenges these families may encounter in contemporary society. Prereq: permission.

HDFS 860 - Family Programs and Policies**Credits: 4**

Analysis of the connection between family support programs and family policy. Program planning, implementation and evaluation are stressed. The research, theory, history, and current status of model family programs are examined.

HDFS 871 - Observation and Assessment of Young Children**Credits:** 4

A comprehensive view of various observation techniques for determining children's strengths and emerging skills. Exploration of issues regarding the use of formal assessments and testing with young children, retention and transitional placements, and the parent's role in testing. Permission. (Fall semester only.)

HDFS 872 - International Approaches to Child Advocacy**Credits:** 4

Investigation into the rationales for advocacy, types of advocacy, advocacy techniques and strategies, and current domestic and international advocacy issues and approaches. Prereq: permission.

HDFS 873 - International Perspectives on Children and Families**Credits:** 4

Investigation of historical and modern conceptions of children and families in selected African, Asian, European, and Latin countries. Emphasis placed on the contribution of these populations to the changing ethnic portrait of America. Prereq: permission.

HDFS 876 - Children, Adolescents and the Law**Credits:** 4

This course is designed to familiarize students with the specialized laws and adjudicative systems that govern children, adolescents and families and reflect society's effort to balance competing interests and goals. It provides the chance to explore laws and processes that affect children and adolescents as they interact with their caregivers, families and society at large; permission.

HDFS 894 - Families and the Law**Credits:** 4

Exploration of laws that affect families as members interact with each other and with society in general.

HDFS 895 - Advanced Independent Study**Credits:** 1-6

Also listed as HDFS 795.

HDFS 897 - Special Topics**Credits:** 1-4

Highly focused examination of a particular theoretical, methodological, or policy issue.

HDFS 898 - Marriage and Family Therapy Practicum**Credits:** 1-8

Clinical experience under direct faculty supervision. Trainees develop competency in treating individuals in the context of their families and larger systems. Prereq: permission. May be repeated. Special fee.

HDFS 899 - Master's Thesis**Credits:** 1-6

May be repeated up to a maximum of 10 credits. Cr/F.

HDFS 911 - Graduate Internship**Credits:** 2-8

Advanced, supervised internships in professional setting. A) Child Development; B) Adolescent Development; C) Child Advocacy and Family Policy. May be repeated to up to a total of 8 credits. Prereq: instructor's permission. Cr/F.

HDFS 930 - Child Development in Context**Credits:** 4

Theory and research on social, cultural, and developmental issues of early childhood with a particular emphasis on ecological and social constructivist frameworks. Prereq: instructor's permission.

HDFS 942 - Advanced Systems of Marital and Family Therapy**Credits:** 4

Critical analysis and integration of selected systems of marital and family therapy. Prereq: HDFS 841; permission.

HDFS 945 - Family Therapy Practice I**Credits:** 4

Designed to develop beginning practice skills in structural, strategic, systematic family therapies; and assessment and treatment skills necessary to manage specialized problems (e.g., divorce, remarriage, substance abuse, suicidal behavior) encountered in practice. Prereq: permission.

HDFS 946 - Critical Problems in Family Life**Credits:** 4

Evaluation of the needs and resources of families with critical problems; maturational and situational sources of stress influencing the contemporary American family; students demonstrate mastery of theoretical concepts by developing self-help strategies to be used by families experiencing stress. Prereq: permission.

HDFS 947 - Family Therapy Practice II**Credits:** 4

Designed to develop advanced skills in integrating structural, strategic, and systematic family therapies; sensitivity to gender differences and cultural diversity; and assessment and treatment skills necessary to manage specialized problems (e.g., physical, emotional, and sexual abuse; sexual dysfunction) encountered in practice. Prereq: permission.

HDFS 950 - Contemporary Issues in Adolescent Development**Credits:** 4

This course is a graduate-level seminar that focuses on contemporary issues faced by youth, adolescents, and emerging adults in our society. Focus is also on the social ecology of adolescent development, which means understanding adolescents within the contexts of families, peers, schools, communities, and the broader culture. This course also emphasizes the positive youth development perspective and approaches aimed at enhancing the lives of youth, adolescents, and emerging adults.

HDFS 952 - Clinical Interventions in Couples Therapy**Credits:** 4

This course will explore interventions that target problems faced by couples at various ages and stages of their relationship. The focus will be on developing and implementing effective strategies for enhancing attachments as well as approaches for improving communication and problem-solving skills in Couples Therapy. The format will be interactive with illustrative demonstration. Majors to include: HDFS: Marriage and Family Therapy and Social Work.

HDFS 954 - Sex Therapy**Credits:** 4

This course begins preparing graduate student therapists to address sexual topics with clients. Using a foundation grounded in the physiology, psychology, and sociology of human sexual development, this course explores problems in sexual interaction and treatment options available through sex therapy, focusing on the integration of sex therapy with couples therapy. Students are encouraged to examine their own attitudes, values, and beliefs regarding sexuality, and will deconstruct "sexual dysfunction".

HDFS 991 - Professional Issues for Family Specialists**Credits:** 4

Exploration of major ethical, legal, and professional issues facing child, family, and consumer specialists. Focus on ethical decision making, values clarification, and development of professional identity. Prereq: permission.

HDFS 993 - Theoretical Approaches to Human Development and Family Studies**Credits:** 4

Scientific knowledge and the scientific method, the relationship between theory and research as it applies to family studies; why and how theories change; major theories in historical context. Prereq: permission.

HDFS 994 - Research Seminar**Credits:** 4

Introduction to social science research methods; analysis of research reports and other professional papers in family and consumer studies; development and evaluation of research proposals. Prereq: permission.

HDFS 995 - Seminar and Special Problems**Credits:** 2-4

A) Consumer Research; B) Family Relations; C) Education; D) Family Resource Management; and E) Human Development. The student contributes to a selective review and critical evaluation of the research and current literature and an examination of issues and trends.

Independent projects may be a part of the experience. These seminars are open to graduate students with sufficient background and are not scheduled every semester. One or more semesters, maximum of 4 credits in one area. Prereq: permission.

HDFS 997 - Advanced Research Seminar**Credits:** 4

Interdisciplinary approach to research in child, family, and consumer studies. Emphasis on the multidimensionality of family problems, appropriate research strategies, and critical analysis of current literature. Prereq: permission.

Integrated Applied Mathematics (IAM)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

IAM 830 - Graduate Ordinary Differential Equations**Credits:** 3

Course is a graduate-level course on ordinary differential equations. It is designed to be accessible to first-year graduate students from math, science or engineering backgrounds who have had a first undergraduate course in differential equations, along with a standard calculus sequence. The course is designed to begin with an intensive review of undergraduate differential equations and then will proceed to handle more advanced concepts, starting with multi-dimensional coupled systems of ordinary differential equations, exponential matrix solutions, using coordinate transformations for conversion to standard forms, nonlinear systems and transform-based solutions, using coordinate transformations for conversion to standard forms, nonlinear systems and transform-based techniques. The course will have an interdisciplinary and applied style and will cover the following topics: Intense review of undergraduate differential equations, Power Series and Fourier Series solutions, Multi-dimensional D.E.s, eigenvectors and Jordan forms, Numerical Methods, Nonlinear D.E.s Dynamical Systems and Chaos.

IAM 851 - Introduction to High-Performance Computing**Credits:** 3

Course gives an introduction to select areas of high-performance computing, providing a basis for writing and working with high-performance simulation codes. The three main topics are: 1) basic software engineering, 2) high-performance and parallel programming, and 3) performance analysis and modeling. Additional topics may include heterogeneous architectures like GPUs and data analysis/visualization. Prereq: Enrollment in a CEPS graduate program, MATH 753, working knowledge of a programming language (C or Fortran), or by permission of instructor.

IAM 932 - Graduate Partial Differential Equations**Credits:** 3

Graduate level introduction to the analysis of linear and nonlinear partial differential equations. topics include: separation of variables, Fourier series, weak and strong solutions, eigenfunction expansions, the Sturm-Liouville problem, Green's functions and fundamental solutions, method of characteristics, and conservation laws. Prereq: Ordinary Differential Equations and Linear Algebra.

IAM 933 - Applied Functional Analysis**Credits:** 3

Introduction to rigorous mathematical analysis from the perspective of applications. Topics include: metric and normed spaces; convergence; completeness; continuity; Lebesgue measure theory; convergence theorems; Banach, Hilbert, L_p , and Sobolev spaces; orthogonality, bases, and projections; Sturm-Liouville theory; spectral theory; distributions; and weak solutions. Applications including to differential and integral equations, are presented throughout. Prereq: real analysis or graduate introductory courses in mathematical physics or applied mathematics.

IAM 940 - Asymptotic and Perturbation Methods**Credits:** 3

Introduction to the asymptotic analysis of linear and nonlinear algebraic equations, ODEs, and PDEs and the asymptotic approximation of integrals arising as transform solutions to ODEs/PDEs. Topics include: algebraic equations and dominant balance; asymptotic approximations; complex variable theory and the asymptotic evaluation of integrals via Laplace's method, stationary phase, and steepest descents; the method of matched asymptotic expansions (boundary-layer theory), coordinate straining, multiple scales, averaging, homogenization theory, and WKBJ analysis for singularly perturbed ODEs and PDEs. Prereq: MATH 527, MATH 528, MATH 644 or equivalent. Pre- or Coreq: PHYS 931.

IAM 950 - Spatiotemporal and Turbulent Dynamics**Credits:** 3

Advanced graduate course on the dynamics of spatiotemporal patterns in nonlinear time-dependent PDEs. Topics include nonlinear pattern formation, bifurcations and symmetry, nonlinear WKB analysis, phase diffusion/amplitude modulation theory, unstable coherent structures in turbulence, and periodic orbit theory. Example systems include 1d and 2d Swift-Hohenberg equation, the 1d Kuramoto-Sivashinsky equation, Rayleigh-Benard convection, and Navier-Stokes in plane Couette and pipe flows. Prereq: MATH 847 and IAM 932, or equivalent; or permission.

IAM 961 - Numerical Analysis I: Numerical Linear Algebra**Credits:** 3

Introduction to numerical analysis and computational methods for linear systems. Topics include: IEEE floating point arithmetic; vector norms and induced norms; conditioning; projectors; LU decompositions; pivoting; Cholesky factorization; QR decompositions; Gram-Schmidt orthogonalization; Householder triangularization; Singular Value decompositions; least squares problems; stability; eigenvalue problems; power iterations; QR algorithm; Krylov methods; Arnoldi iteration; GMRES; Lanczos iteration; Conjugate gradient algorithms; and Preconditioning. Prereq: scientific programming and linear algebra.

IAM 962 - Numerical Partial Differential Equations**Credits:** 3

Numerical analysis applied to partial differential equations. Initial topics include the implementation of finite difference and spectral methods applied to the heat equation, wave equation, Burger's equation, and other model equations. The remainder of the course treats numerical analysis, starting with a brief review of function spaces. The primary topics include approximation theory for Sobolev spaces, projection operators, completeness, convergence, and error estimates. Prereq: IAM 961 or permission.

Justice Studies (JUST)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

JUST 830 - Theories of Justice**Credits:** 4

The idea of justice is central to social, political, and legal theory. Considerations of justice are appealed to in assessing the legitimacy of governments, the fair distributions of goods and opportunities both with nation-states and globally, and to address specific social concerns such as racial or gender discrimination or access to health care. Course examines both historical sources and contemporary debates about the nature of justice.

JUST 865 - Special Topics**Credits:** 4

New or specialized courses are presented under this listing. Staff present material not normally covered by the course offerings. Cross-listed courses. May be repeated but not duplicate content.

JUST 897 - Culminating Project**Credits:** 4

Students conduct a project related to their internship under the supervision of a faculty member. Projects might include an evaluation of a community policing program, interviews with battered women in a shelter, or a survey of corporal punishment. Prereq: JUST 901, 905 or 906, 907. May be repeated up to a maximum of 4 credits. Cr/F.

JUST 899 - Masters Thesis**Credits:** 1-8

Students conduct a masters thesis under the supervision of three graduate faculty members. Thesis projects might include an intervention study to reduce delinquency, a study of immigration law in the 1920s, or a survey of hate crimes. Prereq: JUST 901, 905 or 906, 907. May be repeated up to a maximum of 8 credits. Cr/F.

JUST 901 - Pro-seminar: Introduction to Justice Studies**Credits:** 4

Provides students with an introduction to Justice Studies and its faculty. Interdisciplinary study of informal and formal social organization and conflict resolution. Emphasis on law in practice and how individuals operate within and against the system of law. Topics include social order, crime and punishment, security and surveillance, and sharing/assessing risk.

JUST 905 - Quantitative Research Methods**Credits:** 4

Introduction to the major quantitative methods used by criminologists and justice researchers. Focuses on methods which illuminate causes of crime and justice. Covers all aspects of the research process including conceptualization, design, sampling, data analysis, and dissemination of results. Does not assume prior statistical knowledge.

JUST 907 - Applied Research Methods**Credits:** 4

This is the second course in the Justice Studies graduate program sequence on research methods and it focuses on how to conduct applied research in the Justice Studies field including how to use quantitative methods in more applied settings and specific research tools frequently used in applied settings (e.g. qualitative methods and program evaluation). Students will work on a class research project as well as their own individual projects.

JUST 950 - Internship**Credits:** 4

Field experience internships in a variety of justice settings including courts, law enforcement and victim services. Includes weekly seminar. Prereq: JUST 901. Cr/F.

JUST 951 - Research Internship**Credits:** 4

Research experience internships in research centers on campus such as Justiceworks, Crimes Against Children, and Family Research Lab or with individual researchers on campus who conduct justice-related research. Cr/F.

JUST 965 - Special Topics**Credits:** 4

New or specialized courses are presented under this listing. Staff present material not normally covered by the course offerings. Cross-listed courses. May be repeated for a maximum of 16 credits, but not duplicate content.

JUST 995 - Reading and Research**Credits:** 1-4

A) Criminology; B) Law and Society; C) Law and Psychology; D) Philosophy of Law; E) Courts. The student does independent work under the supervision of a faculty member. The student may plan (1) broad reading in an area; (2) intensive investigation of a special problem; or (3) empirical testing on a particular question. May be taken for 1-4 credits. This course is by permission only and requires a signed agreement/proposal prior to registration. Prereq: JUST 901.

Kinesiology (KIN)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

KIN 802 - Health Content and Youth Risk Behaviors**Credits: 4**

This course explores topics related to adolescent health, well-being, and risk behaviors that are relevant in the health education classroom today. Grounded in health behavior theories and behavior change, students explore ten dimensions of wellness: Cultural, Emotional, Environmental, Financial, Intellectual, Occupational, Physical, Sexual, Social, and Spiritual. Students develop a content base for teaching Standard 1 (Core Concepts) of the National Health Education Standards and better understand how health behaviors affect individual health and health instructions.

KIN 804 - Electrocardiography**Credits: 4**

This course is designed to provide students exposure regarding basic interpretation and identification of electrocardiograms (ECGs). Included in this is detailed heart anatomy, coronary circulation, cardiac conduction system, electrocardiogram development, and all aspects pertaining to normal and abnormal ECGs. Open to Kinesiology majors only.

KIN 805 - Topics in Applied Physiology**Credits: 4**

Advanced exercise physiology course dealing with topics both current and relevant to exercise science majors. Includes: genetics, environmental influences, immune system, detraining and over-training, epidemiology, ergogenic aids and the influence of age and gender. Special fee.

KIN 806 - Neurology**Credits: 4**

A detailed study of the development, morphology, internal configuration, physiology, histology, function, and pathology of the human nervous system. Labs consist of clinical case studies, brain dissections, and videos/slides to enhance the understanding of material. Prereq: human anatomy and physiology. Lab.

Co-requisite: KIN 807**KIN 807 - Neurology Lab****Credits: 2**

Basic histology, neuroanatomy and neurophysiology of the human nervous system. Use of brain specimens, videos and pathology case studies to elucidate cell structure, sensory and motor systems, and spinal cord, brainstem, and cortical organization and anatomy. Prereq: ZOO 507 - ZOO 508 or COMM 521 or equivalent. Special fee. Cr/F.

Co-requisite: KIN 806**KIN 812 - Health Education Practicum****Credits: 4**

The purpose of this practicum is to provide students with an opportunity to observe, develop, and teach in a health education classroom. Students are required to accumulate 60 hours of teaching experience in the schools over the course of the semester. Weekly seminars will integrate field experience with content knowledge in health, nutrition and physical activity. Prereq: KIN 648.

KIN 820 - Science and Practice of Strength Training**Credits: 4**

Designed to provide graduate students exposure to the knowledge and practical experience necessary for establishing strength development programs in a variety of populations, including healthy, athletic, and higher risk individuals. Program design, correct lifting techniques, physiological adaptations, and organization and administration of programs are highlighted. Includes fundamentals regarding the selection of programs and equipment, spotting techniques, as well as ways to assess strength and power in humans without expensive equipment. Prereq: KIN 620 or equivalent.

KIN 822 - Applied Biomechanics**Credits: 4**

This course provides students with a background in the fundamental biomechanical principles that describe and govern human movement. Topics of the course will include friction, linear and angular motion, tissue mechanical properties, conservation of energy, work and power, fluid mechanics, stability and center of gravity, walking and running gait analysis. These topics are taught by quantitatively analyzing human movements through the use of modern biomechanical analyses including dynamometry, electromyography, accelerometry, and optical motion analysis. Prereq: BMS 507, BMS 508, KIN 652 or permission. Kinesiology major or permission.

KIN 824 - Exercise Metabolism: Acute and Chronic Adaptations**Credits: 4**

An overview of the metabolic processes that occur during exercise and metabolic changes that occur as a result of exercise training. Topics covered include glycogenolysis and glycolysis in muscle, cellular oxidation of pyruvate, lipid metabolism, metabolism of proteins and amino acids, neural and endocrine control of metabolism, and fatigue during muscular exercise. Prereq: physiology of exercise and general chemistry.

KIN 831 - Inclusive Teaching Through Sport**Credits: 4**

This hybrid course examines the practical application of inclusion through Paralympic and adapted sports including wheelchair basketball, sitting volleyball, goalball, boccia, table-top games and "traditional" sports. In-class sessions will be held the first three weeks while an on-line/independent portion will be conducted the last two weeks of the course. A variety of sporting activities will be introduced that provide educators with the needed tools to develop and implement physical and recreational programs for all.

KIN 836 - Fitness and Graded Exercise Test and Prescription**Credits: 4**

This course is designed to provide students exposure to the knowledge and practical experience necessary for establishing exercise programs in apparently healthy populations. Topics include fitness testing, test interpretation, and exercise prescription. Prereq: KIN: Exercise Science major. Special fee.

KIN 837 - Exercise Prescription and Leadership in Healthy and Special Populations**Credits: 4**

Provides exposure to the knowledge and practical experience necessary for establishing exercise and health promotion programs in a variety of populations. Includes fundamentals regarding personal training and program selection, implementation and equipment, legal issues, and budget establishment. Aerobic and strength training programs in special populations are highlighted. Prereq: KIN 836.

KIN 840 - Athletic Administration**Credits: 4**

Introduces basic management components and processes used in the successful administration of school and college athletic programs. Topics include planning, organizing, and managing sports programs, personnel and policies; game scheduling; finances and facilities; equipment and event management; student services; and key legal issues. Prereq: permission.

KIN 841 - Social Issues in Contemporary Sports**Credits: 4**

An investigation into interrelationships among sport, culture, and society in an attempt to understand better the role and function of sport in contemporary society. Broad overview of selected socio-cultural factors that influence participation and result from participation in sports. Prereq: introduction to sociology or permission.

KIN 842 - PE Practicum for Students with Disabilities**Credits: 4**

This experience is part of the required coursework for the Adapted Physical Education (APE) certificate through the Graduate School. As a bi-weekly seminar intergrates the field experiences with general physical education (GPE) and adapted physical education contexts through class discussion, readings, and written assignments. The seminar format provides an opportunity for refinement and continued development of teacher skills and practices for working with students with disabilities. A primary focus will be on assessment, planning, and implementation of physical education and physical activity programming for students with disabilities.

KIN 843 - Sport Marketing**Credits: 4**

A survey of concepts and processes used in the successful marketing of sport programs and events. Special emphasis placed on the unique or unusual aspects of sport products, markets, and consumers. Prereq: survey of marketing and methods or permission.

KIN 865 - Advanced Topics in Coaching**Credits: 4**

This course goes beyond the basic principles of coaching and addresses advanced topics in coaching (talent identification, talent development) from both the science and the art of coaching technique and strategies. This course is structured as an upper division course in Sports Studies. Content includes topics related to the development of the field of coaching. The class makes extensive use of case studies and analysis of practical coaching situations for the betterment of coach development. This course combines lecture, small group discussion and practical application of material. Prereq: KIN 565.

KIN 880 - Psychological Factors in Sport**Credits: 4**

Factors of outstanding athletic achievement; psychological variables in competition; the actions and interactions of sport, spectator, and athlete. Special attention to directed to strategies for coaches, teachers, and athletic trainers to utilize sport psychology in their professional practice. Prereq: introduction to psychology.

KIN 881 - Inclusion in Physical Education**Credits: 4**

The course examines the needs of individuals with disabilities in school based and physical activity settings. Legal mandates that define school policy and student placement are addressed while discussing the various teaching orientations that inform practice. This course also includes hands-on teaching experiences across a range of ages and disabilities that shape teaching competencies.

KIN 882 - Therapeutic Applications of Adventure Programming**Credits: 4**

A study of theory, practice, and research of adventure experiences in therapeutic settings. Incorporates theoretical seminars and associated practical experiences. Prereq: KIN 787. (Also listed as SW 882.)

KIN 883 - Pysch Factors of Adventure Ed**Credits: 4**

Adventure educators are often called to work with people facing short-term psychological challenges like being effective in a group or managing fear and discomfort in a vigorous learning environment. Because the adventure environment can be pyschologically demanding, an understanding of basic psychology is an advantage both for effective practice and research. Course emphasizes the history of psychological research to provide a foundation for the adventure educator's work leading, designing and evaluating adventure-based programs.

KIN 884 - Historical Foundations of Outdoor Experiential Education**Credits: 4**

Reviews the historical, conceptual, and political foundations of major 20th century educational reform initiative. It focuses in particular on the educational philosophy of John Dewey, the social reforms advanced by German educator Kurt Hahn(founder of Outward Bound), humanistic 'encounter' programs of the 1960s and 1970s, and scholarship on contemporary reforms. Class follows a seminar format; students complete independent presentations and a comprehensive final exam.

KIN 885 - Program Models and Evaluation in Outdoor Education**Credits: 4**

Provides an understanding of the major outdoor education program models currently being used. Students also analyze the principles underlying program development and examine current trends and program evaluation approaches. Topics include research methods, evidenced-based practices, and ethics.

KIN 886 - Organization and Administration of Outdoor Education Programs**Credits: 4**

Study of administration of outdoor education programs using a variety of organizational models. Students use simulated exercises and work with outdoor agencies on special projects to learn the key factors necessary to manage a program. Field experience. Special fee.

KIN 894 - Cardiopulmonary Pathologies**Credits: 4**

Lecture study of the anatomy, physiology, and pathophysiology of the cardiac, vascular, and pulmonary systems. Particular emphasis on the study of cardiovascular function in diseased and stressed states. Clinical assessment of the cardiopulmonary patient. Course offering includes the addition of teaching experiences and real-patient case study assignments to better prepare the graduate student through increased application of knowledge and experiences to real-world situations. Prereq: KIN 804.

KIN 895 - Advanced Studies**Credits: 2-4**

Independent study problems. Prereq: permission of graduate adviser. May be repeated up to 8 credits.

KIN 896 - Advanced Research in Exercise Science**Credits:** 3 or 6

Students design and conduct original research that culminates in a paper of publishable quality. Completion of either this course or KIN 899 satisfies the department's research requirement for the master's degree. May be taken for 3 credits per semester in each of two semesters or 6 credits in one semester. Maximum 6 credits. Kinesiology majors only. Cr/F. IA (continuous grading).

KIN 897 - Advanced Topics in Outdoor Education**Credits:** 2-6

Meets regularly to support students integrating advanced knowledge into independent projects that culminate in a substantial professional product, a paper of publishable quality, or a presentation to an outside professional audience. Completion of either this course or KIN 899 (thesis) satisfies the department's requirement for culmination of the master's degree. May be taken in combinations of 2, 3, or 4 credits over multiple semesters, or up to 6 credits in one semester. Maximum 6 credits. Kinesiology majors only. Cr/F. IA (Continuous grading).

KIN 898 - Special Topics**Credits:** 1-4

New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated up to 8 credits. Special fee on some sections.

KIN 899 - Master's Thesis**Credits:** 1-6

May be repeated up to a maximum of 6 credits. Cr/F.

KIN 901 - Analysis of Professional Literature**Credits:** 4

Critical interpretation of professional literature. This course focuses on the appropriate use of research methodologies and techniques.

KIN 902 - Colloquium**Credits:** 1-2

Seminar format with readings, discussions, laboratory tutorials, and presentations of current research topics. A) exercise science; B) outdoor education; C) special physical education; D) sport studies. May be repeated up to a maximum of 8 credits. Cr/F.

KIN 909 - PE Practicum for Students with Disabilities**Credits:** 2-4

This experience is part of the required coursework for the Adapted Physical Education (PE/APE) certificate through the Graduate School. Students are expected to accumulate 30 hours of teaching experience in the schools for every two credits. In addition, attendance at a bi-weekly seminar integrates the field experience with general physical education (GPE) and adapted physical education (PE/APE) concepts through class discussion, exercises, readings, and written assignments. The seminar format provides an opportunity for refinement and continued development of teacher skills and attributes for working with student with disabilities. Students learn to instruct effectively, to participate in the individual Education Plan (IEP) process, and to manage their time.

KIN 910 - Curricular Issues in Health Pedagogy**Credits:** 4

This course examines health education and curricular issues as they affect the teaching of health in social settings. Specific curricula designed to focus on health topics are discussed as well as appropriate and relevant teaching methods for elementary, middle and high school students. Students develop units (including lesson plans, handouts and assessments) for selected grade levels. Student also engage in peer teaching episodes related to various health content.

KIN 950 - Internship**Credits:** 2-4

Experiential learning in a setting appropriate to the student's objectives. A 4-credit internship requires a minimum of 300 hours experience. Fewer credits require proportionally fewer hours. A) Exercise Science. Clinical work, normally in a hospital or laboratory setting, involving exercise physiology, graded exercise testing, exercise prescription, and/or cardiac rehabilitation. Must have completed all required coursework except thesis. B) Special Physical Education C) Sport Studies. Cr/F.

KIN 993 - Teaching Practicum**Credits:** 2

Students work with a faculty mentor to investigate, observe, and practice teaching methods using current pedagogical and assessment methods and theories. Includes use of various instructional technologies as tools to enhance the teaching/learning process. Designed for graduate students who wish to gain experience teaching at the collegiate level in KIN fields upon completion of the Master's or Ph.D. degree. May be repeated up to a maximum of 6 credits. Prereq: instructor permission. Cr/F.

KIN 998 - Special Topics**Credits:** 2-4

Occasional, new, or experimental courses for graduate students in both KIN: Sport Studies and RMP. Prereq: permission. May be repeated for different topics up to a total of 8 credits.

Languages, Literatures & Cultures (LLC)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

LLC #842 - Theory and Practice of Translation**Credits:** 3

This course is designed both as an introduction to various theories and philosophies of translation and as an intensive workshop on different types of translation (literary, technical, professional, business, and health related, etc.). Translation is both a simple matter of transferring content and an intensely complex process of adapting linguistic, tonal, and cultural components of communication. The course works extensively on the craft of translation while developing detailed analyses of the theoretical and philosophical implications of choices made. Students complete various translation exercises and develop a significant final project. It is open to students at different levels of language ability but requires at least an intermediate competency. Students work at their own level. Taught in English. Prereq: Intermediate language or permission. Special fee.

LLC 891 - Methods of Foreign Language Teaching**Credits:** 3

Objectives, methods and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills, including developments in computer-assisted instruction. Special fee.

Liberal Studies (LS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

LS 800 - Core Seminar**Credits:** 4

An introductory seminar specially designed for and limited to students within the LS program. Core seminars are interdisciplinary explorations of significant issues, topics, themes, or perspectives in human life in general and the contemporary world in particular. Topics may change from semester to semester. The seminar must be taken within the first year of a student's matriculation in the program, preferably in the first semester.

LS 845 - Special Topics**Credits:** 2-4

New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated to a maximum of 8 credits.

LS 846 - Special Topics**Credits:** 2-4

New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated to a maximum of 8 credits.

LS 895 - Independent Study**Credits:** 1-6

Independent study for graduate students in LS as part of their concentration. Prereq: permission. May be repeated to a maximum of 8 credits.

LS 896 - Independent Study**Credits:** 1-6

See description for LS 895.

LS 898 - Master's Project**Credits:** 1-6

For LS students to work out a final project consistent with concentration and interests. May be repeated up to a maximum of 6 credits. Prereq: LS students only; permission. Cr/F.

LS 899 - Master's Thesis**Credits:** 1-6

For LS students to work out a final thesis consistent with their concentration and interests. May be repeated up to a maximum of 6 credits. Prereq: LS students only; permission. Cr/F.

Life Sciences & Agriculture (LSA)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

LSA 900 - College Teaching**Credits:** 2

An overview of teaching strategies identified at the college level. The planning, execution, and evaluation of instruction for meeting the teaching needs of undergraduate students. Recommended for those who want to teach in a college setting. (Also listed as GRAD 975.) Cr/F.

Marine, Estuarine and Freshwater Biology (MEFB)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MEFB 817 - Lake Ecology**Credits:** 4

Introduction to the ecology of freshwater systems with emphasis on lakes. Origins of lakes and the effects of watersheds on lake chemistry and nutrient cycling are explored. Other topics include the impact of human disturbances on productivity and aquatic food webs and methods used for the management and restoration of lakes. Comparisons are made of the structure and functions of lake ecosystems found in temperate, tropical and arctic regions. Prereq: general biology.

MEFB 819 - Field Studies in Lake Ecology**Credits:** 4

Ecology of lakes and other freshwater habitats examined through field studies. Emphasizes modern methods for studying lakes, analysis and interpretation of data, and writing of scientific papers. Seminars on research papers and student presentations of class studies. Field trips to a variety of lakes, from the coastal plain to White Mountains; investigate problems, such as eutrophication, acidification, biodiversity and biotoxins. Capstone experiences include interaction with state agencies, lake stakeholders and the submission of written manuscripts for publication. Prereq: introductory biology. Special fee. Lab.

MEFB 822 - Marine Phycology**Credits:** 4

Identification, classification, ecology, and life histories of the major groups of marine algae, particularly the benthonic marine algae of New England. Periodic field trips. Prereq: principles of biology or elementary botany or survey of the plant kingdom. Lab. (Not offered every year.) Special fee.

MEFB 825 - Marine Ecology**Credits:** 4

Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes field, laboratory, and independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. Special fee. (Not offered every year.)

MEFB 827 - Algal Physiology**Credits:** 3

Survey of major topics in the physiology and biochemistry of marine and freshwater algae including nutrition, metabolic pathways, reproductive physiology, storage and extracellular products, cell inclusion, growth, and development. Prereq: introduction to biochemistry or permission. (Not offered every year.)

MEFB 832 - Lake Management**Credits:** 4

Lectures and seminars on interpreting lake water quality, developing a natural history inventory for lakes, the process of creating a lake management plan, and resolution of conflicting uses of lakes. Students develop lake management plans in cooperation with governmental agencies and lake associations. Guest speakers from State agencies and non-governmental organizations. Introduction to and use of GIS (Geographic Information Systems) methods for the analysis of lakes and watersheds. Presents lake management issues from scientific and social science points of view. Open to students from all disciplines. Special fee. Lab.

MEFB 847 - Aquatic Plants in Restoration/Management**Credits:** 4

A field-intensive class focusing upon freshwater and marine vascular plants with an emphasis on species commonly associated with ecological restoration, the identification and conservation of rare species, and the adaptations and management of invasive species of aquatic habitats in New England. Field trips emphasize the flora of various wetland habitats, including open water and vegetated fresh water wetlands, as well as coastal and estuarine habitats. Lectures and readings examine the current trends in research and management focusing upon specific taxa and pertinent facets of their taxonomy, physiology, and natural history. Prereq: BIOL 566 or permission. Special fee.

Materials Science (MS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MS 830 - Mechanical Behavior Materials**Credits:** 4

Elastic and inelastic behavior of materials in terms of micro- and macro-mechanics. Stress, strain and constitutive relations related to recent developments in dislocation theory and other phenomena on the atomic scale and to the continuum mechanics on the macroscopic scale. Elasticity, plasticity, viscoelasticity, creep, fracture, and damping. Anisotropic and heterogeneous materials. Prereq: Mechanics II, Introduction to Materials Science; or permission. Lab.

MS 831 - Fracture and Fatigue Engineering Materials**Credits:** 4

Review of fundamentals of linear elastic fracture mechanics and strain energy release rate analysis. Discusses basic methods of design for prevention of failure by fast fracture and fatigue for metals, ceramics, and polymers with attention to the effect of material properties and subsequent property modification on each design approach. Prereq: Mechanics II, Introduction to Materials Science; or permission. Lab.

MS 861 - Diffraction and Imaging Methods in Materials Science**Credits:** 4

Introduction to x-ray diffraction and electron microscopy. Basic crystallography; reciprocal lattice; x-ray and electron diffraction, x-ray methods; transmission and scanning electron microscopy. Prereq: General Chemistry, General Physics II, or permission. Lab.

MS 862 - Electronic Materials Science**Credits:** 4

This course provides engineering and science students with a foundation in the materials science of modern electronic devices. Topics include bonding and structure of solids, electrical and thermal conduction, elements of quantum mechanics, band theory of electrons in solids, semiconductors, magnetism, dielectrics and superconductors. Examples of applications are taken primarily from the fields of semiconductor electronics and nanotechnology, and illustrate how the electrical and optical properties of devices are obtained from their compositions, crystal structures and microstructures. Permission of instructor required.

MS 895 - Special Topics**Credits:** 2-4

New or specialized courses and/or independent study. May be repeated for credit.

MS 898 - Master's Project**Credits:** 3-4

The student works with a faculty member during one or two semesters on a well-defined research and/or original design problem. A written report and seminar are presented. IA (continuous grading) Cr/F.

MS 899 - Master's Thesis**Credits:** 1-6

Cr/F.

MS 900 - Seminar**Credits:** 1

Topics of interest to graduate students and faculty; reports of research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA (continuous grading) grade at the end of one semester.

MS 905 - Macromolecular Synthesis**Credits:** 3

Fundamentals of polymerization reaction mechanisms, kinetics, and chain structures as they are developed from the different chemistries available. Detailed discussions of the chemical mechanisms of step, free radical, ionic, and ring opening polymerizations. Treatment of the reaction parameters that control the rate of polymerization, molecular weight and chemical composition of the polymer chains. Introduction to stereo-chemical and catalytic polymerizations. Considerations of bulk, solution, and dispersion polymerization systems. Permission of instructor required. Open to Biochemistry, Chemical Engineering, Engineering: Chemical, Chemistry, Mechanical Engineering, Engineering: Mechanical, Materials Science, Engineering: Mat Science, and Physics majors only.

MS 910 - Macromolecular Characterization**Credits:** 3

Molecular characterization of synthetic and natural macromolecules in solution and in the solid state. Emphasis on the principles of various analytical techniques designed to provide information on the chemical composition, polymer chain size and structure in solution and in the dry state. Extension to methods that measure the interaction and association between polymer molecules. Interpretations of data from important characterization techniques including liquid chromatography (GPC), spectroscopy (FTIR, NMR, MS), microscopy (TEM, AFM, Confocal Raman), thermal analysis (DSC), light scattering, sedimentation, and x-ray diffraction. Permission of instructor required. (Also listed as BCHM 950). Open to Biochemistry, Chemical Engineering, Engineering: Chemical, Chemistry, Chem: Chemistry Education, Mechanical Engineering, Materials Science, Engineering: Mat Science, and Physics majors only.

MS 960 - Thermodynamics and Kinetics of Materials I**Credits:** 3

Classical and statistical thermodynamics are used to establish the conditions of equilibrium for simple and multi-component, heterogeneous materials. Additionally, the thermodynamics of phase diagrams, miscibility, interfaces, and defects are explored. Examples and problems apply these concepts to various types of materials, including metals, ceramics, and polymers.

MS 961 - Thermodynamics and Kinetics of Materials II**Credits:** 3

Introduction to diffusion and phase transformations in materials, and detailed descriptions of interfacial regions. Mechanisms of phase separation by spinodal decomposition and homogeneous nucleation. Kinetic processes leading to changes in phase structure driven by chemical reaction, temperature and diffusive processes (e.g. Ostwald ripening) are treated quantitatively. Applications to metals, ceramics and polymers. Prereq: Thermodynamics and Kinetics of Materials I.

MS #965 - Advanced Surface and Thin Film Characterization**Credits:** 4

Fundamentals of modern analytical techniques used to analyze the surface region of materials. Prereq: Introduction to Materials, or permission.

MS 995 - Graduate Special Topics**Credits:** 2-4

Investigation of graduate-level problems or topics in Materials Science.

MS 999 - Doctoral Research**Credits:** 0

Cr/F.

Mathematics & Statistics (MATH)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MATH 801 - Exploring Mathematics for Teachers I**Credits:** 3

Provides prospective elementary teachers with the opportunity to explore and master concepts involving number systems and operations, data analysis and probability. Additional topics may include geometry, measurement, and algebraic thinking. Mathematical reasoning, problem solving, and the use of appropriate manipulatives and technology are integrated throughout the course. Readings, class discussions, and assignments focus on mathematics content as well as applicable theories of learning, curriculum resources, and state and national recommendations. The course models instructional techniques that can be adapted to the elementary curricula. Prereq: EDUC 500 or EDUC 935; or permission. Credit offered only to M.Ed. and M.A.T., certificate students, and in-service teachers. (Not offered for credit if credit is received for MATH 821 or MATH 823.)

MATH 821 - Number Systems for Teachers**Credits:** 3

Ways of representing numbers, relationships between numbers, number systems, the meanings of operations and how they relate to one another, and computation with number systems as a foundation for algebra; episodes in history and development of the number system; and examination of the developmental sequence and learning trajectory as children learn number concepts. Credit offered only to M.Ed., M.A.T., Elementary Math Specialist certificate only students, and in-service teachers. Prereq: permission. Not offered for credit if credit received for MATH 621.

MATH 822 - Geometry for Teachers**Credits:** 3

Explorations of the foundations of informal measurement and geometry in one, two and three dimensions. The van Hiele model for geometric learning is used as a framework for how children build their understanding of length, area, volume, angles and geometric relationships. Visualization, spatial reasoning and geometric modeling are stressed. As appropriate, transformational geometry, congruence, similarity and geometric constructions will be discussed. Credit offered only to M.Ed., M.A.T., Elementary Math Specialist certificate only students, and in-service teachers. Prereq: permission. Not offered for credit if credit received for MATH 622.

MATH 823 - Statistics and Probability for Teachers**Credits:** 3

An introduction to probability, descriptive statistics and data analysis; exploration of randomness, data representation and modeling. Descriptive statistics will include measures of central tendency, dispersion, distributions and regression. Analysis of experiments requiring hypothesizing, experimental design and data gathering. Credit offered only to M.Ed., M.A.T., Elementary Math Specialist certificate only students, and in-service teachers. Prereq: MATH 621 or MATH 821, permission. Not offered for credit if credit received for MATH 623.

MATH 825 - Algebra and Functions for K-8 Mathematics Teachers**Credits:** 3

Representation and analysis of mathematical situations and structures using generalization and algebraic symbols and reasoning. Attention is given to the transition from arithmetic to algebra, working with quantitative change, and the description and prediction of change. Credit offered only to M.Ed., M.A.T., Elementary Math Specialist certificate only students, and in-service teachers. Prereq: MATH 621 or MATH 821, permission. Not offered for credit if credit received for MATH 625.

MATH 826 - Rational Numbers and Proportional Reasoning for K-8 Mathematics Teachers**Credits:** 3

Goal of this course is to prepare the K-8 mathematics teachers with sufficient mathematical knowledge for effective teaching of rational numbers and proportional reasoning. Attention is given to developing connections among a range of mathematical topics related to proportional reasoning, and the learning to assess elementary students' thinking about these topics. Credit offered only to M.Ed., M.A.T., Elementary Math Specialist certificate only students, and in-service teachers. Prereq: MATH 621 or MATH 821, permission.

MATH 831 - Mathematics for Geodesy**Credits:** 3

A survey of topics from undergraduate mathematics designed for graduate students in engineering and science interested in applications to geodesy and Earth Sciences. Topics include essential elements from analytic geometry, geometry of surfaces, linear algebra and statistics, Fourier analysis, discrete Fourier transforms and software, filtering applications to tidal data. Prereq: MATH 645, or the equivalent; MATH majors not allowed.

MATH 835 - Statistical Methods for Research**Credits:** 3

This course provides a solid grounding in modern applications of statistics to a wide range of disciplines by providing an overview of the fundamental concepts of statistical inference and analysis, including t-tests and confidence intervals. Additional topics include: ANOVA, multiple linear regression, analysis of cross classified categorical data, logistic regression, nonparametric statistics and data mining using CART. The use of statistical software, such as JMP, S PLUS, or R, is fully integrated into the course.

MATH 836 - Advanced Statistical Methods for Research**Credits:** 3

An introduction to multivariate statistical methods, including principal components, discriminant analysis, cluster analysis, factor analysis, multidimensional scaling, and MANOVA. Additional topics include generalized linear models, general additive models, depending on the interests of class participants. This course completes a solid grounding in modern applications of statistics used in most research applications. The use of statistical software, such as JMP, S PLUS, or R, is fully integrated into the course. Prereq: MATH 835 or MATH 839.

MATH 837 - Statistical Methods for Quality Improvement and Design**Credits:** 3

Six Sigma is a popular, data-focused methodology used worldwide by organizations to achieve continuous improvement of their existing processes, products and services or to design new ones. This course provides a thorough introduction to the Six Sigma principles, methods, and applications for continuous improvement (DMAIC process) and an overview of Design for Six Sigma (DFSS). Both manufacturing and non-manufacturing (transactional Six Sigma) applications will be included. Emphasis is placed on the use of case studies to motivate the use of, as well as the proper application of, the Six Sigma methodology. Formal Six Sigma Green Belt certification from UNH may be attained by successfully completing TECH 696. Prereq: MATH 539, MATH 644; or permission.

MATH 838 - Data Mining and Predictive Analytics**Credits:** 3

An introduction to supervised and unsupervised methods for exploring large data sets and developing predictive models. Unsupervised methods include: market basket analysis, principal components, clustering, and variables clustering. Important statistical and machine learning methods (supervised learning) include: Classification and Regression Trees (CART), Random Forests, Neural Nets, Support Vector Machines, Logistic Regression and Penalized Regression. Additional topics focus on metamodeling, validation strategies, bagging and boosting to improve prediction or classification, and ensemble prediction from a set of diverse models. Required case studies and projects provide students with experience in applying these techniques and strategies. The course necessarily involves the use of statistical software and programming languages. Prereq: MATH 539 (or MATH 644); or permission.

MATH 839 - Applied Regression Analysis**Credits:** 3

Statistical methods for the analysis of relationships between response and input variables: simple linear regression, multiple regression analysis, residual analysis model selection, multi-collinearity, nonlinear curve fitting, categorical predictors, introduction to analysis of variance, analysis of covariance, examination of validity of underlying assumptions, logistic regression analysis. Emphasizes real applications with use of statistical software. Prereq: basic introductory statistics.

MATH 840 - Design of Experiments I**Credits:** 3

First course in design of experiments with applications to quality improvement in industrial manufacturing, engineering research and development, or research in physical and biological sciences. Experimental factor identification, statistical analysis and modeling of experimental results, randomization and blocking, full factorial designs, random and mixed effects models, replication and sub-sampling strategies, fractional factorial designs, response surface methods, mixture designs, and screening designs. Focuses on various treatment structures for designed experimentation and the associated statistical analyses. Use of statistical software. Prereq: basic introductory statistics; permission.

MATH 841 - Survival Analysis**Credits:** 3

Explorations of models and data-analytic methods used in medical, biological, and reliability studies. Event-time data, censored data, reliability models and methods, Kaplan-Meier estimator, proportional hazards, Poisson models, loglinear models. The use of statistical software, such as SAS, JMP, or R, is fully integrated into the course. Prereq: MATH 839. (Offered in alternate years.)

MATH 843 - Time Series Analysis**Credits:** 3

An introduction to univariate time series models and associated methods of data analysis and inference in the time domain and frequency domain. Topics include: Auto regressive (AR), moving average (MA), ARMA and ARIMA processes, stationary and non-stationary processes, seasonal ARIMA processes, auto-correlation and partial auto-correlation functions, identification of models, estimation of parameters, diagnostic checking of fitted models, forecasting, spectral density function, periodogram and discrete Fourier transform, linear filters. parametric spectral estimation, dynamic Fourier analysis. Additional topics may include wavelets and long memory processes (FARIMA) and GARCH Models. The use of statistical software, such as JMP, or R, is fully integrated in to the course. Prereq: MATH 835 or MATH 839. Offered in alternate years in the spring.

MATH #844 - Design of Experiments II**Credits:** 3

Second course in design of experiments, with applications in quality improvement and industrial manufacturing, engineering research and development, research in physical and biological sciences. Covers experimental design strategies and issues that are often encountered in practice complete and incomplete blocking, partially balanced incomplete blocking (PBIB), partial confounding, intra and inter block information, split plotting and strip plotting, repeated measures, crossover designs, Latin squares and rectangles, Youden squares, crossed and nested treatment structures, variance components, mixed effects models, analysis of covariance, optimizations, space filling designs, and modern screening design strategies. Prereq: MATH 840; or permission.

MATH 845 - Foundations of Applied Mathematics I**Credits:** 3

An introduction to Partial Differential Equations (PDEs) and associated mathematical methods and the analytical foundation for applied mathematics. Topics include: PDE classification, superposition, separation of variables, orthonormal functions, completeness, convergence, Fourier Series, Sturm-Liouville eigenvalue problems, and eigenfunctions. Methods are introduced for the analysis and solution of boundary value problems, in particular, the Heat, Wave, and Laplace equations. Prereq: Multi-dimensional calculus and ordinary differential equations.

MATH 846 - Foundations of Applied Mathematics II**Credits:** 3

An introduction to special functions, asymptotic analysis, and transform methods applied to partial differential equations. Topics include: Boundary value problems in cylindrical coordinates, the Bessel equation and Bessel functions, Fourier-Bessel expansions in cylindrically symmetric spatial domains, the Fourier Transform, the Hilbert Transform, Cosine and Sine Transforms, problems on semi-infinite intervals, and Asymptotic Analysis. Prereq: Multi-dimensional calculus and ordinary differential equations.

MATH 847 - Introduction to Nonlinear Dynamics and Chaos**Credits:** 3

An introduction to the mathematics of chaos and nonlinear dynamics. Topics include: linear and nonlinear systems of ordinary differential equations; discrete maps; chaos; phase plane analysis; bifurcations; and computer simulations. Prereq: elementary differential equations; linear algebra; and multidimensional calculus. (Not offered every year.)

MATH 853 - Introduction to Numerical Methods**Credits:** 3

Introduction to mathematical algorithms and methods of approximation. A wide survey of approximation methods are examined including, but not limited to, polynomial interpolation, root finding, numerical integration, approximation of differential equations, and techniques used in conjunction with linear systems. Included in each case is a study of the accuracy and stability of a given technique, as well as its efficiency and complexity. It is assumed that the student is familiar and comfortable with programming a high-level computer language. (Also offered as CS 853.)

MATH 855 - Probability with Applications**Credits:** 3

Introduces the theory, methods, and applications of randomness and random processes. Probability concepts, random variable, expectation, discrete and continuous probability distributions, joint distributions, conditional distributions; moment-generating functions, convergence of random variables.

MATH 856 - Principles of Statistical Inference**Credits:** 3

Introduces the basic principles and methods of statistical estimation and model fitting. One- and two-sample procedures, consistency and efficiency, likelihood methods, confidence regions, significance testing, Bayesian inference, nonparametric and re-sampling methods, decision theory. Prereq: MATH 855; or permission.

MATH 857 - Mathematical Optimization for Applications**Credits:** 3

This course introduces the foundations of mathematical optimization and reinforces them via applications. The content includes convex optimization, first and second-order methods, constrained problems, duality, linear and quadratic programming, as well as discrete and non-convex optimization. Applications will focus on machine learning methods but also include problems from engineering and operations research. Prereq: MATH 426; Programming proficiency in MATLAB, R, Java, C, Python, or equivalent.

MATH 859 - Introduction to the R software**Credits:** 1

This course provides a basic introduction to the open-sources statistical software R for students who have never used this software or have never formally learned the basics of it. Topics include: Numeric calculations, simple and advanced graphics, object management and work-flow, RStudio, user-contributed packages, basic programming, writing of functions, statistical modeling and related graphs, distributed computing, reproducible research and document production via markup language. Cr/F.

MATH 861 - Abstract Algebra**Credits:** 3

This course establishes the axiomatic framework that underlies number systems and similar mathematical structures, investigating basic properties of groups, rings, fields and their homomorphisms.

MATH 862 - Linear Algebra**Credits:** 3

Abstract vector spaces, linear transformations, and matrices. Determinants, eigenvalues, and eigenvectors. Prereq: MATH 861.

MATH 863 - Abstract Algebra II**Credits:** 3

This course extends the investigations of MATH 861 into more specialized situations related to old and new problems in mathematics, such as the nature of solutions of polynomial equations. It presents advanced properties of groups, rings, fields and their applications. Prereq: MATH 861.

MATH 865 - Introduction to Commutative Algebra and Algebraic Geometry**Credits:** 3

Methods of determining solution sets of polynomial systems; affine varieties and their ideals; the 'algebra-geometry correspondence'; theory and applications of Grobner bases.

MATH 867 - One-Dimensional Real Analysis**Credits:** 3

Theory of limits, continuity, differentiability, integrability.

MATH 868 - Real Analysis II**Credits:** 3**MATH 869 - Introduction to Differential Geometry****Credits:** 3

Introduction to the study of the geometric properties of curves and surfaces in 3-dimensional space.

MATH 870 - Foundations of Number Theory**Credits:** 3

Factorization and prime numbers, arithmetic functions, congruences, reciprocity laws, quadratic forms, Diophantine equations, computational number theory. Offered in alternate years.

MATH 872 - Combinatorics**Credits:** 3

Graph theory (including planar graphs, graph coloring, Hamiltonian circuits, trees); counting principles (including permutations, combinations, pigeonhole principle, inclusion-exclusion principle); and related topics.

MATH 876 - Logic**Credits:** 3

Induction and recursion; sentential logic; first-order logic; completeness, consistency, and decidability; recursive function. (Not offered every year.)

MATH 883 - Set Theory**Credits:** 3

Axiomatic set theory, including its history, Zermelo-Fraenkel axioms, ordinal and cardinal numbers, consistency, independence, and undecidability. (Not offered every year.)

MATH 884 - Topology**Credits:** 3

Open sets, closure, base, and continuous functions. Connectedness, compactness, separation axioms, and metrizability. Prereq: MATH 767/ MATH 867 or permission.

MATH 888 - Complex Analysis**Credits:** 3

Complex functions, sequences, limits, differentiability and Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor's and Laurent's series, residues, conformal mapping. Prereq: MATH 867.

MATH 896 - Topics in Mathematics and Statistics**Credits:** 1-4

New or specialized courses not covered in regular course offerings. Prereq: permission of instructor. May be repeated.

MATH 898 - Master's Project**Credits:** 1-6

May be repeated to a maximum of 6 credits. IA (continuous grading). Cr/F.

MATH 899 - Master's Thesis**Credits:** 1-6

May be repeated up to a maximum of 6 credits. Cr/F.

MATH 900 - Bridges from the Classroom to Mathematics**Credits:** 1

An introduction to the goals of the MST program. Students have the opportunity to explore mathematical problems; to complete activities that make connections between several areas of mathematics, including the mathematical content in the MST degree program and the secondary school mathematics classroom; and to participate in readings/on-line discussion on the nature of mathematics. Permission required. Cr/F.

MATH 902 - Classroom Mathematics Practicum**Credits:** 1

A follow-up course to the six core mathematics content courses of the MST degree program. During the course, students choose a mathematical topic and/or set of concepts learned in one of the core MST courses and develop and teach a unit based on these concepts at the middle school or secondary school level. Permission required. Cr/F.

MATH #903 - Algebraic Structures**Credits:** 3

An exploration of the structural similarities between and among seemingly disparate number systems, beginning with counting numbers, and progressing to integers, the rational numbers, the real numbers, and the complex numbers; and leading to a discussion of polynomials as an integer analogue and to fields as polynomial "quotients" through the basic concepts of splitting fields and Galois Theory. Permission required.

MATH 905 - Euclidean and non-Euclidean Geometries from a Synthetic Perspective**Credits:** 3

An axiomatic development of geometry, beginning with finite geometries; emphasis is given to the fundamental concepts of Euclidean and non-Euclidean geometries from a synthetic perspective. Permission required.

MATH 906 - Analytic and Transformational Geometry**Credits:** 3

Fundamental concepts of transformational, projective geometry, and inversive geometry, including properties of conics and quadratic surfaces. Permission required.

MATH #907 - Real Analysis**Credits:** 3

An introduction to the fundamental concepts in real analysis that provide the mathematical foundation for calculus. Content focuses on properties of sequences and series; properties of functions, including continuity, the derivative and the Riemann integral. Permission required.

MATH 909 - Probability and Statistics for Teachers**Credits:** 3

Permutations and combinations; finite sample spaces; random variables; binomial distributions; statistical applications.

MATH 910 - Selected Topics in Mathematics Education for Teachers**Credits:** 1-4

Current developments and issues in mathematics education; content, curricula, methods, and psychology of teaching mathematics. Can be repeated for credit.

MATH 913 - Graph Theory and Topics in Discrete Mathematics**Credits:** 3

Key theoretical and computational aspects of graph theory and related areas of discrete mathematics. Applications of graph theory as well as current "open" problems are explored. Permission required.

MATH 914 - Topology for Teachers**Credits:** 3

Fundamental concepts of elementary topology; network and map problems; sets, spaces, and transformations.

MATH 915 - Algebraic Structures**Credits:** 3

An exploration of the structural similarities between and among seemingly disparate number systems, beginning with counting numbers, and progressing to integers, the rational numbers, the real numbers, and the complex numbers; and leading to a discussion of polynomials as an integer analogue and to fields as polynomial "quotients" through the basic concepts of splitting fields and Galois Theory. Permission required.

MATH 916 - Theory of Numbers for Teachers**Credits:** 3

Divisibility and primes; congruences; quadratic reciprocity; number theoretic functions; Diophantine equations; perfect and amicable numbers.

MATH 917 - Mathematical Proof and Problem Solving**Credits:** 3

Introduction to abstract mathematics with an emphasis on problem solving and proof structure, methods and techniques. Content includes logic, set theory and basic number theory.

MATH 918 - Analysis of Real Numbers**Credits:** 3

An introduction to the fundamental concepts in real analysis that provide the mathematical foundation for calculus. Content focuses on properties of sequences and series; properties of functions, including continuity, the derivative and the Riemann integral. Permission required.

MATH #920 - History of Mathematics**Credits:** 3

A problem-study approach to mathematical problems from the period of Greek mathematics until the modern era.

MATH 925 - Problem Solving Seminar**Credits:** 3

A study of variety of problem solving strategies and techniques in the context of solving mathematical problems. Problems will emphasize the connections between the core areas of algebra, geometry and analysis. Other mathematical topics may be included. Typically taken in conjunction with the Concluding Experience Problem Set. Cr/F.

MATH 928 - Selected Topics in Mathematics for Teachers**Credits:** 1-3

New or specialized topics not covered in the regular course offerings. May be repeated for credit.

MATH 929 - Directed Reading**Credits:** 1-3

A directed reading project on a selected topic in mathematics or mathematics education, planned in collaboration with a faculty member. May be repeated up to 6 credits.

MATH 931 - Mathematical Physics**Credits:** 3

Complex variables, differential equations, asymptotic methods, integral transforms, special functions, linear vector spaces and matrices, Green's functions, and additional topics selected from integral equations, variational methods, numerical methods, tensor analysis, and group theory. Prereq: differential equations; linear algebra; multidimensional calculus. (Also offered as PHYS 931.)

MATH 941 - Bayesian and Computational Statistics**Credits:** 3

Current approaches to Bayesian modeling and data analysis and related statistical methodology based on computational simulation. Fundamentals of Bayesian estimation and hypothesis testing. Multi-level and hierarchical Bayesian modeling for correlated data. Introduction to Markov chain Monte Carlo based estimation approaches such as the Gibbs sampler and the Metropolis-Hastings algorithm. Prereq: knowledge of intermediate statistics: distributions, discrete and continuous random variables, transformation of variables (calculus based), bivariate and multivariate normal distribution, maximum likelihood estimation; working knowledge of linear regression and analysis of variance; basic linear algebra: vectors and matrices, linear spaces, matrix multiplication, inverse of a matrix, positive definiteness. Matrix-vector notation for linear regression and ANOVA.

MATH 944 - Spatial Statistics**Credits:** 3

Frequentist and Bayesian methods for estimation of characteristics measured in space (usually 2-dimensional Euclidean space). Spatial averaging. Spatial point processes: models for clustering and inhibition. Cluster detection. Point referenced data: variogram estimation, Kriging, spatial regression. Lattice based data: spatial auto-regression, Markov random field models. Spatial regression models. Non-Gaussian response variables. Hierarchical Bayesian spatial models and Markov chain Monte Carlo methods. Multivariable spatial models. Prereq: Intermediate statistics including basics of maximum likelihood estimation; linear regression modeling including familiarity with matrix notation, basic concepts of calculus including partial derivatives.

MATH 945 - Advanced Theory of Statistics I**Credits:** 3

Introduction to the theory and practice of statistical modeling and inference. Basic multivariate analysis: covariance and expectation, multivariate-normal and non-central chi-squared distributions, linear and quadratic forms. Basic inequalities for probabilities and expectations: Markov, Chebyshev, Jensen, and Cauchy-Schwartz. Basic decision theory, sufficiency, minimal sufficiency, ancillarity and completeness, Point estimation: method of moments, maximum likelihood, Bayesian procedures, likelihood procedures and information inequalities. Measures of performance, notions of optimality, and construction of optimal procedures in simple situations. Convergence in distribution and in probability. Prereq: MATH 856; or permission.

MATH 946 - Advanced Theory of Statistics II**Credits:** 3

Asymptotic statistical inference: consistency, asymptotic normality and efficiency. Hypothesis testing: Neyman-Pearson lemma, uniformly most powerful test, generalized likelihood ratio tests, Chi squared goodness-of-fit tests, Wald tests and related confidence intervals, pivotal quantities, optimality properties. Modern likelihood methods (quasi, pseudo and composite). Algorithmic inference: Gibbs sampling, bootstrapping, simultaneous inferences in high-dimensional data and functional data. Nonparametric and semiparametric estimation methods, asymptotic estimation theory and large sample tests. Prereq: MATH 945; or permission.

MATH 951 - Algebra I**Credits:** 3

Groups and their homomorphisms, products and sums, structure of groups; rings and their homomorphisms, ideals, factorization properties. Prereq: MATH 861.

MATH 952 - Algebra II**Credits:** 3

Field extensions; Galois theory; module theory. Prereq: MATH 951.

MATH 953 - Analysis I**Credits:** 3

Measurable spaces and functions, measures, Lebesgue integrals, convergence theorems. Prereq: MATH 867.

MATH 954 - Analysis II**Credits:** 3

Cauchy theory and local properties of analytic functions, Riemann mapping theorem, representation theorems, harmonic functions. Prereq: MATH 888.

MATH 955 - Topology I**Credits:** 3

Subspace, product, and quotient topologies; embedding; separation and countability axioms; connectedness; compactness and compactifications; paracompactness, metrization, and metric completions. Prereq: MATH 884.

MATH 956 - Topology II**Credits:** 3

Chain complexes; homology of simplicial complexes, singular homology and cohomology; axiomatic homology; cup and cap products. Prereq: MATH 861 and MATH 884.

MATH 958 - Foundations of Math Education**Credits:** 3

Topics will include: major issues, trends, and programs in mathematics education research, the research process, theoretical perspectives to guide research, the profession and infrastructure of mathematics education, cultural and historical aspects of mathematics education, and the research-practice interface. Examples span the K-16 spectrum. Prereq: permission.

MATH 961 - Topics in Algebra I**Credits:** 3

An introduction to topics chosen from algebra and number theory. Prereq: MATH 951-MATH 952. May be repeated.

MATH 964 - Topics in Analysis I**Credits:** 3

An introduction to topics in analysis. Prereq: permission. May be repeated.

MATH 965 - Topics in General Topology I**Credits:** 3

An introduction to topics in general topology. Prereq: MATH 955. May be repeated.

MATH 966 - Topics in Algebraic Topology I**Credits:** 3

An introduction to topics in algebraic topology. Prereq: MATH 956. May be repeated.

MATH #967 - Topics in Applied Mathematics I**Credits:** 3

An introduction to topics in applied mathematics. Prereq: permission. May be repeated.

MATH 968 - Topics in Mathematics Education I**Credits:** 3

A) The Teaching and Learning of Mathematics; B) Curriculum and History in Mathematics Education. Topics selected from: epistemologies of knowledge applied to mathematics; theories of learning and teaching mathematics; theoretical perspectives in research; mathematics education research programs K-16; research methods for studying mathematics teaching, learning, and curricula; theoretical frameworks for curriculum development, implementation of new curricula, and research on curricula; historical perspectives of research in mathematics education; the evolution and history of K-16 mathematics curricula both in United States and internationally. Versions A and B offered alternately. Prereq: MATH 958 or permission. May be repeated.

MATH 969 - Topics in Probability and Statistics I**Credits:** 3

Selected advanced topics from one or several of the following areas: probability, stochastic processes, design of experiments, biostatistics, Bayesian theory and methods, spatial and spatio-temporal statistics, time series analysis, nonparametric statistics. Prereq: permission. May be repeated.

MATH 971 - Topics in Algebra II**Credits:** 3

An introduction to advanced topics chosen from algebra and number theory. Prereq: MATH 951 - MATH 952; permission. May be repeated.

MATH 973 - Topics in Operator Theory**Credits:** 3

Selected topics in operator theory. Prereq: MATH 963. May be repeated.

MATH 977 - Topics in Applied Mathematics II**Credits:** 3

An exploration of an area of research in applied mathematics. Prereq: permission. May be repeated.

MATH 978 - Topics in Mathematics Education II**Credits:** 3

An exploration of an area of research in mathematics education. Prereq: permission. May be repeated.

MATH 979 - Research Topics in Statistics**Credits:** 3

An exploration of the main statistical issues and computational methods associated with research problems from such areas as survival analysis, reliability, latitudinal data, categorical data, spatio-temporal data, and industrial processes. Student term projects require: literature searches, presentation, use of modern statistical software, and written reports. Prereq: permission. May be repeated.

MATH 997 - Statistics Seminar**Credits:** 1

A seminar of weekly and bi-weekly meetings organized by the statistics Ph.D. students with supervision by a statistics faculty member. Informal presentations of faculty members, students, and outside guest presenters; also discussion of topics that are of mutual interest to its participants. Dissertation proposal presentations. Seminar presentations are open to the greater public. Statistics Ph.D. students are required to enroll for at least 3 semesters. Attendance is mandatory by those students who are wneolled in the seminar. Credits do not count towards the Master's degree. May be repeated to a maximum of 6 credits. Cr/F.

MATH 998 - Reading Courses**Credits:** 1-6

A) Algebra; B) Analysis; C) Operator Theory; D) Geometry; E) General Topology; F) Algebraic Topology; G) Applied Mathematics; H) Mathematics Education; I) Probability and Statistics. Prereq: permission.

MATH 999 - Doctoral Research**Credits:** 0

Cr/F.

Mechanical Engineering (ME)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ME 806 - Renewable Energy: Physical and Engineering Principles**Credits:** 3

The goal of this course is to become "fluent in energy" and to learn about the engineering fundamentals of renewable energy technologies. The course begins by giving an overview of U.S. energy usage and sources, as well as history and trends. Various renewable energy topics are then introduced and discussed. Where applicable, topics are discussed in detail from a fluid and thermal sciences point of view. Guest lectures and a field trip may be included. This course is open to all engineering graduate students. Prereq: Thermodynamics, Fluid Dynamics, or equivalent, or instructor permission.

ME 807 - Analytical Fluid Dynamics**Credits:** 4

Kinematics of flow; constitutive relationships; development of the Navier-Stokes equations; vorticity theorems; potential flow. Prereq: fluid dynamics.

ME 809 - Computational Fluid Dynamics**Credits:** 3

Conservation of mass, momentum, and energy, discretization and discretization schemes, boundary and initial conditions, turbulence and turbulence models, two-equation models, CFD software such as OpenFOAM, best practice guidelines for CFD. The class incorporates the use and creation of Open Educational Resources (OER)

ME 812 - Waves in Fluids**Credits:** 3

Linear and nonlinear dynamics of hyperbolic and dispersive wave systems with application to acoustic waves, surface and internal gravity waves, Rossby waves, and capillary waves. Key physical concepts include wave-generation mechanisms, wavelength and amplitude dispersion, group velocity and energy propagation, steady streaming, and mode interactions. Prereq: fluid dynamics; or permission.

ME 824 - Vibrations Theory and Applications**Credits: 4**

Discrete vibrating systems. Linear system concepts; single-degree-of-freedom systems with general excitation. Matrix theory and eigenvalue problems. Many degrees of freedom, normal mode theory for free and forced vibration. Numerical methods; introduction to continuous systems; applications to structural and mechanical systems. Prereq: statics; dynamics or permission.

ME 827 - Advanced Mechanics of Solids**Credits: 4**

Stress, strain, stress-strain relations, anisotropic behavior, introduction to elasticity, plane stress/strain, bending and torsion of members with general cross-sections, introduction to thin plates and shells, energy methods. Prereq: strength of materials or permission.

ME 835 - Mechanics of Composite Materials**Credits: 4**

Classification of composites - Anisotropy of composite materials. Micromechanical predictions of elastic and hygrothermal properties. Strength and failure of composite materials. Analysis of laminates. Experimental methods for characterization of composites. Prereq: strength of materials or permission.

ME 843 - Satellite Systems, Dynamics, and Control**Credits: 3**

General satellite systems with emphasis on spacecraft dynamics and control. Course topics include general satellite information such as types of satellites, missions, and orbits, as well as satellite subsystems. Basic spacecraft dynamics and orbital mechanics topics are covered. Advanced topics will include attitude and orbit estimation, and automatic attitude control. Prereq: systems modeling or permission.

ME #860 - Physical Metallurgy I**Credits: 4**

Introduction to physical metallurgy: dislocations, thermodynamics of materials, diffusion, phase transformations, and strengthening mechanisms in solids. Prereq: introduction to materials science or permission. Lab.

ME 870 - Design with Microprocessors**Credits: 4**

Basic operation of microprocessors and microcontrollers explained, and interfacing these devices to sensors, displays and mechanical systems explored. Topics include: number systems, architecture, registers, memory mapping, interrupts and interfacing for system design. Methods of programming and interfacing with mechanical/electrical systems are covered and then implemented in lab. Prereq: introduction to electrical engineering. Lab.

ME 872 - Control Systems**Credits: 4**

Development of advanced control systems design concepts such as Nyquist analysis; lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to nonlinear and modern control. Includes interactive computer-aided design and real-time digital control. Prereq: permission. (Also offered as ECE 872.) Lab.

ME 873 - Electromechanical Analysis and Design**Credits: 4**

Analysis and design of electromechanical systems using lumped parameter models and magnetic finite element analysis (FEA). Electrostatic and magnetic field equations discussed and used to derive magnetic and electric lumped model elements. A brushless dc motor analyzed using lumped models and FEA. Various drive types discussed and the motor system analyzed to obtain torque-speed curves. Design principles given and utilized in a design project. Prereq: systems modeling, simulation, and control or permission.

ME 877 - Computer Aided Engineering**Credits: 4**

In this course, modules of Solid Works (beyond its basic solid modeling capabilities) and other software is used to demonstrate how computer based tools can be used in engineering practice, in particular design analysis and optimization. Emphasis placed on using knowledge from past engineering courses to obtain theoretical calculations to compare with the results from the computer software package. Prereq: Strength of Materials; Mechanics III; Heat Transfer; and Fluid Dynamics (or equivalent); or permission.

ME 882 - Industrial Skills and Engineering**Credits: 3**

In this course, the principles of Lean Manufacturing and Value Stream Mapping (VSM) as pioneered by Toyota and now utilized by most leading manufacturers will be studied and applied. Lean Manufacturing principles will be taught with classroom instruction and a structured model factory exercise. Instruction on the theory of Value Stream Mapping (VSM) will be followed with an actual industrial VSM activity where a process will be studied and a Desired Future State defined with VSM methods. This factory floor activity will be done collaboratively with employees from a manufacturing company.

ME 885 - Solid Mechanics in Manufacturing**Credits: 4**

Characterization of material properties will be studied with emphasis on plastic deformation. Also, numerical approaches to solve for the forces, stresses, and strains in manufacturing processes will be covered. In particular, two prominent mass production manufacturing areas, metal forming and cutting, will be examined. Prereq: introduction to materials science, dynamics.

ME 886 - Introduction to Finite Element Analysis**Credits: 4**

Topics include basic matrix theory, potential energy approach, direct stiffness method, calculus of variations, development of finite element theory, and modeling techniques. Applications in solid mechanics, heat transfer, fluids, and electromagnetic devices, via both commercially available codes and student written codes. Prereq: Mechanics. of Materials, Heat Transfer or permission. Special fee. Lab.

ME 895 - Special Topics**Credits: 1-4**

New or specialized courses and/or independent study. May be repeated for credit.

ME 899 - Master's Thesis**Credits: 1-8**

May be repeated up to a maximum of 8 credits. Cr/F.

ME 906 - Convection Heat Transfer**Credits:** 4

An analytical study of heat transfer to laminar and turbulent boundary layers of compressible and incompressible fluids. Basic differential equations governing the heat transfer are derived and analytical solutions are obtained where possible and checked with experimental results.

ME 909 - Viscous Flow**Credits:** 3

Exact solutions of the Navier-Stokes equations; laminar boundary layers; wakes and jets; Stoke's flow; stability of parallel flows and boundary layers; transition to turbulence. Prereq: analytical fluid dynamics or permission.

ME 910 - Turbulence**Credits:** 3

Modern analysis of turbulent flow: the governing equations; stationary random functions and the various averaging techniques; empirical results on turbulence; homogenous turbulence; the Kolmogorov theory for isotropic turbulence; upper bound theory; turbulence in the atmosphere and oceans; applications to problems in science and engineering. Prereq: ME 807 or permission.

ME 922 - Continuum Mechanics**Credits:** 4

Cartesian tensors. Lagrangian and Eulerian description of a continuum. The material time derivative. Deformation gradient. Displacement and rotation. Strain tensors. Rates of deformation. Conservation of mass. Momentum balance equations. Cauchy and Piola-Kirchhoff stress tensors. Balance of energy; stress power, rate of work, and internal energy. Entropy and the second law of thermodynamics. Constitutive equations for elasticity and plasticity. Newtonian and non-Newtonian fluids. Inviscid and viscous flow. Navier-Stokes equations. Ideal and rotational flows.

ME 927 - Theory of Plasticity**Credits:** 4

Analysis of stress and deformation in inelastic solids; general development of stress invariants, variational principles, constitutive relations, and yield and loading functions. Special emphasis on ideal plasticity, strain-hardening, creep, limit analysis, and limit design.

ME 935 - Micromechanics of Composite and Porous Materials**Credits:** 4

Classification of composites, periodic and random microstructures. Mechanics of materials approach to micro-mechanical modeling. Representative volume element, analytical and numerical modeling of the effective properties. Micromechanics of failure of composite and porous materials. Prereq: mechanics of composites or permission.

ME 944 - Nonlinear Control Systems**Credits:** 4

Analysis and design of nonlinear control systems from the classical and modern viewpoints are discussed. Liapunov's stability theory; phase space methods; linearization techniques; simulation; frequency response methods; generalized describing functions; transient analysis utilizing functional analysis; and decoupling of multivariable systems. Prereq: advanced control systems I. (Also offered as ECE 944.)

ME 951 - Advanced Control Systems I**Credits:** 3

State-space representation of multivariable systems; analysis using state transition matrix. Controllability and observability; pole placement using state and output feedback; Luenberger observers. Introduction to computer-controlled systems (sampling, discrete state representation, hybrid systems): nonlinear analysis (Liapunov, Popov, describing function). Prereq: control systems. (Also offered as ECE 951.)

ME 952 - Advanced Control Systems II**Credits:** 3

Special topics in control theory: continuous and discrete systems: optimal control systems, including calculus of variations, maximum principle, dynamic programming, Weiner and Kalman filtering techniques, stochastic systems, adaptive control systems. Prereq: advanced control systems I. (Also offered as ECE 952.)

ME 986 - Advanced Finite Element Analysis**Credits:** 4

Topics include introduction to dynamics, treatment of nonlinear material behavior, and plate and shell element technology. Emphasis given to problems in solid mechanics and heat transfer. Prereq: finite element analysis or equivalent.

ME 992 - Master's Project**Credits:** 4

The student works with a faculty member during one or two semesters on a well-defined research and/or original design problem. A written report and seminar are presented. IA (continuous grading). Cr/F.

ME 995 - Graduate Special Topics**Credits:** 1-4

Investigations of graduate-level problems or topics in mechanical engineering.

ME 999 - Doctoral Research**Credits:** 0

Cr/F.

Microbiology (MICR)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MICR 805 - Immunology**Credits:** 3

An introduction to the fundamental mechanisms of immune function. Topics include the cells and organs of the immune system, humoral and cellular immune responses, the generation of immune cells, and how immune cells fight various infectious pathogens. Prereq: introductory microbiology and lab.

MICR #806 - Virology**Credits:** 3

Principles of animal and selected plant and bacterial virology in relation to infection and disease. Emphasizes the molecular biology of viruses, viral replication, isolation, propagation, assay, pathogenesis, diagnosis, detection, epidemiology, and control. Prereq: introductory microbiology and lab.

MICR #808 - Virology Laboratory**Credits:** 2

Principles of animal and selected plant and bacterial virology in relation to infection and disease. Emphasizes the molecular biology of viruses, viral replication, isolation, propagation, assay, pathogenesis, diagnosis, detection, epidemiology, and control. Prereq: introductory microbiology and lab. Special Fee.

Co-requisite: MICR #806**MICR 815 - Immunology Laboratory****Credits:** 2

This applied immunology laboratory course highlights both historic and current methodologies important for both elucidation and diagnosis of immune function. Techniques used to study phagocytosis, antibody production, immunodiffusion, and T-cell function will be introduced. Applications of the antibody technologies to other scientific disciplines (ELISA, immunofluorescence microscopy, immunoblotting, etc.) will also be covered. Prereq: introductory microbiology and lab. Special fee.

Co-requisite: MICR 805

Molecular, Cellular and Biomedical Science (MCBS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MCBS 895 - Special Topics**Credits:** 1-4

Special topics course.

MCBS 899 - Master's Thesis**Credits:** 1-10

May be repeated to a maximum of 10 credits. Cr/F.

MCBS 901 - Introduction to Research in the Life Sciences**Credits:** 2

This two-credit graduate course is designed to acquaint first-year master's and doctoral students with facilities and tools for designing, conducting, and communicating research. Topics include: acquiring proper background information; the art of oral presentation; effective writing; data analysis and graphics using computers; ethics in science; and issues in research.

MCBS 905 - Contemporary Topics in Molecular, Cellular and Biomedical Sciences**Credits:** 1

Presentation, discussion, and critical evaluation of current research literature in molecular/cellular life sciences and in biomedical sciences. Topics will vary each semester. May be repeated for a maximum of 5 credits. Cr/F.

MCBS 913 - Applied Bioinformatics**Credits:** 3

Genome-enabled biology is the exploration of basic biological questions by combining high-throughput data gathering approaches, such as DNA sequencing, with computational skills in the area of Bioinformatics. Course is designed to provide an opportunity for graduate students in the life sciences to develop sophisticated methods of data analysis by participating in a collaborative project. May be repeated for a maximum of 6 credits.

MCBS 995 - Special Topics**Credits:** 1-4

Special topics course.

MCBS 997 - Seminar**Credits:** 1

Graduate student and faculty presentations on current topics in the molecular life sciences and biomedical sciences. Graduate students are expected to present one seminar per year and attend all seminars each semester. May be repeated. Cr/F. (Offered both fall and spring).

MCBS 999 - Doctoral Thesis**Credits:** 0

Cr/F.

Music (MUSI)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MUSI 803 - Music of the Renaissance**Credits:** 3

Works of the 15th- and 16th-century composers from Dunstable to Palestrina.

MUSI 805 - Music of the Baroque**Credits:** 3

Music of Europe from de Rore to Bach.

MUSI 807 - Music of the Classical Period**Credits:** 3

Growth of musical styles and forms from early classicism through the high classicism of Haydn, Mozart, and the young Beethoven.

MUSI 809 - Music of the Romantic Period**Credits:** 3

A survey of Romanticism in music from Beethoven's late period to the end of the 19th century. The works of Schubert, Berlioz, Schumann, Mendelssohn, Chopin, Wagner, Verdi, Brahms, Austrian symphonists, French pre-impressionists, and national styles in European music.

MUSI 811 - Music of the 20th and 21st Centuries**Credits:** 3

Styles and techniques of composers from Debussy to the present. Special emphasis on tonal music before World War I; neoclassical trends; the emergence of atonality and serial techniques; electronic music.

MUSI 813 - Art Song**Credits:** 3

History and literature of the solo song with piano accompaniment. Survey of national styles of the 19th and 20th centuries and deeper study of the central core of the art song—the German Lied.

MUSI 815 - Survey of Opera**Credits:** 3

History of the genre from Monteverdi to the present.

MUSI 831 - Advanced Instrumental Conducting**Credits:** 2

Physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. Reading and analysis of full and condensed scores, study of transposition, psychology of rehearsal. Prereq: advanced music theory. May be repeated for a maximum of 12 credits. Special fee.

MUSI 832 - Advanced Choral Conducting**Credits:** 2

Physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. Reading and analysis of full and condensed scores, study of transposition, psychology of rehearsal. Prereq: advanced music theory. May be repeated for a maximum of 12 credits.

MUSI 836 - Graduate Early Wind Instruments**Credits:** 1-4

Private instruction in Renaissance and Baroque wind instruments. May be repeated. Special fee.

MUSI 841 - Graduate Piano**Credits:** 1-4

Private instruction in piano. May be repeated. Special fee for non-majors.

MUSI 845 - Graduate Voice**Credits:** 1-4

Private instruction in voice. May be repeated. Special fee for non-majors.

MUSI 846 - Graduate Violin**Credits:** 1-4

Private instruction in violin. May be repeated. Special fee for non-majors.

MUSI 847 - Graduate Viola**Credits:** 1-4

Private instruction in viola. May be repeated. Special fee for non-majors.

MUSI 848 - Graduate Cello**Credits:** 1-4

Private instruction in cello. May be repeated. Special fee for non-majors.

MUSI 849 - Graduate Bass**Credits:** 1-4

Private instruction in bass. May be repeated. Special fee for non-majors.

MUSI 850 - Graduate Classical Guitar**Credits:** 1-4

Special fee.

MUSI 851 - Graduate Flute**Credits:** 1-4

Private instruction in flute. May be repeated. Special fee for non-majors.

MUSI 852 - Graduate Clarinet**Credits:** 1-4

Private instruction in clarinet. May be repeated. Special fee for non-majors.

MUSI 853 - Graduate Saxophone**Credits:** 1-4

Private instruction in saxophone. May be repeated. Special fee for non-majors.

MUSI 854 - Graduate Oboe**Credits:** 1-4

Private instruction in oboe. May be repeated. Special fee for non-majors.

MUSI 855 - Graduate Bassoon**Credits:** 1-4

Private instruction in bassoon. May be repeated. Special fee for non-majors.

MUSI 856 - Graduate French Horn**Credits:** 1-4

Private instruction in French horn. May be repeated. Special fee for non-majors.

MUSI 857 - Graduate Trumpet**Credits:** 1-4

Private instruction in trumpet. May be repeated. Special fee for non-majors.

MUSI 858 - Graduate Trombone**Credits:** 1-4

Private instruction in trombone. May be repeated. Special fee for non-majors.

MUSI 859 - Graduate Euphonium**Credits:** 1-4

Private instruction in euphonium. May be repeated. Special fee for non-majors.

MUSI 860 - Graduate Tuba**Credits:** 1-4

Private instruction in tuba. May be repeated. Special fee for non-majors.

MUSI 861 - Graduate Percussion**Credits:** 1-4

Private instruction in percussion. May be repeated. Special fee for non-majors.

MUSI 862 - Graduate Keyboards**Credits:** 1-4

Private instruction in jazz piano. May be repeated. Special fee for non-majors. Permission required.

MUSI 863 - Graduate Jazz Guitar**Credits:** 1-4

Private instruction in jazz guitar. May be repeated. Special fee for non-majors.

MUSI 864 - Graduate Drum Set**Credits:** 1-4

Private instruction in drum set. May be repeated. Special fee for non-majors.

MUSI 871 - Counterpoint**Credits:** 3

Contrapuntal techniques of tonal music. Melodic construction and dissonance treatment through work in species counterpoint and studies in harmonic elaboration and prolongation. Analysis of selected compositions emphasizes the connection between fundamental contrapuntal techniques and the voice-leading of composition. Prereq: permission.

MUSI 875 - Composition**Credits:** 1-4

Construction of phrases, periods, and short compositions following classical models. Problems of text-setting. Prereq: permission.

MUSI 876 - Composition**Credits:** 1-4

Construction of phrases, periods, and short compositions following classical models. Problems of text-setting. Prereq: MUSI 875 and permission.

MUSI 877 - Advanced Composition**Credits:** 1-4

Continuation of MUSI 876. Individual compositional projects. Prereq: MUSI 876 and permission. May be repeated for credit.

MUSI 878 - Topics in Electronic Music**Credits:** 1-4

Introduces and develops skills in the fundamentals of musical acoustics, and the principal compositional resources of digital/electronic music. Permission required.

MUSI 879 - Orchestration**Credits:** 3

Characteristics of band and orchestral instruments both individually and in small (homogeneous) and large (mixed) groupings. Students study scores, write arrangements, and have arrangements performed if at all possible. Prereq: permission.

MUSI 881 - Analysis: Form and Structure**Credits:** 3

An introduction to analytical techniques through the study of representative masterworks; formal and structural elements and their interrelationships. Analysis of 18th- and 19th-century works. Prereq: permission.

MUSI 882 - Analysis: Form and Structure**Credits:** 3

An introduction to analytical techniques through the study of representative masterworks; formal and structural elements and their interrelationships. Analysis of 20th and 21st century works. Prereq: permission.

MUSI 895 - Special Studies**Credits:** 1-4

A) J.S. Bach; B) Franz Schubert; C) Debussy and Ravel; D) the world of jazz; E) piano literature; F) 19th century French music; G) advanced analysis; H) advanced study in electronic music; I) composition through computer-generated sound; J) woodwind literature; K) brass literature; L) string literature; M) medieval performance practice; N) renaissance performance practice; O) baroque performance practice; P) classical performance practice; Q) 19th century performance practice; R) 20th century performance practice; S) woodwind repair; T) string repair; U) advanced jazz improvisation; V) advanced piano pedagogy; W) advanced accompanying; X) advanced conducting; Y) independent study. Prereq: permission. May be repeated for credit with permission.

MUSI 955 - Introduction to Bibliography**Credits:** 3

MUSI 955 is a comprehensive survey of skills and resources fundamental for undertaking research projects in music. Topics include bibliography (a survey of standard reference works, periodicals, monographs, collected editions, and other important sources); research techniques; critical reading, thinking, and writing; oral presentation; and the planning and drafting of a research paper (including methods of citation). A reading knowledge of German, French, and Italian is helpful, but not required.

MUSI 956 - Readings in Music History: Antiquity to 1600**Credits:** 3

An opportunity to read and study in detail a restricted number of monographs and editions.

MUSI 957 - Readings in Music History: 1600 to 1820**Credits:** 3

An opportunity to read and study in detail a restricted number of monographs and editions.

MUSI 958 - Readings in Music History: 1820 to the Present**Credits:** 3

An opportunity to read and study in detail a restricted number of monographs and editions.

MUSI 959 - Musicology Seminar**Credits:** 3

A seminar course that explores a specialized topic in musicology in depth. Students survey the principal primary and secondary materials for the given topic, present oral presentations related to it, and write an essay showing understanding of the literature and research issues involved. Topics change each time the course is offered. May repeat up to a maximum of 9 credits.

MUSI 991 - Research Seminar**Credits:** 1-4

Guidance on individual research projects. Prereq: permission.

MUSI 994 - Theory Seminar**Credits:** 3

Study of representative masterworks. Score analysis. Prereq: permission.

MUSI 995 - Independent Study in the History and Theory of Music**Credits:** 1-4

Opportunity for especially qualified students to investigate, with guidance, specific areas of their scholarly concern. Prereq: permission.

Music Education (MUED)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MUED 841 - Techniques and Methods in Choral Music**Credits:** 2

Problems in the organization and performance of high school, college, and community choruses. Techniques of choral conducting and rehearsal, repertory, and materials.

MUED 843 - Materials and Methods in Piano Music**Credits:** 2

Gives potential piano teachers a coherent but flexible approach to the instruction of students of different ages and levels of talent through evaluation of methods and materials and discussion of the role of the private teacher.

MUED 845 - Techniques and Methods in String Instruments**Credits:** 2

Class and individual instruction. Intensive training on the violin, viola, cello, and double bass. Classroom procedures, establishment of string programs, and evaluation of available methods materials. Permission required.

MUED 847 - Techniques and Methods in Woodwind Instruments**Credits:** 3

Basic course in embouchure formation, tone production, tonguing, fingering and instrument care as applied to each of the woodwinds: flute, oboe, clarinet, bassoon and saxophone. Methods, studies, solos and ensembles most useful with school players of woodwind instruments.

MUED 849 - Techniques and Methods in Brass Instruments**Credits:** 2

Basic course in embouchure formation, tone, tonguing, fingering, flexibility, accuracy, and range development as applied to the trumpet, French horn, trombone, euphonium, and tuba; methods, studies, solos, and ensembles most likely to be useful with school players of brass instruments. Permission required.

MUED 851 - Techniques and Methods in Percussion Instruments**Credits:** 2

Basic performance skills on snare drum, timpani, mallet instruments, and other percussion instruments used in bands and orchestras. Materials and methods of instruction.

MUED 855 - Vocal Pedagogy**Credits:** 2

A study of vocal anatomy, vocal function, and teaching methods, with an emphasis on application for singers and voice teachers.

MUED 865 - Instrumental Music Methods**Credits:** 2

Organization and delivery of instruction to groups of instrumental music students. Examination of appropriate curricula and materials, application of instrumental and conducting techniques, structure of rehearsals, assessment of student progress.

MUED 871 - Marching Band Methods**Credits:** 2

Role of marching bands in the school music program. Design and execution of field shows and parade marching. Understanding of marching percussion and auxiliary units. Examination of appropriate music.

MUED 890 - Teaching Elementary School Music**Credits:** 3

Experiential approach toward learning creative strategies for teaching elementary school music. Includes various curricula and methods; philosophy and psychology of music; demonstration of materials and instruments. Observation and teaching in schools. Prereq: piano proficiency.

MUED 891 - Teaching Secondary School Music**Credits:** 3

Assembling, managing, and teaching junior/senior high school music curriculum. Academic issues of philosophy, curriculum building, application of learning theories, administration, evaluation, motivation, and classroom management combined with field experience in lesson planning and teaching/rehearsal techniques. Prereq: piano proficiency; conducting methods.

MUED 895 - Special Studies**Credits:** 1-4

Allows upper-level students to explore individually or in groups areas related to their specific professional interests. Prereq: permission.

MUED 983 - Instrumental Literature and Its Performance**Credits:** 3

Exploration of representative solo and ensemble music for string, wind, and percussion instruments. Typical literature from each period of music is studied. As much as possible, live performance is included; recordings are used as required. Detailed attention given to interpretation. Project required.

MUED 995 - Special Projects**Credits:** 1-4

Independent study, investigation, or research in music education. Creative projects may be included. Prereq: permission.

MUED 996 - Foundations and Perspectives of Music Education**Credits:** 4

Philosophical, sociological, and psychological foundations and principles of music education and the relationship of these principles to music learning and teaching.

Natural Resources & Earth Systems Science (NRES)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

NRES 995 - Independent Study**Credits:** 1-4**NRES 996 - Environmental Science Seminar****Credits:** 0

This course exposes students to a wide range of interdisciplinary presentations and interaction with accomplished speakers from across the country representing a variety of environmental science fields. Seminars address topics such as marine ecology, water resources management, agricultural ecology, climate change and its impacts, soil science, natural resources protection, microbial communities, ecosystem ecology, environmental policy and ethics, geology, forestry, carbon modeling, biochemistry, small mammal ecology, and other subjects of interest.

NRES 997 - Interdisciplinary Research in Natural Resources and Earth and Environmental Sciences**Credits:** 1

This course provides NRESS students opportunities to build a peer network, discuss the nature of interdisciplinary/transdisciplinary research, and read papers from Natural Resources and Earth Systems primary literature. Weekly discussion of topics relevant to interdisciplinary research and careers, along with several guest speakers, are included. The course is facilitated by the NRESS faculty chair, and is required for incoming NRESS students.

NRES 999 - Doctoral Research**Credits:** 0

Cr/F.

Natural Resources (NR)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

NR 801 - Ecological Sustainability and Values**Credits:** 4

Deeper more fundamental philosophical questions, including spiritual values questions, are being asked concerning the ecological/environmental challenge of our time; its causes and resolution. Aspects of this challenge—environmental education, energy, food, agriculture, and natural resources—analyzed with ethics and values approaches. Students develop ways of responding to problem identification and resolution.

NR 802 - Workshops**Credits:** 1-4

Short-term courses (generally a few days to two weeks) offered off campus, covering a broad variety of environmental and natural resource topics. May be repeated. Special fee required depending on topic. Prereq: permission required.

NR 803 - Watershed Water Quality Management**Credits:** 4

Principles of land use as they relate to water quality and quantity. Lectures focus on biogeochemical cycles and the watershed approach to land and water resource management. Labs and field trips focus on methods of water sampling and analysis. One year of chemistry is recommended. Prereq: freshwater resources or watershed hydrology, or permission. Special fee. Lab/field trips.

NR 806 - Soil Ecology**Credits: 4**

Examines the ecological relationships between soil microorganisms and their biotic and abiotic environment, with emphasis on the role of soil microorganisms in biogeochemical cycling. Specific objectives are to examine the biodiversity present in soil systems, factors controlling microbial community composition and diversity, and linkages between soil microbial communities, soil physical properties, and soil organic matter and nutrient cycling dynamics. Prereq: Introduction to principles of biology, general chemistry or equivalent, or permission. Lab. Special fee.

NR 807 - Environmental Modeling**Credits: 4**

Environmental Modeling introduces students to a range of key mathematical and computer modeling concepts and the ways they can be used to address important scientific questions. The course is divided into four topical sections: Population and Community Ecology, Hydrology, Biogeochemistry, and Ecosystems. In each section, modeling concepts and skills are presented together with environmental information to emphasize the linkage between quantitative methods and relevant scientific results. Prereq: MATH 425. (Also listed as EOS 807.)

NR 810 - Endangered Species Seminar**Credits: 2**

This seminar provides students with an interactive class of student presentations and guest lectures by endangered-species biologists. Emphasis is placed on biological, sociological, economic, and political factors that influence endangered-species policy. Prereq: basic ecology/biology; permission. Special fee.

NR 811 - Wetland Ecology and Management**Credits: 4**

Analysis of the natural resources of coastal and inland wetlands and environmental problems caused by human use and misuse of these ecosystems. Groups will collect field data to summarize the structure and function of four wetland types within a management context. Special fee. Lab. Prereq: general ecology; watershed water quality management;/ or permission. Special fee. Lab/field trips.

NR 812 - Mammalogy**Credits: 4**

Evolution, ecology, behavior, physiology and diversity of mammals. The focus of the course is on conceptual issues, such as the relation of structure, function, physiology and ecology of species; reproductive physiology and life history strategies; and the evolution of mating systems and social structure. Familiarity of mammalian groups to the family level and identification of local fauna to species will be required. Prereq: BIOL 411 and BIOL 412 or equivalent. Lab. (Not offered every year.) Special fee.

NR 818 - Law of Natural Resources and Environment**Credits: 3**

Federal and state environmental statutory and administrative law, its application, strengths and weaknesses, and options for future amendment.

NR #819 - Wetlands Restoration and Mitigation**Credits: 3**

Assesses the problems of wetlands loss and learning how to repair the damage. Asks what steps can be take. Does restoration work, can habitat value be replaced, what constitutes equivalent mitigation? Field experience and theoretical background in restoring marine and freshwater environments. First half of course involves field trips to visit and sample mitigation and restoration sites. Second half focuses on student projects using the scientific method to address wetland issues. Prereq: NR 811 or permission. Special fee. Lab/field trips. (Not offered every year.)

NR 820 - International Environmental Politics and Policies for the 21st Century**Credits: 4**

Students examine policies for managing human activities to sustain the health of regional ecosystems and planetary life-support systems. Selected problems of the international commons (oceans, marine resources, atmosphere, migratory species); global and regional carrying capacity (population, resource consumption), internationally shared ecosystems (trans-boundary watersheds, water-bodies, tropical forests); and the relevant international institutions and politics for policy formation, conflict resolution, and implementation. Using a policy-analytic framework, students develop case studies to assess international policies and institutional arrangements to achieve the objectives of Agenda 21--Earth Summit Strategy to Save the Planet. Prereq: permission.

NR 824 - Resolving Environmental Conflicts**Credits: 4**

Theories and practices of environmental dispute settlement. Roles of public, non-governmental and governmental organizations. Effectiveness of public participation initiatives in influencing public policy decisions and/or resolving environmental conflicts. Alternative approaches to consensus (policy dialogues, joint problem solving; strategic planning; negotiation, mediation) as well as litigation. Specific cases are critiqued and evaluated; conflict resolution skills are developed. Students observe and/or participate in ongoing local decision processes. Prereq: permission. Lab. Special fee.

NR 829 - Silviculture**Credits: 4**

The science and art of establishing, growing, and tending forests to meet multiple objectives. Basics of forest stand dynamics applied to the problems of timber management, wildlife habitat, water quality, and carbon sequestration. Prereq: NR 425 and NR 527 or permission. Special fee.

NR 830 - Terrestrial Ecosystems**Credits: 4**

Processes controlling the energy, water, and nutrient dynamics of terrestrial ecosystems; concepts of study at the ecosystem level, controls on primary production, transpiration, decomposition, herbivory; links to Earth-system science, acid deposition, agriculture. Prereq: forest ecology and introduction to botany or principles of biology, or permission.

NR 834 - Tropical Ecology**Credits: 4**

This course introduces students to the ecology of different tropical ecosystems, and involves students in analyzing and interpreting ecological field data and remotely sensed data. An important emphasis is to understand patterns and processes across scales - from individual plants to ecosystems and landscapes. The also addresses important global issues in the tropics, including climate change, land use change, diverse ecosystem services, and sustainable resource management.

NR #835 - Land Conservation Principles and Practices**Credits: 4**

Students gain practical knowledge, understanding and experience in land conservation planning and implementation of options for land protection based on current practice in New Hampshire. By interacting with practitioners, students learn what it takes to implement successful land conservation projects, and conservation stewardship requirements and practices. Permission. Special fee. Lab.

NR 836 - Tropical Ecology and Conservation**Credits: 4**

This intensive field course in Costa Rica introduces students to the science and practice of tropical ecology and conservation. The course includes visits to major tropical biomes, including cloud forest, rainforest, dry forest, and diverse arecosystems. A focus in on understanding how ecological information is scaled from trees to ecosystems and landscapes, and the impact of climate change and land management. Students conduct a project on a topic of interest, involving data collection, analysis, and interpretation. Special fee.

NR #838 - Wildlife Policy and Management**Credits: 4**

Local, regional, and national issues and strategies in policy and administration. Contemporary issues including land management, commercialization of wildlife, overpopulation, endangered species, wildlife diseases, and professionalism. Prereq: permission. Special fee. Lab.

NR 840 - Inventory and Montoring of Ecological Communities**Credits: 4**

Provides an introduction to the major concepts associated with monitoring change in ecological communities. Students develop an appreciation for such issues as: identification of appropriate baselines for comparison; use of indicator species; the tools used to inventory common, rare, and secretive species; how trend data are analyzed; and the implications of failing to detect an indicator species. Restricted to senior wildlife majors others by premission. Special fee. Lab.

NR 844 - Biogeochemistry**Credits: 4**

Examines the influence of biological and physical processes on elemental cycling and geochemical transformations from the molecular to the global scale, involving microorganisms, higher plants and animals and whole ecosystems; factors that regulate element cycles including soils, climate, disturbance and human activities; interactions among the biosphere, hydrosphere, lithosphere, and atmosphere; transformations of C, N, S, and trace elements. Prereq: one semester biology and two semesters chemistry or permission. (Also offered as EOS #844.)

NR 845 - Forest Management**Credits: 4**

Forest land ownership; management objectives; forest inventory regulation and policy; forest administration; professional responsibilities and opportunities. Restricted to Natural Resources majors. Lab. Special fee.

NR 849 - Forest Inventory and Modeling**Credits: 4**

Applied sampling and statistical techniques for assessing current forest conditions and predicting future growth, yield, and structure. Topics include plot and point sampling, ecological inventory, and evaluation of site quality and stand density. Prereq: MATH 420 and BIOL 528. Special fee.

NR 851 - Aquatic Ecosystems**Credits: 4**

Energy flow and nutrient cycling in streams, rivers and lakes, with an emphasis on understanding the control of primary productivity, decomposition and community structure by both hydrologic and biotic drivers. Role of aquatic ecosystems in carbon and nitrogen budgets at watershed, regional, and global scales. Impacts of environmental changes such as global climate change and suburbanization on aquatic ecosystems. Lab. Prereq: General Ecology.

NR 857 - Remote Sensing of the Environment**Credits: 4**

Practical and conceptual presentation of the use of remote sensing and other geospatial technologies for mapping and monitoring the environment. This course begins with the use of aerial photographs (photogrammerty, and photo interpretation) and includes measures of photo scale and area, parallax and stereo viewing, object heights, flight planning, photo geometry, the electromagnetic spectrum, camera systems and vegetation/land cover mapping. The course concludes with an introduction to other geospatial technologies including digital image analysis, global positioning (GPS), and geographic information systems (GIS). Conceptual lectures are augmented with practical homework assignments and hands-on lab exercises. Prereq: algebra. Special fee. Lab.

NR 859 - Digital Image Processing for Natural Resources**Credits: 4**

Introduction to digital remote sensing, including multispectral scanners (Landsat and SPOT) radar, and thermal imagery. Hands-on image processing including filtering, image display, ratios, classification, registration, and accuracy assessment. GIS as it applies to image processing. Discussion of practical applications. Use of ERDAS image-processing software. Knowledge of PCs required. Prereq: NR 857 or equivalent and permission.

NR 860 - Geographic Information Systems in Natural Resources**Credits: 4**

This course in geographic information systems (GIS), covers advanced theory, concepts, and applications of GIS for natural resource and related disciplines. Discussion of database structures, data sources, spatial data manipulation/analysis/modeling, data quality and assessment. Students conduct a project of their design exploring aspects of GIS most useful to them. Lecture emphasizes concepts and applications through a text and selected peer-reviewed articles. Lab uses the latest version of ArcGIS software and provides hands-on experience. Prereq: introductory GIS course. Permission required.

NR 861 - Environmental Soil Chemistry**Credits: 4**

Chemical transformations in soils are the basis for soil fertility and plant productivity in natural and managed ecosystems, and also influence key ecosystem processes including soil organic matter turnover and soil-atmosphere exchange of trace gases. This class will explore soil chemistry processes and transformations related to soil nutrient cycling, plant nutrient acquisition, and other critical environmental services. Prereq: a course in soil sience or instructor permission.

NR 882 - Forest Health**Credits:** 4

Forests cover over 30% of the land surface of the Earth and are incredibly important ecologically, economically, and to the health of the planet. While forests show great capacity to withstand disturbance, these ecosystems are increasingly threatened worldwide by climate change, native and introduced insects and disease, poor management practices, land clearing, drought, fire, and pollution. This course offers an overview of the dominant threats to forests, their causes and consequences, and options for monitoring, management, and mitigation. Special fee.

NR #883 - Forest Communities of New Hampshire**Credits:** 4

A hands-on field course designed to introduce students to the diverse forest community types of New Hampshire. Topics include: 1) field identification of forest types using different classification systems and keys; 2) identification of characteristic plant and animal species; 3) the roles of climate, geology, soils, natural disturbance, forest management, and biotic factors in determining forest community type; 4) primary and secondary succession, including old-growth. Prereq: One course in ecology or environmental biology or permission. Special fee.

NR 887 - Advanced Topics in Sustainable Energy**Credits:** 4

This course will engage students in advanced topics in sustainable energy. Course reviews basic structure of our energy system, energy markets and economics, and the environmental, economic and technological of our energy landscape. Focus will be on electricity and building use with introductions to the transportation system. Students will gain the knowledge to evaluate innovations in technology, policy and financing necessary to implement sustainable energy goals from conservation and efficiency to renewables and energy storage. Prereq: NR 507 or CHE 410 or POLT 444.

NR 897 - Special Topics**Credits:** 1-4

An experimental course for the purpose of introducing a new course or teaching a special topic for a semester in an area of specialization in natural resources. Permission required. Special fee on some sections.

NR 899 - Master's Thesis**Credits:** 1-10

Usually 6 credits, but up to 10 credits when the problem warrants. Cr/F.

NR 902 - Ecological Ethics and Values**Credits:** 4

Increasingly fundamental philosophical questions, including spiritual values questions, are posited concerning the ecological/environmental challenge of our time, its causes, and its resolution. Examination of these questions, put forth with ethics and values approaches. Students work to develop responses to both problem identification and resolution.

NR 903 - Approach to Research**Credits:** 2

Provides incoming graduate students with an overview of the scientific method, peer review, and various research approaches and methods. Ethics, institutional and individual responsibilities, and effective communication are also addressed in a seminar and discussion format. Cr/F.

NR 904 - Survey Research Methods**Credits:** 2

Theoretical foundations and practical considerations in conducting survey research. Methods for obtaining high-quality responses using current technology. Topics include questionnaire design, survey implementation, and strategies for reducing errors encountered in the conduct of surveys.

NR 905 - Grant Writing**Credits:** 2

The ability to secure financial support for research and outreach activities is becoming increasingly important. This course is intended for graduate and post-graduate level students who need to write proposals for their graduate work or to gain external funding from government agencies. Students will gain in-depth understanding of the proposal writing process through class discussions, insights shared by UNH faculty, and by writing a research proposal following the entire process.

NR 909 - Analysis of Ecological Communities and Complex Data**Credits:** 4

This course introduces you to a suite of tools appropriate for analyzing and interpreting multivariate data arising from agroecological (and other ecological) research. In this course we cover a variety of multivariate analyses, including clustering, ordination (principle components analysis, nonmetric multidimensional scaling, correspondence analysis), group comparisons (multi-response permutation procedures, PerMANOVA, indicator species analysis, discriminant analysis, mantel test), and other hypothesis-driven techniques, including structural equation modeling.

NR 910 - Forest Stand Dynamics**Credits:** 4

Discussion and presentation on forest dynamics to include soil-site quality evaluation, individual tree growth, stand growth and yield, stand and forest management, and related resource politics. (Not offered every year.)

NR 912 - Sampling Techniques**Credits:** 2-4

Techniques of sampling finite populations in environmental sciences; choice of sampling unit and frame, estimation of sample size, confidence limits, and comparisons of sample designs. Prereq: Applied statistics or equivalent. (Not offered every year.)

NR 913 - Quantitative Ecology**Credits:** 4

Applied quantitative techniques: basic concepts in probability and statistics applied to ecological systems; population dynamics; spatial patterns; species abundance and diversity; classification and ordination; production; and energy and nutrient flow. Prereq: calculus, statistics, and ecology. (Not offered every year.)

NR #915 - Coastal Challenges Sci-Policy**Credits:** 2

This seminar introduces TIDES students to the environment in which they will develop an understanding of the organization and workings of NOAA's Estuarine Research Reserve System, how this system serves the research needs of coastal communities and how the NERRS collaborate with other coastal and estuarine programs (e.g. Coastal Zone Management, National Estuarine Program), and develop strategies to solve coastal problems. The course involves field work at NERRS and other coastal areas in ME, NH and MA. Permission.

NR #916 - Linking Decision-making and Coastal Ecosystem Science**Credits: 4**

Integrating coastal ecosystem science, policy and management is the focus of this course, designed as an inquiry-based collaborative learning laboratory, with both classroom and field components. Students explore ways to effectively link knowledge to action(s) designed to address complex coastal and related watershed problems, including those related to climate change. We examine both theories and practices that are more likely to foster the production and use of salient, credible and legitimate knowledge that is trusted by scientists/technical experts, citizens and decision-makers and thus likely to meet the needs of and be used by the decision-makers. In addition to developing an understanding of criteria used to judge the adequacy of ecosystem-based knowledge and its relevance to support decisions, students are exposed to a range of models for analyzing complex problems, including the process of joint fact finding and other collaborative problem solving mechanisms. These are examined and tested by the students. Students develop specific problem assessment, communication, and process skills, and examine and evaluate a range of specific cases through in class simulations and practical applications relevant to real world initiatives. Original case studies of specific current coastal issues are undertaken to test their models. Permission required.

NR 917 - Coastal Ecosystem Science Policy and Management Internship**Credits: 6**

TIDES Program Internship is served at a National Estuarine Research Reserve, Coastal Community or NEP where TIDES program graduate student interns help facilitate collaborative learning and problem solving with scientists, decision-makers and coastal resource users, assist with information transfer, and help coastal communities plan for and protect coastal and estuarine related resources. TIDES M.S. students only.

NR 947 - Current Issues in Ecosystem Ecology**Credits: 2**

Examines current issues in ecosystem ecology and biogeochemistry by weekly discussion of primary research articles. Topics covered include elemental interactions in biogeochemical processes, mechanisms regulating nitrogen losses from terrestrial ecosystems, and hydrologic-chemical interactions in streams and groundwater. Cr/F.

NR 965 - Community Ecology**Credits: 4**

This course investigates how community properties -- species richness, and abundance distribution -- are influenced by evolutionary history, landscape phenomena such as dispersal and migration, and local factors such as the physical environment, disturbance, competition, predation, and positive interactions. Mechanistic models of community dynamics, including succession, are discussed. The influence of species diversity on ecosystem function is discussed, and all aspects of the course are related to conservation science.

NR 993 - Natural and Environmental Resources Seminar**Credits: 1 or 2**

Presentation and discussion of recent research, literature, and policy problems in the natural and social sciences influencing resource use. Cr/F.

NR 995 - Investigations**Credits: 1-4**

Investigations in Natural Resources may include topics in environmental conservation, forestry, soil science, water resources, and wildlife management. Permission required.

NR 996 - Natural Resource Education**Credits: 1**

Responsibilities include set-up, teaching, and grading of one lab section per week or equivalent lecture experience. Required of all M.S. degree students in the department. Cr/F.

NR 997 - Special Topics**Credits: 1-4**

An experimental course for the purpose of introducing a new course or teaching a special topic for a semester in an area of specialization in natural resources. Permission required. Special fee on some sections.

NR 998 - Directed Research**Credits: 1-4**

Student designs and conducts original research that culminates in a paper of publishable quality. Alternative to NR 899 for those choosing non-thesis degree option. Cr/F. IA (continuous grading). May be repeated up to a maximum of 4 credits.

Nursing (NURS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

NURS 806 - Clinical Inquiry**Credits: 4**

Theory course focuses on identifying problems and the role of the nurse in decision-making situations in nursing practice. Emphasizes using decision-making theories, patient education theories and practice, critical thinking, ethical concepts in decision-making, tools for organizing nursing information, and applying evidence based practice. In addition, learners are introduced to information management and nursing informatics as they apply to planning and delivery of nursing care. Prereq: majors only. Special fee.

NURS 807 - Pathophysiology and Pharmacology**Credits: 4**

Theory course focuses on concepts of human pathophysiology and pharmacology relevant to professional nursing practice. Physiologic response and manifestations of alterations in normal body functioning are analyzed. Pharmacological agents used for these alterations are examined. Application of concepts across the lifespan are incorporated through the discussion of pathophysiology and pharmacology. Provides the foundation for the clinical decision-making and management of care. In addition, learners are introduced to the professional nurse's responsibility for educating clients about basic pathophysiology and pharmacology issues. Nursing majors only.

NURS 810 - Families in Health and Illness**Credits: 3**

Seminar focusing on the family environment as a context for the experience of health and illness. Current middle-range theories and research from nursing and other disciplines analyzed for their application to family health. Public policy initiatives related to family health will be explored.

NURS 811 - Clinical Reasoning Through Simulation**Credits: 2**

The course further develops and refines critical thinking skills by student participation in clinical scenarios and de-briefings. Students prepare for the care of patients in a simulated environment, engaging in health assessment, psychomotor skills, pathophysiology, and implementing the nursing process, to develop a plan of care to encompass the QSEN competencies. Prereq: majors only. Special fee. Cr/F.

NURS 813 - Health Assessment and Clinical Nursing Theory**Credits: 4**

This course is designed to provide the student with evidence-based knowledge related to acquiring the psychomotor and assessment skills required for the safe delivery of nursing care to the adult client. Students develop foundational skills applicable to achieving program outcomes. The focus of the course will be on developing beginning health assessment, and clinical nursing skills while implementing critical thinking, and application of the nursing process, highlighting fundamental nursing concepts as they pertain to providing and improving client care.

Prereq: majors only. Special fee.

Co-requisite: NURS 813C

NURS 813C - Health Assessment and Clinical Nursing**Credits: 2**

Care of the adult clinical is designed to provide the student with the opportunities to apply the nursing process and clinical judgment within an acute care setting to clients with commonly occurring disease states and those undergoing surgery. The experience focuses on the application of knowledge and skills, evidence-based practice, clinical judgment and relationship-centered care. Prereq: majors only.

Co-requisite: NURS 813

NURS 825 - Collaborative Care I: Care of Older Adult**Credits: 3**

Theory course focuses on care outcomes for major functional and health transitions of older adults across health settings. Emphasizes nurse's advocacy in facilitating care collaboration based on informed practice utilizing current research and best practice models of care. Learners incorporate theories from nursing and other disciplines to achieve a broad perspective and understanding of the aging experience and cultural implications for nursing practice. Prereq: majors only.

NURS 826 - Caring for People with Severe and Persistent Mental Illness**Credits: 2**

This theory course is designed to provide an understanding of the neurobiological and psycho-social concepts of mental health and illness, factors influencing human behavior and interaction, current somatherapies, and the role of the psychiatric nurse as part of the interdisciplinary team. Previous course knowledge and communication skills provide a theoretical foundation in explaining, guiding, and predicting nursing action. Prereq: majors only.

Co-requisite: NURS 826C

NURS 826C - Caring for People with Severe and Persistent Mental Illness Clinical**Credits: 2**

This clinical course provides students with the opportunity to participate in collaborative and interdependent health care relationships with professional and paraprofessional mental health partners. A special focus is placed on the integration of personal knowledge, therapeutic use of self, and professional communication skills inherent in nurse-client relationships. Prereq: majors only.

NURS 827 - Collaborative Care III: Managing Acute and Complex Care of Individuals**Credits: 4**

In this theory course students develop the knowledge base to refine their clinical judgment and decision-making skills in care of individuals from diverse populations with acute, critical, and chronic illnesses. Focuses on illness management, health restoration, and risk reduction in prototypic health care problems. Focuses on nurses' ability to use leadership skills and concepts of care collaboration with clients, families, peers, and members of the health care team to maximize client outcomes. Care experiences primarily center on the acute care environment. Prereq: majors only.

Co-requisite: NURS 827C

NURS 827C - Collaborative Care III: Managing Acute and Complex Care of Individuals Clinical**Credits: 2**

In this clinical course students demonstrate the ability to apply knowledge to refine clinical judgment and decision-making skills while caring for individuals from diverse populations with acute, critical, and chronic illnesses. Focuses on illness management, health restoration, and risk reduction in prototypic health care problems. Focuses on nurses' ability to use leadership skills and concepts of care collaboration with clients, families, peers, and members of the health care team to maximize client outcomes. Care experiences primarily center on the acute care environment. Prereq: majors only.

Co-requisite: NURS 827

NURS 828 - Public Health Nursing**Credits: 3**

This course offers students the opportunity to engage in a public health project at the community and population level. Emphasis placed on the synthesizing concepts, theories, knowledge and practice from nursing, and public health sciences while engaging with the community to address a public health problem. Students demonstrate application of knowledge to the skills of community assessment, health promotion, health protection, illness prevention, and vulnerability from a public health nursing perspective. Prereq: majors only.

NURS 830 - Collaborative Care II: Childbearing and Childrearing Families**Credits: 4**

This theory course focuses on nursing care for young families throughout the childbearing and childrearing period. Health transitions and physical alterations are examined. The health needs of the family are discussed in terms of major morbidity/mortality and contemporary issues. This course integrates theories of growth and development, pathophysiology and use of decision making models. Prereq: majors only.

Co-requisite: NURS 830C

NURS 830C - Collaborative Care II: Childbearing and Childrearing Families Clinical**Credits: 1**

This clinical course focuses on nursing care for families throughout pregnancy, birth, and child-rearing periods. Healthy transitions and physical alteration occurring from conception through adolescence are examined. This course integrates clinical opportunities in a variety of clinical settings to provide opportunities for the development of the nurse generalist role. Prereq: majors only.

Co-requisite: NURS 830

NURS 894 - Special Topics**Credits: 1-4**

Formal course given on selected topics or special interest subjects. Several topics may be taught in one year or semester. Prereq: permission. May be repeated. Special fee on some sections.

NURS 894T - Special Topics/Study Away**Credits:** 1-4

Study Away. Special fees. Permission required.

Co-requisite: INCO 589**NURS 899 - Master's Thesis****Credits:** 1-6

Prereq: permission. May be repeated up to a maximum of 6 credits. Cr/F.

NURS 901 - Health Policy**Credits:** 3

Emphasizes identification of emerging issues that have an impact on the health care system and nursing in providing leadership to address these issues. Students analyze problems and process solutions from a nursing perspective with reasoned approach to their resolution. Prereq: majors only.

NURS 902 - Advanced Physical Assessment**Credits:** 2

This course focuses on providing the student with the knowledge and skills to perform a comprehensive health assessment. Emphasis is placed on physical, psychosocial, and cultural assessment necessary to perform a high quality health history, review of systems, and head-to-toe comprehensive physical exam for clinical decision making that can be communicated in both written and oral form to members of the multi-disciplinary health care team. The course builds on knowledge of anatomy, physiology, and pathophysiology. Prereq: Majors only.

NURS 907 - Advanced Pharmacology**Credits:** 3

This course focuses on concepts of pharmacology including pharmacotherapies, pharmacodynamics, and pharmacokinetics necessary for prescriptive authority for the advanced practice nurse in primary care. Prereq: majors only.

NURS 908 - Advanced Pathophysiology**Credits:** 3

The course examines normal physiologic and pathologic mechanisms of disease that serve as the foundation for clinical assessment, decision making, and management. Prereq: majors only.

NURS 909 - Advanced Health Assessment and Diagnostic Reasoning**Credits:** 3

This course is designed to cover communication skills, comprehensive history-taking techniques, advanced physical examination skills, screening/diagnostic testing, and diagnostic reasoning skills required in advanced nursing practice. The focus is on developing these skills from an evidence-based, culturally responsive perspective. Prereq: majors only. Special fee.

NURS 925 - Health Care Systems and Leadership**Credits:** 3

This theory course emphasizes the use of systems thinking and systems theory as a guide for analyzing and improving health systems. Careful consideration is given to the complex challenges of achieving quality care delivery and quality health outcomes for aggregates within specific environments. Course contents include systems theory, health systems analysis, shaping care delivery, research utilization, ethics, and leadership. Course fosters student integration of knowledge in preparation for clinical nursing leadership responsibilities. Prereq: majors only.

NURS 935 - Primary Care of Families I**Credits:** 3

This course covers ethical decision making and evidence-based primary care management of healthy adults through the lifespan with a focus on health maintenance and disease prevention. It focuses on evaluation and management of common acute and chronic health care problems and the many ethical issues in healthcare. Major causes of adult morbidity are covered. Prereq: majors only. Special fee.

Co-requisite: NURS 936**NURS 936 - Practicum in the Primary Care Families I****Credits:** 3

This clinical course provides supervised clinical experience in the primary care management of families through the lifespan including assessment and management of common acute and chronic health issues. Students focus on the clinical application of knowledge of health maintenance, disease prevention and the evaluation and management of major causes of morbidity and mortality. Prereq: majors only. Special fee.

Co-requisite: NURS 935**NURS 937 - Primary Care of Families II****Credits:** 3

Lecture/discussion course covering the primary care management of children across the health-illness continuum, including assessment and management of common acute and chronic clinical problems. A developmental perspective is taken to examine child-health evaluation and maintenance from infancy through adolescence. Prereq: majors only.

Co-requisite: NURS 938**NURS 938 - Practicum in the Primary Care of Families II****Credits:** 3

Supervised clinical experience in the primary care management of the child and adolescent, including assessment and management of common acute and chronic clinical problems. A family-centered developmental perspective is taken to provide child-health services from infancy through adolescence. Nursing care, family, and rehabilitation issues related to various health problems are investigated in practice. Prereq: majors only.

Co-requisite: NURS 937**NURS 939 - Seminar and Practicum in the Primary Care of Families III****Credits:** 6

Final integrative clinical course that allows for intensive application of primary care knowledge and skills in practice. Seminar allows for in-depth analysis of various clinical problems, scope of practice and professional role issues. This course provides students the opportunity to develop objectives for their own learning experiences in order to complete their individual achievement of the family nurse practitioner expected outcomes. The course provides the opportunity for extensive clinical experience under the guidance of a preceptor. Prereq: majors only. Special fee.

NURS 944 - Population Health Promotion and Risk Reduction**Credits:** 3

Students examine the theoretical and empirical bases for health promotion and risk reduction assessment and interventions to improve population health outcomes. International and national health objectives provide the organizing framework for the consideration of health behaviors. Health promotion and risk reduction are examined within an ecological perspective, including critical social, political, racial/ethnic, cultural and economic environments. Students examine issues that impact individual, family, and community wellness throughout the lifespan. Prereq: majors only.

NURS 951 - Clinical Epidemiology and Decision Analysis**Credits:** 3

This theory course provides an in-depth study and application of methods and tools used to guide clinical nursing leader's decision-making under conditions of uncertainty. Prereq: majors only.

NURS 952 - Clinical Nursing Leadership I**Credits:** 2

This seminar course focuses on the integration of systems thinking when engaging in clinical nursing leadership and the application of systems theory in analyzing dynamic health systems. Emphasizes the developing leadership role at the micro-system level and with an aggregate focus (e.g., long term care; community/public health agencies; ambulatory care clinics; health centers; schools; and acute care settings). Seminars focus student reflection on leadership experiences and emerging issues in health systems, professional development and collegiality. Prereq: majors only.

Co-requisite: NURS 952C**NURS 952C - Clinical Nursing Leadership Clinical****Credits:** 6

This clinical course focuses on the integration of systems thinking when engaging in clinical nursing leadership and the application of systems theory in analyzing dynamic health systems. This course immerses the student in a clinical microsystem to facilitate the development of the clinical nurse leader role with an aggregate focus (e.g., long term care, community/public health agencies; ambulatory care clinics; health centers; schools; and acute care settings). Prereq: majors only. Special fee.

Co-requisite: NURS 952**NURS 953 - Promoting Quality Management****Credits:** 3

This course focuses on frameworks for the collection and analysis of quality data. Students are introduced to the creation and execution of action plans for quality improvement at the microsystem level. Changing processes, structures and outcomes using data are emphasized. Prereq: majors only.

NURS 955 - Practicum in Advanced Nursing Practice**Credits:** 3-12

Students acquire the specialty knowledge and skills required in the area of their master's study. Students work with their faculty mentor to propose performance competencies, learning activities, settings, and resource persons for this supervised practicum. Practicum must include a minimum of 112 hours of supervised practice. May be repeated. Must hold RN license in state of practicum. Prereq: majors only. Special fee.

Co-requisite: NURS 956**NURS 956 - Capstone Project Seminar****Credits:** 3

This seminar course requires students to focus on nursing practice issues and to work as individuals or groups to develop solutions. As the capstone course for the evidence-based nursing track, the students are required to complete this scholarship project under the direction of a faculty member. Must hold RN license in state of project. Prereq: majors only.

Co-requisite: NURS 955**NURS 958 - Clinical Nurse Leader Capstone****Credits:** 6

This 6 credit capstone (200 hour) course requires students to complete a scholarly project that defines and/or implements strategies that will address/resolve a substantive nursing practice issue that impacts the quality and safety of patients. As the capstone course for the clinical nurse leader nursing track, the students are required to complete and present this scholarship project under the direction of course faculty and masters-prepared preceptor in the clinical agency. Prereq: majors only, all previous nursing courses in the CNL track. Pre- or Coreq: NURS 901. Special fee. Cr/F.

NURS #961 - Evolution of the Doctor of Nursing Practice**Credits:** 1

This course provides the background of the evolution of the DNP role and the four role components of practitioner, educator, clinical scientist, and clinical manager. The essentials of DNP practice are examined for an understanding of the expectations and resources required for DNP practice.

NURS #962 - Science of Advanced Nursing Practice**Credits:** 3

This course engages the students in the analysis of philosophical and theoretical perspectives of the discipline of nursing. Paradigms in nursing are examined in relation to advanced nursing practice. Through critical inquiry, theories and empirical evidence are synthesized in order to translate, integrate and disseminate knowledge across disciplines. Advanced nursing practice is studied in the context of complex, clinical, business, ethical and systems issues.

NURS 963 - Advanced Clinical Epidemiology**Credits:** 3

Epidemiologic research and concepts are synthesized and applied to clinical and population based health to identify and analyze the determinants of health, health promotion and risk reduction strategies, and to evaluate the distribution of health conditions. Epidemiological and biostatistical approaches are used to analyze population data to better understand determinants of health and illness. Prereq: majors only or permission. No credit earned if credit received for NURS 951.

NURS 964 - Technology and Health Care**Credits:** 3

This course provides students with essential knowledge and skills to utilize information systems/technology to improve and transform health care systems. Students analyze information requirements, design system alternatives, and consider the management of resources. The evaluation of the effectiveness of clinical and/or management information systems in health care is considered. The course examines the resources and methods required to apply technology to enhance health care delivery and provide leadership within health care systems.

NURS 965 - Organizational Leadership**Credits:** 3

This course focuses on the organization and systems leadership to improve population health. Emphasis is placed on the strategies used in needs assessments and implementation of effective health care programs, policies, and interventions. The advanced nursing professional is prepared to respond to current realities and provide enhanced leadership for future health policy development and professional practice. Prereq: majors only or permission.

NURS 967 - Evidence Synthesis**Credits:** 3

This course engages the student in the analysis of sources of evidence available for clinical decision making. Guidelines and systematic reviews are developed and examined for application to advanced nursing practice. Prereq: graduate level course in research.

NURS 968 - Nursing Science and Evidence Based Practice**Credits:** 3

This course focuses on knowledge acquisition of nursing science, nursing theorists, borrowed theorists, and the use of evidence knowledge. Through a process of selective review and critical evaluation, students examine the current literature and explore the issues and trends in the current research in the discipline of nursing. Emphasis is on the critique of research findings and application of research to clinical practice and advanced nursing knowledge. Learners analyze conceptual and theoretical perspectives specific to advancing nursing practice. The processes of creating theory based practice guidelines will be explored. Emphasis on creating strategies for making theory based practice a reality. Prereq: majors only.

NURS 969 - Health Policy and Finance**Credits:** 3

This course provides knowledge and understanding needed to participate in health policy development, analysis and implementation. The impact of policies on the delivery of health care and nursing services will be explored. The relationship of health policies to the financing of health care will be presented. Students will be introduced to health economics with a focus on the elements of financial management including the language and basic concepts of cost, the budgeting process and systems of reimbursement. Global, national, state, and local systems of financing health care will be compared. Prereq: majors only.

NURS 970 - Clinical Practicum for Advanced Practice Nurse**Credits:** 2

This clinical practicum is designed to provide the student with the opportunity to implement the role of the advanced practice nurse while under the supervision of other health care professionals in practice. Student will focus on clinical application of knowledge in a self-designed practicum. Student may complete up to 250 clinical practicum hours in this course, and may repeat this course one time. Prereq: majors only. Cr/F.

NURS #971 - Data Analysis I: Qualitative Methods**Credits:** 1

This course includes the application of qualitative data analysis to advanced clinical practice, including skill building in thematic analysis. Selected qualitative research designs are presented and the philosophical underpinnings and specific data collection and analysis methods associated with each design are identified, discussed, compared, contrasted and analyzed. Students identify a method of qualitative analysis to interpret focus group data.

NURS 972 - Data Analysis: Quantitative Methods**Credits:** 3

This course includes the application of quantitative data analysis to advanced clinical practice. Topics include descriptive and graphical statistical methods, confidence intervals, hypothesis testing, regression, ANOVA, statistical process control, failure modes and effects analysis, Six-Sigma concepts and methods, quality tools, process capability studies, Lean methodology and measurement system analysis. Use of a statistical software package is an integral part of the course. (Also listed as MATH 837).

NURS 973 - Health Care Quality**Credits:** 3

This course prepares the advanced practice nurse with the knowledge, theory and organizational science concepts necessary to design and evaluate performance improvement in health care organizations related to quality and safety. The role and requisite competencies of the DNP in leading innovative quality and safety initiatives are addressed.

NURS 974 - Organizational Behavior**Credits:** 3

This course is an exploration of organizational behavior theories and applications designed to improve the student's understanding of human behavior in organizations. The focus is on the development of strategies for managing behavior in ways that serve both employee and organizational goals while promoting health care concerns.

NURS 975 - Psychotherapeutic Frameworks and Modalities**Credits:** 3

Clinical seminars and didactic sessions provide an overview of major concepts, theories, and research related to psychotherapeutic treatments for mental disorders across the lifespan. Integration of psychotherapeutic treatment planning and the application of evidence-based brief psychotherapies for the treatment of particular disorders, symptoms and issues are examined. Prereq: majors only.

Co-requisite: NURS 976**NURS 976 - Psychiatric Mental Health Nurse Practitioner Practicum I****Credits:** 3

Clinical training in the full role of the psychiatric mental health nurse practitioner emphasizes integration of two content areas: the knowledge and skills for PM-MHNP practice; and the specific mental health needs. Clinical experiences, lectures, case discussions, and projects allow students the opportunity to develop competencies in the ethical, safe, collaborative, and evidence-based provision of mental health. Minimum of 250 clinical hours. Prereq: majors only. Special fee. IA (continuous grading).

Co-requisite: NURS 975**NURS 977 - Neurobiology of Mental Disorders****Credits:** 2

This online course builds on the NP's fundamental knowledge of anatomy, physiology, and pathophysiology, focusing on major mental disorders across the lifespan. Disorders are examined including various factors such as developmental, genetic, injury, trauma, infection, degeneration, and substance use disorders. Complex networks necessary for maintaining homeostasis within the brain and between the brain and body are examined in relation to these disorders. Prereq: majors only.

NURS 978 - Clinical Psychopharmacology**Credits:** 2

This online course provides the NP an overview of the principles and best practices for using psychopharmacology to treat mental disorders across the lifespan. Clinical uses, neuro-pharmacological mechanisms, risks, benefits, and outcomes of commonly used psychotropic drugs in the context of a comprehensive treatment plan are explored. Majors only.

NURS 980 - Doctoral Scholarly Project I**Credits:** 3

This course focuses on models and methods of translating evidence into practice, including synthesis of evidence, program planning and evaluation, and preparation of an evidence-based research proposal. Students lay the foundation for their DNP Scholarly Project and may begin their 500 required clinical hours. Prereq: majors only. Cr/F.

NURS 981 - Doctoral Scholarly Project II**Credits:** 3

This course encourages further exploration and analysis of the selected client, population, and/or system. Students use their own evidence-based analysis and data from either clinical practice and/or epidemiological studies to guide the design and implementation of the practice dissertation including human subjects review, intervention and analysis. The course includes a clinical practice immersion in the DNP role. Prereq: NURS 980. Cr/F.

NURS 982 - Doctoral Scholarly Project III**Credits:** 3

This final course focuses on interpretation and presentation of findings of the DNP Project and a clinical immersion. Students identify additional goals and activities to meet the minimum requirement of 500 practicum hours. Prereq: NURS 981.

NURS 984 - Differential Diagnosis of Mental Disorders**Credits:** 3

The NP will develop advanced skills for the differential diagnosis of mental disorders by expanding observational and interviewing skills, and the use and interpretation of screening tools, laboratory tests, and behavioral assessments. Clinical seminars and didactic sessions are based on the most current edition of the Diagnostic and Statistical Manual for Mental Disorders V (DSM 5) and other appropriate methodologies for diagnosis. Majors only.

Co-requisite: NURS 985**NURS 985 - Psychiatric Mental Health Nurse Practitioner Practicum II****Credits:** 3

Clinical II expands training in the full role of the psychiatric mental health nurse practitioner with emphasis placed on the integration of content areas to advance competencies in the ethical, safe, collaborative, and evidence-based provision of mental health. Minimum of 250 clinical hours. Majors only. IA (continuous grading).

Co-requisite: NURS 984**NURS 996 - Independent Study****Credits:** 1-3

Opportunity for study and/or practice in an area of choice. Objectives are developed by students and must be approved by faculty. May be repeated. Prereq: permission.

Nutrition (NUTR)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

NUTR 800 - Career Development in Dietetics**Credits:** 1

Preparation for applying to dietetic internship programs and/or graduate school. Topics include writing resumes and personal statements, interviewing, professional skills, and navigating the online internship application.

NUTR 809 - Nutritional Epidemiology**Credits:** 4

This course introduces basic concepts and methods in key areas of nutritional epidemiology, and discusses practical considerations related to designing, analyzing, and evaluating population-based nutrition studies. Research methods used in nutritional epidemiology will be taught to provide students with the ability to critically evaluate the nutritional epidemiological evidence. Learning will be enhanced by practical experiences in the collection, management, and analysis of nutritional epidemiological data during lab and in-class activities. Prereq: an introductory nutrition course and statistics course. Permission required.

NUTR 820 - Community Nutrition**Credits:** 4

Identification of causes of complex public health nutrition problems (such as food insecurity and escalating obesity rates) and cost-effective community-based interventions required to solve them. Provides skills and tools needed to assess design and evaluate community nutrition and wellness interventions. Prereq: NUTR 400 or equivalent.

NUTR 829 - Dietetics: Intro to Dietetics Principle and Practice**Credits:** 2

Dietetics professionals are engaged in multiple arenas that demand familiarity with community food access, public health, food system challenges and health care practices. Resources and strategies to identify reliable sources of information, critical thinking skills, professional development and professional standards of behavior will be considered throughout the course. Simulation and extensive practicum-based training are critical components of this course as students prepare for extensive practicum placements in food service, community and clinical care settings. Prereq: Must be an MSDI student.

NUTR 830 - From Seed to Sea: Examining Sustainable Food Systems**Credits:** 4

Integration of diverse human and natural system interactions in a seminar-based course to understand issues in food system sustainability. Examination of food system structure and function from coupled human and natural systems perspective. Current and topical issues of food and agriculture include: exploration of using natural resources to meeting growing population demands; conflicting views on meeting food and nutrition requirements; impacts of increased stress on natural resources; inequities and discrimination in the food system; impact on dietary guidelines on the environment. Prereq: introductory nutrition course or by permission.

NUTR 836 - Sustainable Food Systems and Culinary Arts Practicum**Credits:** 3

The Sustainable Food Systems and Culinary Arts experience is designed to provide both theoretical and practical information that builds upon core values of population and planetary health. Students will use a food systems lens to review food costs, evaluate food access and food security, consider the role of culture and place in food selection and conduct nutrient analysis. They will expand their culinary skills, while integrating knowledge of local, organic and sustainable food concepts. Prereq: MSDI student or instructor permission.

NUTR 840 - Nutrition for Children with Special Needs**Credits:** 4

Nutritional assessment and care of children with special needs resulting in feeding difficulties requiring medical nutrition therapy. Prereq: NUTR 400.

NUTR 850 - Nutritional Biochemistry**Credits:** 4

Digestion, absorption, transport, and utilization of food nutrients. Role of macro- and micro-nutrients as substrates and catalyst for metabolic pathways, and the role of these pathways in maintaining human health at the cellular, organ and whole-body levels. Prereq: two semesters anatomy and physiology; one semester biochemistry; or equivalents.

NUTR 851 - Nutritional Biochemistry of Micronutrients**Credits:** 4

Investigation of the nutritional and biochemical aspects of micronutrient metabolism. All essential vitamins and minerals, as well as some phytonutrients and quasi-nutrients are explored in depth. Nutrients are examined for their molecular, cellular, and metabolic and biomedical functions, as well as the biochemical and clinical consequences of their deficiency or excess. Prereq: NUTR 850 or equivalent.

NUTR 855 - Treatment of Adult Obesity**Credits:** 4

Overview of the risk factors associated with obesity; evidence-based recommendations for assessment and treatment of obesity. Counseling skills important to successful weight management and non-diet approaches are also explored.

NUTR 865 - Geriatric Nutrition**Credits:** 4

Overview of the physiological changes associated with aging and their impact on preparing, consuming, digesting, absorbing, and metabolizing food. Role of routine nutritional assessment in the promotion of health to prevent and manage chronic disease, with a social focus on the influence of polypharmacy on nutritional status. Prereq: an introductory nutrition course; a life cycle nutrition course.

NUTR 873 - Clinical Nutrition**Credits:** 4

Principles and mechanisms of disease that result in altered nutrient requirements in humans. Prereq: one semester introductory nutrition; two semesters anatomy & physiology; one semester biochemistry.

NUTR 875 - Practical Applications in Medical Nutrition Therapy**Credits:** 4

Combination of lecture and supervised practical experience in medical nutrition therapy in a New England hospital. Emphasizes nutritional counseling, assessment, and instruction of patients with nutrition-related disorders.

NUTR 876 - Advanced Pathophysiology and Clinical Care**Credits:** 4

Designed to integrate scientific principles and clinical knowledge with emphasis on clinical decision-making related to providing optimal nutrition care. Course will emphasize understanding the pathophysiology of diseases and mastery of their nutritional implications and interventions. Students build and expand on knowledge and emphasize applications into their clinical care process. Active participation in lecture discussions and lab simulation is an integral part of class. Prereq: NUTR 773/NUTR 873, NUTR 775/NUTR 875, NUTR 750/NUTR 850.

NUTR 880 - Critical Issues in Nutrition**Credits:** 4

Critical review and analysis of controversial topics in nutrition; emphasis on developing oral and written communications skills and critical thinking skills. Prereq: NUTR 873 or permission.

NUTR 895 - Investigations**Credits:** 1-4

Prereq: permission.

NUTR #898 - Nutrition Research Experience**Credits:** 4

Students develop a project of interest and identify a mentor within the department to advise them throughout the project. Students prepare a project proposal for review. Final paper and presentation. May be repeated up to a maximum of 4 credits.

NUTR 899 - Master's Thesis**Credits:** 1-6

Graduate students must enroll for a total of 6 credits for this course. Students may enroll in 1-6 credits per semester. Permission required. Cr/F.

NUTR 900 - Contemporary Topics in Animal, Nutritional, and Biomedical Sciences**Credits:** 1

An informal forum for graduate students to gain experiences in evaluating the current literature of a contemporary topic. (Also offered as ANSC 900.) May be repeated for a maximum of 2 credits. Offered both fall and spring semesters. Cr/F.

NUTR 930 - Diet: Foodservice and Community**Credits:** 6

Pre-professional work experiences with continued examination and application of theory and practice in the dietetic profession. Concepts include foodservice management topics such as facility and human resources management, translation of nutrition into foods/menus, procurement, distribution and service within delivery systems, and food safety and sanitation. Community nutrition topics include nutrition screening and assessment, nutrition counseling and education, food security and sustainability, program development and evaluation, as well as exploration of health promotion and disease prevention theory and application. Assignments and supplemental reading reinforce practicum experiences. Practicum experience (500-600 hours) is integrated into the course design. Prereq: Permission and NUTR 929 and/or NUTR 931. Special fee.

NUTR 931 - Dietetics: Clinical Theory and Practice**Credits:** 6

Integration of clinical theory and practice in dietetics care. Bi-weekly seminars, on-line assignments and supplemental readings provide a mechanism to examine the nutritional basis of diet and disease relationships and consider appropriate nutritional interventions. Clinical rotations (500-600 hours) provide the opportunity to explore the application of nutritional science principles and practices within inpatient and outpatient environments. Staff responsibility, coupled with an in-depth case study presentation of a current patient with multiple nutrition risk factors, serves as the capstone practicum project. Prereq: Permission and NUTR 929 and/or NUTR 930. Special fee.

NUTR 955 - Topics in Human Obesity**Credits:** 4

Various topics related to obesity are discussed from year to year. Topics include: neuroregulatory and hormonal mechanisms; role of diet, exercise and energy metabolism, fat as an endocrine organ; obesity, immune function and chronic disease.

NUTR 960 - Research Methods in Nutritional Science I**Credits:** 4

Course is designed to provide students with an understanding of research methods, terminology, and improved ability to be consumers of research literature, and the skills necessary to conduct applied nutrition research studies (e.g. writing a research proposal, interpreting research results and critically evaluating research), as well as communicate scientific information (research presentation). Students will gain experience with data collection methodologies relevant to human nutrition.

NUTR 961 - Research Methods in Nutritional Science II**Credits:** 4

Course is designed to provide students with an understanding of research methods, terminology, and improved ability to be consumers of research literature, and the skills necessary to conduct applied nutrition research studies (e.g. writing a research proposal, interpreting research results and critically evaluating research), as well as communicate scientific information (research presentation). Students will gain experience with data collection methodologies relevant to human nutrition. Prereq: NUTR 960.

NUTR 995 - Non-thesis Investigations**Credits:** 1-4

Advanced investigations in a research project, exclusive of thesis project. Elective only after consultation with the instructor. May be repeated for a maximum of 4 credits. (Offered both fall and spring semesters.)

Occupational Therapy (OT)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

OT 810 - OT Practice and Professional Roles**Credits:** 3

Students are introduced to foundation knowledge, values and philosophy of occupational therapy practice. Students learn skills to apply professional behaviors and skills required to be ethical practitioners. They learn about various practice settings and systems within which occupational therapists practice to prepare them to begin to make decisions regarding their fieldwork site selections. They are introduced to models of OT practice. Only open to OT majors. Special fee.

OT 822 - Introduction to Assistive Technology**Credits:** 4

This hands on course will provide participants with an overview of the application of assistive technology in all life settings for individuals affected by physical, sensory, or cognitive limitations. Methods, materials, and resources for obtaining and providing assistive technology services will also be discussed. Special fee.

OT 824 - Assistive Technology and Physical Disabilities**Credits:** 4

An advanced course that focuses on the specialized assistive technology needs of persons with physical impairments. Topics include: seating and positioning needs; prosthetic devices; manual and powered mobility devices; ergonomics and computer access. Special fee.

OT 826 - Assistive Technology and Sensory, Communicative, and Cognitive Disabilities**Credits:** 4

Explores the application of various technologies for individuals with visual, auditory, cognitive and communication impairments. Included are: Blind and low vision aides, assistive listening devices, alternative and augmentative communication devices, memory aides, and prompting aides. Special fee.

OT 830 - Assistive Technology for Enhancing Occupational Performance**Credits:** 3

This course provides instruction on how occupational therapy practitioners use and apply assistive technology in the context of client evaluation and intervention, to improve quality of life and functional capacities. Students learn and apply clinical reasoning skills related to selection, procurement, modification and training in the use of assistive technology solutions.

Co-requisite: OT 830L**OT 830L - Assistive Technology for Enhancing Occupational Performance Lab****Credits:** 2

Co-Requisite Laboratory for OT 730/830 Assistive Technology for Enhancing Occupational Performance. Students are provided hands-on learning experiences regarding the fabrication, identification, adaptation and training in the use of assistive technology for individuals with functional problems associated with disability or impairment. OT evaluation and interventions related to the application of assistive technology are addressed.

Co-requisite: OT 830**OT 831 - Introduction to Assistive Technology Principles****Credits:** 2

This course presents an overview of the various assistive technology service delivery models, assessments tools, legislation, funding, and assistive technology across the lifespan.

OT 832 - Introduction to Assistive Technology Practices**Credits:** 2

This course provides an overview of various service delivery models and teaches students how to create and modify devices. Students will conduct device demonstrations, training, reuse, and repair while acquiring skills using various fabrication tools, materials and techniques. Students will receive a materials kit they will use to fabricate eight assistive technology solutions. They will also be required to submit video clips and photos demonstrating their skills providing device demonstrations, loans and customer training.

OT 833 - Assistive Technology and Physical Disabilities for Electronic Devices**Credits:** 2

This course focuses on switch and computer access solutions; programming switch interfaces for computers and iPads; alternative mice and keyboards; switch access recipes; iPad mounting solutions; electronic aids for daily living, voice controlled solutions for the phone, computer, and activation of household appliances. Students will learn how to make, modify, and mount various switches and electronic devices. Intensive hands-on AT exploration will be completed on campus or virtual evidence provided will be accepted.

OT 834 - Assistive Technology and Physical Disabilities for the Home, Community and Employment**Credits:** 2

This course focuses on assistive technology solutions to maximize independence at home, in the community, and on the job for individuals who experience physical disabilities. Students will acquire skills in conducting accessibility assessments. Topics explored include wheelchair seating and mobility; ergonomic hand tools; independent living aids; ramps and lifts; vehicle modifications; and modifications for canes, crutches, walkers, and wheelchairs. Intensive hands-on AT exploration will be completed on campus or virtual evidence provided will be accepted.

OT 835 - Assistive Technology for Communication and Cognitive Impairments**Credits: 2**

This course focuses on alternative and augmentative communication devices and devices that benefit individuals who experience cognitive impairments. This course explores assistive technology solutions for note taking, devices and apps for self-regulation, organization, and reminders. Students will learn how to conduct cognitive demand analysis for devices and apps to help users select appropriate accommodations and assistive technology solutions. Intensive hands-on AT exploration will be completed on campus or virtual evidence provided will be accepted.

OT 836 - Assistive Technology and Vision and Hearing Impairments**Credits: 2**

This course focuses on assistive technology for blind and low vision; deaf and hard of hearing; and deaf/blindness. Students will use an assortment of magnification devices; amplification systems; and assistive listening devices as well as learn how to create a variety of approaches to accommodate for vision and hearing impairments. Intensive hands-on AT exploration will be completed on campus or virtual evidence provided will be accepted.

OT 841 - Human Occupation**Credits: 4**

This course introduces students to the broad concept of occupation by exploring ways people acquire skills for occupational performance. Students develop an understanding of the relations between health and occupation, disability and occupation, and explore how humans find meaning in their lives, through occupational engagement. This course is writing intensive.

OT 844 - Fieldwork and Professionalism - Level 1**Credits: 1**

This course prepares students to enter level 1 fieldwork with confidence and working knowledge of expectations for a full-time two-week level 1 fieldwork experience. Cr/F.

OT 845 - Administration and Management for Occupational Therapy Practice**Credits: 3**

This course aims to increase the student's understanding of systems of practice, and to business fundamentals associated with occupational therapy service delivery. Specific topics covered include and analysis of practice settings, reimbursement, supervision of professional and non-professional staff, program evaluation methods, ethics, OT management practices, marketing, health policy including medicare, Human Rights and Education Legislation, and the impact of policy decisions for the delivery of OT services. OT and OT Asst Tech Certificate majors only.

OT 846 - Transitions: Student to Professional**Credits: 2**

This course is designed to help occupational therapy students explore role changes involved in leaving the academic world and entering the larger realm of professional and practice settings. Research on professional development indicates this transition is easier when students are prepared in both personal and institutional domains. Through lecture, presentations, small group work, readings, and written assignments students are given opportunities to analyze factors that contribute to successful professional development and ethical practice. Students use the results of their analyses to plan their individual transitions to fieldwork and entry-level practice. Prereq: OT 892; second semester standing in first year of MS program.

OT 851 - Mind Body Systems/Neurologically-based Function and Dysfunction**Credits: 3**

Students study most significant occupational-related disorders commonly seen by occupational therapists. A self-directed method is used to examine the perceptual, cognitive, biopsychosocial basis of these disorders. A basic overview of human body-mind systems is provided with an emphasis on pathology, the recognition of symptoms, their causes and the occupational implications of the disorders. The course is a prerequisites for courses in specific occupational therapy assessment and intervention.

OT 852 - Human Movement and Environmental Effects on Everyday Occupations**Credits: 3**

Students will integrate their prerequisite knowledge of occupation. The course will develop skills required for interpretation of biomechanical analysis for creating successful occupational performance for individuals with varied musculoskeletal, cardiac, and respiratory dysfunction. Integration of the occupational therapy clinical reasoning process and the use of occupations as a therapeutic mechanism for change will be emphasized. The analysis of environment as it relates to human movement and participation in desired occupations will be explored. Special fee.

Co-requisite: OT 852L**OT 852L - Human Movement and Environmental Effects on Everyday Occupations Lab****Credits: 1**

Lab. OT majors only. Special fee. Cr/F.

Co-requisite: OT 852**OT 853 - Mind Body Systems: Neurologically-based Function and Dysfunction--Pediatric Conditions****Credits: 4**

This course is the first course in a two-part sequence that uses a life span approach, drawing on occupational science perspectives to study conditions diagnosed during childhood (birth through age 20). The emphasis is on the interaction of the individual (the mind), the body and the psychosocial environment as related to occupational performance. Students will work in pairs to examine selected disorders, and will further develop their presentation skills. This course is a prerequisite for courses in occupational therapy assessment and intervention in pediatric practice. Prereq: KIN 706.

OT 854 - Level II Fieldwork, I**Credits: 8**

This course is a 12-week, full-time internship that takes place after completion of the first graduate year, either in the summer or the fall. Level II fieldwork provides students with opportunities to: experience in-depth delivery of occupational therapy services to clients; focus on the application of purposeful and meaningful occupation and/or research, administration and management of occupational therapy services. Level II fieldwork is designed to promote clinical reasoning and reflective practice, to transmit values and beliefs that promote ethical practice and to develop professionalism and competence as career responsibilities. OT majors only. Cr/F.

Co-requisite: OT 855

OT 855 - Level II Fieldwork Discussion**Credits: 1**

OT 855 Level II Fieldwork, I, online discussion is a co-requisite course that accompanies OT 854 and OT 856: Level II Fieldwork. Students respond to instructor-lead discussion prompts as well as to postings of their classmates. The online discussion provides the opportunity for students to relate fieldwork experiential learning to all areas of UNH coursework including: mind-body systems, health-and-human systems of care; assessment; intervention; documentation; evidence-based practice; client-centered and occupation-centered practice; and application of research to practice. Students engage in on-going discussion about professional identity and the transition from student to professional as they describe and discuss fieldwork challenges and successes across a variety of practice settings. Cr/F.

Co-requisite: OT 854

OT 856 - Level II Fieldwork, II**Credits: 8**

This course is the second 12-week, full-time internship. It takes place after two semesters in the second graduate year. OT 856 provides students with opportunities to evaluate, develop and implement in-depth delivery of occupational therapy services in population-based practice and to focus on research and/or administration and management of occupational therapy services. OT majors only. Cr/F.

OT 857 - Mind Body Systems: Neurologically-based Function and Dysfunction--Adult Conditions**Credits: 4**

This course is the second course in a two-part course sequence that uses a life span approach, drawing on occupational science perspectives to study conditions typically diagnosed during adulthood (ages 21 and up). The emphasis is on the interaction of the individual (the mind), the body and the psychosocial environment as related to occupational performance. Students will work in pairs to examine selected disorders, and will further develop their presentation skills. This course is a prerequisite for courses in occupational therapy assessment and intervention for adults. Prereq: KIN 706; OT 753/OT 853.

OT 860 - Psychosocial Evaluation and Intervention**Credits: 3**

Examines the evaluation of psychosocial and psycho-emotional areas of occupational performance and the planning and implementation of occupation-based interventions across domains of practice and client populations. Course addresses developing a client's occupational profile, narrative reasoning and therapeutic use of self, behavioral change, illness representation, and adjustment to chronic disorders. A specific focus of the course is evaluation of and intervention for clients' presenting with mental health disorders. Open to OT majors only.

Co-requisite: OT 860L

OT 860L - Psychosocial Evaluation and Intervention Lab**Credits: 1**

This is the co-requisite lab for OT 860. Lab provides hands-on experiences regarding the evaluation and intervention of psychological and psycho-emotional areas of occupational performance. Course focuses on the evaluation and intervention for clients presenting with mental health disorders and also addresses narrative reasoning, therapeutic use of self, behavioral change, illness representation and adjustment to chronic disorders. Special fee. Cr/F.

Co-requisite: OT 860

OT 862 - OT Evaluation and Intervention for Children**Credits: 3**

Students will gain foundation knowledge of OT evaluation intervention process. Students apply the clinical reasoning process for the evaluation and treatment of children with various conditions, and across age groups. Students learn common assessment tools used by occupational therapists, and how to select and critique evaluation methods. Select cases will be used for the application of knowledge, interventions, and frames of reference used with children.

Co-requisite: OT 862L

OT 862L - OT Evaluation and Intervention for Children - Lab**Credits: 1**

This is the corequisite lab for OT 862, Evaluation and Intervention for Children. Students develop technical skills in administering evaluation tools, methods and procedures, in making clinical decisions about intervention planning and implementation. Students learn, practice and demonstrate many intervention techniques used with children, and complete a number of clinical case studies. OT majors only. Special fee.

Co-requisite: OT 862

OT 863 - Occupational Therapy Intervention for Adults**Credits: 3**

Students gain foundation knowledge of the OT evaluation and intervention process with adults with neurological and orthopedic conditions. Students apply the clinical reasoning process to clinical practice with adults with various types of medical conditions. Students learn about common assessment tools available to occupational therapists for adults, where, when, and how to apply them. Students develop technical skills in administering selected evaluation tools, in integrating assessment data, and demonstrate clinical decisions about intervention planning and implementation. Selected cases are used for application of knowledge, and the course covers the application of common intervention strategies used by occupational therapists with adults.

Co-requisite: OT 863L

OT 863L - Occupational Therapy Evaluation and Intervention for Adults - Lab**Credits: 1**

Students develop technical skills in administering selected evaluation tools, in integrating assessment data, and demonstrate clinical decisions about intervention planning and implementation. OT majors only. Special fee.

Co-requisite: OT 863

OT 863R - Adult Evaluation and Intervention Recitation**Credits: 0**

Adult Evaluation and Intervention Recitation provides additional hands-on and reflective discussion for acquiring skills needed for acute care/hospital in-patient settings.

Co-requisite: OT 863

OT 865 - Occupational Therapy Practice and Professional Reasoning**Credits: 3**

Develops professional reasoning by building upon level II fieldwork experiences. Students develop a population-based intervention plan, explore occupational therapy in an emerging or specialized practice setting, and implement a plan for continuing professional development. Students prepare for their OT board certification examination, and complete a culminating capstone experience.

OT 866 - AMPS Training**Credits:** 4

The Assessment of Motor and Process Skills (AMPS) provides a client-centered, occupation-based assessment of a person's ADL ability. The course supports occupation-based intervention. Students learn to reliably administer the AMPS and use it in the context of occupational therapy practice. Cr/F.

OT 871 - Enabling Participation in Community Groups**Credits:** 3

Students will work in an organization, learn about the people served by this organization, conduct therapeutic groups within the organization. Emphasis of content includes group process, clinical documentation, intervention planning and OT services with adults with cognitive impairments.

OT 871L - Enabling Participation in Community Groups Lab**Credits:** 2

Students will work in an organization, learn about the people served by this organization and conduct therapeutic groups. This lab serves as a Level I Fieldwork placement. Special fee.

OT 875 - Leadership in Occupational Therapy Systems of Practice**Credits:** 3

Students will integrate concepts, principles, and strategies that are fundamental to the provision of occupational therapy services in the changing U.S. health care system. This course links system management, reimbursement mechanisms, and public policy found in occupational therapy practice settings to the populations served. Knowledge of leadership, management, ethics and marketing principles that are necessary for success in today's health care industry are emphasized.

OT 885 - Research Methods and Application to Practice**Credits:** 3

Qualitative, quantitative, and mixed methods types of research are introduced and applied to relevant occupational therapy questions. Students acquire the fundamental skills of conducting research such as formulating research questions and identifying appropriate research designs and/or methods. Students also develop the ability to critically analyze research studies and apply the outcome to evidence-based practice in occupational therapy. OT majors only.

OT 886 - Engagement in Research**Credits:** 3

Students engage in activities of systematic inquiry and research under the mentorship of a research-active faculty mentor. Students gain experience with aspects of the research process, which may include conducting a literature review, developing a research proposal, data collection, data analysis, writing a research paper, and the presentation of research findings. Students also apply ethics for the use of human participation in research, and learn about funding avenues for different areas of research. OT and OT Asst Tech Certificate majors only.

OT 887 - Upper Extremity Rehabilitation and Splinting**Credits:** 4

This graduate course is designated to expose students to the specialized area of upper extremity rehabilitation including a detailed, working knowledge of hand anatomy, biomechanics, kinesiology, surgical techniques, and splinting in order to effectively treat upper extremity clinical problems. Students also learn about the common diagnoses seen in upper extremity rehabilitation, critically analyze treatment protocols, and precautions for these common diagnoses, and develop splinting and other evaluation and intervention techniques for this population. OT majors only. Special fee.

OT 888 - Application of Physical Agent Modalities in Occupational Therapy Practice**Credits:** 3

This course is designed to instruct occupational therapy students and practicing occupational therapists in proper application of physical agent modality techniques through a physiologically based approach. The course will link the underlying physical and biological principles of PAMS interventions with their use as preparatory methods for enhancement of occupational performance, improving client outcomes when applied in a client centered, occupation based approach. Prereq: OT 863. Special fee.

OT 889 - Using iPads to Support Children with Disabilities**Credits:** 3

The iPad has changed the way we teach, learn and play. Effectively using the iPad to support children with significant disabilities is part of being an inclusive professional knowledgeable about Assistive Technology. In this course, students explore using the iPad to support children with disabilities through asynchronous lectures, videos and assignments as well as hands on activities.

OT 890 - Occupational Therapy and Sensory Integration**Credits:** 4

This course presents, integrates and applies Ayres sensory integration (SI) theory in the context of occupational therapy for children. Content related to the theoretical constructs upon which sensory integration functions is emphasized. Current views related to sensory processing disorders, diagnostic considerations, patterns of sensory integration dysfunction, and SI deficits commonly associated with disorders such as autism and attention disorders are covered. Intervention planning and implementation are covered through video case studies, and observation and analysis of occupational therapy sessions using SI strategies. Students apply their understanding of normal and abnormal child development, and clinical reasoning skills for providing OT services for children with sensory integration problems in clinical, early intervention and school-based settings. Prereq: OT 862 and OT 862L. OT majors only.

OT 891 - Ergonomics for Occupational Therapy**Credits:** 4

This course explores the definition, concepts, and application of ergonomics, within OT evaluation and intervention, with the emphasis on work-related occupations. Students learn about the numerous components of ergonomics, evaluation and intervention techniques, current research, advanced educational opportunities and the relationship it has to the field of occupational therapy. Students also have the opportunity to apply their knowledge with the UNH community in performing job-site evaluations. OT majors only.

OT 892 - Level I Fieldwork**Credits:** 1

During a two-week fieldwork, students observe an occupational therapist and participate in the planning and implementation of the occupational therapy evaluation and intervention process for a client. The Level I Fieldwork placement is scheduled between fall and spring of their first graduate year. OT majors only. Cr/F.

OT 893 - Special Topics**Credits:** 2-4

Formal courses given on selected topics or special interest subjects. Work may be directed in one of the following areas: A) Administration; B) Clinical Education; C) Pediatrics; D) Physical Disabilities; E) Mental Health; F) Gerontology/Geriatrics; G) School-based Practice, and others. Prereq: permission. May be repeated to a maximum of 12 credits. Special fee on some topics.

OT 894 - Special Topics**Credits:** 2-4

This course is a 12-week, full-time internship that takes place after completion of the first graduate year, either in the summer or the fall. Level II fieldwork provides students with opportunities to: experience in-depth delivery of occupational therapy services to clients; focus on the application of purposeful and meaningful occupation and/or research, administration and management of occupational therapy services. Level II fieldwork is designed to promote clinical reasoning and reflective practice, to transmit values and beliefs that promote ethical practice and to develop professionalism and competence as career responsibilities. Cr/F.

OT 895 - Readings and Research in Occupational Therapy**Credits:** 1-6

Independent work under the guidance of an instructor. Work may be directed in one of the following areas: A) Administration; B) Clinical Education; C) Pediatrics; D) Physical Disabilities; E) Mental Health; F) Gerontology/Geriatrics; G) School-based Practice, and others. Prereq: permission. May be repeated to a maximum of 8 credits.

Ocean Engineering (OE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

OE 810 - Ocean Measurements Laboratory**Credits:** 4

Measurements of fundamental ocean processes and parameters. Emphasis on understanding typical offshore measurements, their applications, and the use of the acquired data. The latter is in terms of the effects on structures and processes in the ocean.

OE 853 - Ocean Hydrodynamics**Credits:** 3

Fundamental concepts of fluid mechanics as applied to the ocean; continuity; Euler and Navier-Stokes equations; Bernoulli equation; stream function, potential function; momentum theorem; turbulence and boundary layers are developed with ocean applications. Prereq: MATH 527; CIE 642 or ME 608.

OE 854 - Ocean Waves and Tides**Credits:** 4

Small amplitude, linear wave theory, standing and propagating waves, wave energy, refraction, diffraction, transformation in shallow water, statistics of random seas, spectral energy density, generating wave time series using the random phase methods forces on structures, Froude scaling of wave tank experiments, nonlinear effects. Description of tides as long waves, equilibrium tide, mathematical modeling including friction, nonlinear effects, and Coriolis forces, tidal analysis, the Great Bay Estuarine System as a case study. Prereq: General Physics I; Differential Equations, and Multi-Dimensional Calculus.

OE #856 - Principles of Naval Architecture and Model Testing**Credits:** 4

Fundamentals of naval architecture presented including hydrostatics, basics of resistance and propulsion, sea keeping and scaling. Concepts applied in experiments utilizing the tow/wave tank and associated instrumentation. Prereq: fluid dynamics, mechanics III, or equivalent. Lab.

OE 857 - Coastal Engineering and Processes**Credits:** 3

Introduction to small-amplitude and finite-amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling. Prereq: fluid dynamics or permission. (Also offered as CIE 857 and ME 857.)

OE 858 - Design of Ocean Structures**Credits:** 3

The foundational information necessary for the design of ocean structures. Topics include floating body, fixed body and moored line hydrostatics; wave forces on small and large bodies; dynamic response of floating bodies; and pile and gravity foundation geotechnics. Prereq: Mechanics of Materials; Fluid Mechanics; Dynamics; Differential Equations, Waves & Tides, or permission.

OE 864 - Spectral Analysis of Geophysical Time Series Data**Credits:** 4

This course considers basic exploratory techniques and in-depth spectral analysis for estimation with geophysical time series data, including calculations of confidence intervals and significance testing. This course prepares students for interpreting time series data with science and engineering applications. Topics include sampling theory, filtering, statistics, probability, spectral analysis, and empirical orthogonal functions. Students gain experience in code-writing for the analysis of time series data. Students enrolled at the 800 level provide data for analysis. Prereq: MATH 426.

OE 865 - Underwater Acoustics**Credits:** 3

An introduction to acoustics in the ocean. Fundamental acoustic concepts including the simple harmonic oscillator, waves on strings, and the acoustic wave equation; the sonar equation; sound generation and reception by underwater acoustic transducers and arrays; basics of sound propagation; reflection and scattering from ocean boundaries. Spring semester; offered every year; satisfies core course requirement in Ocean Engineering. Prereq: General physics and differential equations.

OE 871 - Geodesy and Positioning for Ocean Mapping**Credits:** 4

The science and technology of acquiring, managing, and displaying geographically referenced information; the size and shape of the earth, datums and projections; determination of precise positioning of points on the earth and the sea, including classical terrestrial-based methods and satellite-based methods; shoreline mapping, nautical charting and electronic charts. Prereq: one year of calculus and one year of college physics. (Also listed as ESCI 871.)

OE 874 - Integrated Seabed Mapping Systems**Credits:** 4

Overview of typical applications that involve mapping the sediment-water interface in the ocean and adjacent waters. Emphasis on defining the task-specific resolution and accuracy requirements. Fundamentals of acoustics relevant to seabed mapping. Progressions through typical configurations involving single beam, sidescan, phase differing and multibeam systems. Integration of asynchronous 3D position, orientation and sound speed measurements with sonar-relative acoustic travel times and angles. Analysis of impact offsets, mis-alignments and latency in all integrated sensors.

OE 875 - Fundamentals of Ocean Mapping II**Credits:** 4

The second of two courses covering the principles and practices of hydrography and ocean mapping. In this course the following topics are covered: Ancillary Sensor Integration, System Calibration, Verification and Field QA/QC, Water Levels (Tides); Mapping Standards; Survey Planning, Execution and Reporting; Terrain Analysis; Optical Remote Sensing; Data Presentation; Seafloor Characterization; Electronic Navigational Charts; Hydrography for Nautical Charting, Product Liability and Contracts; and the United Nations Common Law of the Sea (UNCLOS). Prereq: OE/ESCI 874. Pre- Coreq: MATH 896 Mathematics for mapping.

OE 895 - Special Topics**Credits:** 1-4

New or specialized courses and/or independent study. May be repeated for credit.

OE 899 - Master's Thesis**Credits:** 1-6

May be repeated up to a maximum of 6 credits. Cr/F.

OE 965 - Advanced Underwater Acoustics**Credits:** 3

Focused topics varying from year to year depending on student interests and need. Topics may include one or more of the following: sonar systems engineering; underwater acoustic transducers; volume and surface scattering; underwater acoustic propagation; fisheries acoustics. Spring semester; offered every other year. Prereq: Underwater acoustics or permission.

OE 972 - Hydrographic Field Course**Credits:** 4

A lecture, lab, and field course on the methods and procedures for the acquisition and processing of hydrographic and ocean mapping data. Practical experience in planning and conducting hydrographic surveys. Includes significant time underway (day trips and possible multi-day cruises) aboard survey vessel(s). Prereq: Fundamentals of Ocean Mapping, Geodesy and Positioning for Ocean Mapping; or permission. (Also listed as ESCI 972.)

OE 973 - Seafloor Characterization**Credits:** 3

Remote characterization of seafloor properties using acoustic (echo sounders, sub-bottom profilers, side-scan, multi-beam and interferometric sonars) and optical (video and laser line-scanner) methods. Models of sound interaction with the seafloor will be explored as well as a range of possible geologic, geotechnical, morphologic, acoustic, and biologic descriptors. Prereq: permission. (Also listed as ESCI 973.)

OE 990 - Ocean Seminars I**Credits:** 1

Various topics, including marine systems design, marine vehicle operation, data collecting and processing, and marine law. Cr/F.

OE 991 - Ocean Seminars II**Credits:** 1

Various topics, including marine systems design, marine vehicle operation, data collecting and processing, and marine law. Cr/F.

OE 995 - Graduate Special Topics**Credits:** 1-4

Investigation of graduate-level problems or topics in ocean engineering. May be repeated for a maximum of 16 credits.

OE 998 - Independent Study**Credits:** 1-4

Independent theoretical and/or experimental investigation of an ocean engineering problem under the guidance of a faculty member.

OE 999 - Doctoral Research**Credits:** 0

Cr/F.

Oceanography (OCE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

OCE 898 - Directed Research**Credits:** 2

Research project on a specified topic in Oceanography, guided by a faculty member. Oceanography M.S. majors only. Cr/F.

OCE 899 - Master's Thesis**Credits:** 1-6

Master's thesis research in Oceanography. May be repeated up to a maximum of 6 credits. Oceanography M.S. majors only. Cr/F.

OCE 999 - Doctoral Research**Credits:** 0

Doctoral Research in Oceanography. Oceanography PhD majors only. Cr/F.

Physics (PHYS)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

PHYS 805 - Experimental Physics**Credits:** 4

Experiments in nuclear, solid-state, and surface physics. Includes discussion of laboratory techniques, data analysis, and data presentation. Special projects assigned to individual students.

PHYS 806 - Introduction to Physics Research and Teaching**Credits:** 1

This course introduces new graduate students to both research and teaching. The teaching portion focuses on facilitating group work, problem solving, and deeper student thinking. The research portion focuses on research currently conducted at UNH, library resources, responsible conduct in research, how research differs from coursework, and how research results are presented in the research community. Cr/F.

PHYS 808 - Optics**Credits:** 4

Geometrical optics, electromagnetic theory of light, interference, diffraction, polarization, related phenomena and nonlinear optics. (Alternate years only.)

PHYS 810 - Introduction to Astrophysics**Credits:** 4

Review of the sun, stars, Milky Way, external galaxies, and expansion of the universe. Recent discoveries of radio galaxies, quasi-stellar objects, cosmic black-body radiation, x rays, and gamma rays precede a discussion of Newtonian and general relativistic cosmological models, steady-state/big-bang theories, and matter-antimatter models. (Also offered as EOS 810.) (Alternate years only.)

PHYS 811 - Topics in Modern Physics**Credits:** 1-4

Discussions, lectures, and laboratory work on topics of current interest in physics. An introductory course for secondary school teachers and others with some science background.

PHYS 812 - Introduction to Space Plasma Physics**Credits:** 4

Introduction to the subject of space plasma physics including solar physics, heliospheric physics, magnetospheric physics, and ionospheric physics. The course provides an overview of the basic phenomena and processes (e.g. particle acceleration and transport, shock formation, magnetic structures and reconnection, wave propagation, wave-particle interactions, instabilities), theoretical techniques (e.g. single-particle orbits, kinetic and fluid descriptions), and experimental techniques. (Also offered as EOS 812.) (Alternate years only.)

PHYS 818 - Introduction to Solid-State Physics**Credits:** 4

Crystal structure, diffraction, lattice vibrations, electronic and optical properties of metals and semiconductors; selected topics in modern condensed matter physics. Prereq: introduction to quantum mechanics I, electricity and magnetism I or equivalent. (Normally offered every other year.)

PHYS 820 - Nuclear Physics**Credits:** 4

Nuclear phenomenology, reactions, models, radiation, interaction of radiation with matter; accelerators; properties and interactions of elementary particles; symmetries and symmetry breaking standard model. Prereq: introduction to quantum mechanics I and II; electricity and magnetism I and II; or permission of instructor.

PHYS 864 - General Relativity and Cosmology**Credits:** 4

Review of special relativity, and the motivation for considering gravity in terms of curvature of space time. Introduction to Riemannian geometry, general relativity and Einstein's equations. Application of general relativity in the study of black holes, gravitational waves, cosmology, as well as recent results on inflation and quantum gravity. (Alternate years only.)

PHYS 895 - Independent Study**Credits:** 1-8

Individual project under direction of a faculty adviser.

PHYS 899 - Master's Thesis**Credits:** 1-6

May be repeated up to a maximum of 6 credits. Cr/F.

PHYS 900 - Introduction to Physics Research and Teaching I**Credits:** 1

Introduction to teaching/research in physics including responsibilities and methods for teaching assistants, research currently conducted at UNH, library sources, responsible conduct in research, how research differs from coursework, how research results are presented in the research community, and readings from physics education research literature. Cr/F.

PHYS 901 - Introduction to Physics Research and Teaching II**Credits:** 1

Introduction to teaching/research in physics including responsibilities and methods for teaching assistants, research currently conducted at UNH, library sources, responsible conduct in research, how research differs from coursework, how research results are presented in the research community, and readings from physics education research literature. Cr/F.

PHYS 902 - Issues in Teaching and Learning Physics**Credits:** 1-3

Issues in teaching and learning physics including cognitive models of learning; assessment tools; meta-cognitive issues; role of mathematics; effectiveness of labs; issues in problem solving; misconceptions studies. Extensive reading, writing, discussion and reflection is required. May be repeated for a maximum of 3 credits.

PHYS 931 - Mathematical Physics**Credits:** 3

Complex variables, differential equations, asymptotic methods, integral transforms, special functions, linear vector spaces and matrices, Green's functions, and additional topics selected from integral equations, variational methods, numerical methods, tensor analysis, and group theory. (Also offered as MATH 931.)

PHYS 935 - Statistical Physics**Credits:** 3

Review of thermodynamics and kinetic theory, followed by an introduction to classical and quantum statistical mechanics. Microcanonical, canonical, and grand canonical ensembles; ideal Fermi and Bose gases and applications of statistical mechanics to selected physical problems. Prereq: PHYS 931; 939; 943.

PHYS 939 - Classical Mechanics**Credits:** 3

Newtonian, Lagrangian, and Hamiltonian formulation of the classical mechanics of particles and rigid bodies. Topics that serve as background for the study of modern physical theories are emphasized.

PHYS 941 - Electromagnetic Theory I**Credits:** 3

The formulation and detailed application of electromagnetic theory to physical problems. The material covered is at the level of the text by J.D. Jackson, "Classical Electrodynamics".

PHYS 942 - Electromagnetic Theory II**Credits:** 3

The formulation and detailed application of electromagnetic theory to physical problems. The material covered is at the level of the text by J.D. Jackson, "Classical Electrodynamics".

PHYS 943 - Quantum Mechanics I**Credits:** 3

Introduces non-relativistic quantum theory, covering wave mechanics, Dirac notation, angular momentum, the use of perturbation theory to calculate atomic energy levels, the interaction of atoms with radiation, and various approaches to calculating the differential scattering cross-section.

PHYS 944 - Quantum Mechanics II**Credits:** 3

See description for PHYS 943.

PHYS 951 - Plasma Physics**Credits: 3**

Kinetic theory of plasmas; plasma waves, instabilities, turbulence, diffusion, adiabatic motion of charged particles, nonlinear plasma phenomena. Prereq: PHYS 935; PHYS 941; PHYS 941. (Normally offered every other year.)

PHYS 953 - Magnetohydrodynamics of the Heliosphere**Credits: 3**

Introduction to solar physics, with emphasis on gas dynamics and magnetic fields. Interior structure, the theory of convection, wave motions in the presence of magnetism and gravity, coronal heating theories, steady and nonsteady flows, dynamo theory, and the theory of solar flares and other transient phenomena. Salient observational data are reviewed. (Normally offered every other year.)

PHYS 954 - Heliospheric Physics**Credits: 3**

The solar wind and its effects on cosmic rays. The basic equations of the solar wind: mass, momentum, angular momentum, and energy balance. Transport processes. Waves, shocks, and instabilities in the solar wind. The basic equations of energetic particle transport. Solar modulation of solar and galactic cosmic rays. Interaction of energetic particles with shock waves. Salient data are reviewed. (Normally offered every other year.) Also offered as EOS #954.

PHYS 961 - Advanced Quantum Mechanics I**Credits: 3**

Relativistic wave equations, propagator theory and Feynman diagrams, quantum theory of radiation, second quantization, introduction to quantum field theory and related topics. Prereq: PHYS 939; PHYS 944. (Normally offered every other year.)

PHYS #962 - Advanced Quantum Mechanics II**Credits: 3**

Relativistic wave equations, propagator theory and Feynman diagrams, quantum theory of radiation, second quantization, introduction to quantum field theory and related topics.

PHYS 965 - Advanced Solid-State Physics**Credits: 3**

Theory of crystalline metals, semiconductors, and insulators. Selected topics from the following: surfaces, films, quantum dots, clusters, solid-state devices. Prereq: PHYS 935; PHYS 941; PHYS 943. (Normally offered every other year.)

PHYS 987 - Magnetospheres**Credits: 3**

Introduces plasma of physics of the interaction of solar and stellar winds with planets having internal magnetic fields, most predominately, the Earth. Both MHD and kinetic descriptions of internal and boundary processes of magnetospheres as well as treatment of the interaction with collisional ionospheres. Flow of mass, momentum, and energy, through such systems. Prereq: PHYS 951; PHYS 952;/or permission. (Also offered as EOS 987.) (Normally offered every other year.)

PHYS 995 - Special Topics**Credits: 1-3**

Any special fields of study not covered by the above courses may be included. Topic choices in previous years: astrophysics; elementary particles; lasers/masers; many-body theory; general relativity and cosmology; group theory; atomic physics; quantum theory of light; nonlinear equations, and chaos. May be taken more than once. (Not offered every year.)

PHYS 999 - Doctoral Research**Credits: 0**

Cr/F.

Plant Biology (PBIO)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

PBIO 899 - Master's Thesis**Credits: 1-10**

May be repeated up to a maximum of 10 credits. Cr/F.

PBIO 985 - Advanced Topics**Credits: 1-6**

Discussions of current topics in selected areas of plant biology. A) Systematic Botany; B) Physiology; C) Pathology; D) Anatomy; E) Morphology; F) Ecology; G) Mycology; H) Phycology; I) Cell Biology; J) Genetics; K) Evolution; L) Plant Utilization; M) Cell Physiology; N) Developmental Plant Biology; O) Cell and Tissue Culture; P) Physiological Ecology; Q) Plant Disease Control; R) Plant Hormones. Prereq: permission.

PBIO 995 - Investigations**Credits: 1-6**

Supervised projects in selected areas of plant biology. A) Systematic Botany; B) Physiology; C) Pathology; D) Anatomy; E) Morphology; F) Ecology; G) Phycology; H) Mycology; I) Cell Biology; J) Cell Physiology; K) Microtechnique; L) Cell and Tissue Culture; M) Genetics; N) Crop Management; O) Developmental Plant Biology; P) Scientific Writing; Q) History of Botany; R) Teaching in Plant Biology; S) Plant Growth Research and Modeling. Prereq: permission.

PBIO 997 - Graduate Seminar**Credits: 1**

Tips and techniques for effective communication in science. Discussions and practice in oral and written communication, including presentations at scientific meetings, seminars, grant proposals, abstracts, dissertations, and research papers. Cr/F.

PBIO 999 - Doctoral Research**Credits: 0**

Cr/F.

Political Science (POLT)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

POLT 801 - Courts and Public Policy**Credits: 3**

Impact of judicial decisions on public policy and influences on judicial decision making at the federal, state, and local levels.

POLT 802 - Grant-writing for Public and Non-profit Sectors**Credits: 3**

This class provides students with a comprehensive overview of the process for writing proposals for grant funding. Students will learn to research funding opportunities and write the various sections of a funding proposal. Differences in seeking grants from foundation, corporate, and government funders will be explored. In addition to individual projects, the class will work as a group to research, write, and submit a funding proposal for a nonprofit or municipal government program.

POLT 803 - Performance Management in Public and Non-Profit Organizations**Credits: 3**

This course will explore a major aspect of public management, an advanced management tool that can help managers gain efficiencies and increase accountability. Theoretical foundations and practical applications of performance measurement and management techniques will examine how managers, government and non-profit, might utilize performance measurement to make budgetary decisions and improve organizational performance.

POLT 804 - Policy and Program Evaluation**Credits: 3**

Policy and program evaluation of federal, state, and local governmental enterprise; focuses on the politics, practices, and methods of evaluative investigation. Evaluation as a technique for providing rational information for budgetary and policy-making decisions.

POLT #806 - State and Local Government**Credits: 3**

Advanced study of powers, politics, political cultures, and constitutional settings of American state and local government.

POLT 808 - Administrative Law**Credits: 3**

Examines the legal rules governing regulatory agencies, in the US. Topics include regulatory adjudication and rulemaking, legislative and executive control over administrative agencies, judicial review and public participation. Course examines federal and state levels of government.

POLT 811 - Public Opinion and Survey Research**Credits: 3**

Examination of the role of public opinion in democracy. Research, design, implementation and analysis of a public opinion survey.

POLT 812 - Leadership Theory and Practice**Credits: 3**

Exploration of the major theoretical approaches to leadership, including students' and others' leadership skills, styles, roles, and practices. Students will refine their own conceptual and practical approaches to leadership in a variety of settings.

POLT 815 - Art of Negotiation**Credits: 3**

Identification, analysis, evaluation and application of effective communication and negotiation skills. Course will include case studies and simulation/role-playing exercises.

POLT 818 - Special Topics - Public Administration**Credits: 1**

Selected topics in public administration, emphasis on specific aspects of management in public and non-profit sectors.

POLT 821 - Feminist Political Theory**Credits: 3**

Exploration of various strands of feminist political theory; taking a specifically political view of the challenges of feminist activism and philosophy. Issues of public space, power, social transformation and democracy addressed.

POLT 825 - Politics and Literature**Credits: 3**

Seminar: Advanced work in exploring classical and contemporary works of literature to illustrate perennial issues in political philosophy.

POLT 840 - States and Societies in the Middle East**Credits: 3**

This seminar explores the comparative politics of selected countries and conflicts in the contemporary Middle East and North Africa. We focus on understanding the causes and consequences of popular uprisings, civil wars, and protracted conflicts. The class is taught through discussion, with students taking active, participatory roles. Themes include changing forms of governance, changing practices of warfare, gender and minority rights, economic and environmental problems, protest and activism, state-society relations, and migration and refugees. Students read memoir, journalistic accounts, and theoretical articles in comparative politics to understand important developments. Specific country and issue cases change each year; recent seminars have addressed Israel-Palestine, Syria, Egypt, Iran, and Iraq. Writing, reading, and discussion intensive class. Designed as follow-on course to POLT 559, Comparative Politics of the Middle East, counts as capstone course for the Middle East Minor.

POLT 842 - Politics of Afghanistan, Pakistan, and India**Credits: 4**

Afghanistan, Pakistan, and India are strategically important states and potential flashpoints of conflict. Nuclear neighbors, India and Pakistan have been in conflict for 70 years while Afghanistan remains internally unstable. The politics of these countries are also intimately involved with each other. The class will focus both on the internal politics of these states and their foreign relations with each other and the United States. Students will develop expertise in a crucial world region.

POLT 848 - Food and Wine Politics**Credits: 3**

This course investigates the evolution of wine and foods politics over the past few decades. Food and wine politics provides a lens through which to analyze contrasting perspectives on production, markets, quality, consumer preferences, health, and safety. This course draws upon texts from economic history, political economy, economic sociology, and public policy to shed light on the differences and similarities in political and market organization across Europe, the United States, and emerging market economies. The first half of the course will focus on wine politics and the second half of the course will focus on food politics.

POLT 850 - Politics of Poverty**Credits: 3**

Why are some countries rich while others are so poor? This course answers this question by examining several theories of economic development: political culture, modernization, dependency, regime types, urban bias, rent-seeking institutions, and international aid. The immediate goal of this course is for students to understand the causes of international inequality in the distribution of wealth. Students also improve their ability to evaluate theoretical arguments and empirical evidence critically, and develop reading and writing skills.

POLT 851 - Comparative Environmental Politics and Policy**Credits: 3**

Environmental politics and policy across national boundaries and at different levels of governance. Comparisons of the U.S. and European Union environmental policies to build a foundation for comparisons across national boundaries and sub-national authorities. Students improve their understanding of how and why comparative methods are used to gain insight into politics and policymaking. Central concepts and debates addressed include the roles of expertise, sustainability, precautionary principle, the use of market mechanisms in policy, environmental justice, policy devolution and flexibility, environmental performance assessment, NGO roles, activism, and social movements. Using a range of theoretical approaches and historical and contemporary events and case studies, students will evaluate the claims and explanatory power of various concepts and theories. Includes ethical issues emerging from the theory and practice of environmental politics.

POLT 860 - Theories of International Relations**Credits: 3**

Theoretical approaches of international politics, international organization, and international political economy with particular emphasis on systems theories, domestic determinants of foreign policy, and theories of decision making.

POLT 862 - International Political Economy**Credits: 3**

This course has been designed to introduce advanced undergraduates and graduate students to the current theoretical discussions in international political economy. The course analyzes the development of current international economic regimes, as well as looks at systemic theories (interdependence, hegemonic stability), domestic determinants (bureaucratic, interest group) and decision-making theories (rational choice). By monitoring current economic and political news, students are challenged to apply these ideas to explain the current problems in political economy.

POLT 865 - Security Intelligence Study**Credits: 3**

The goal of the Security Intelligence Study course is to provide an opportunity for students to apply research and analysis models used by intelligence professionals to a real world problem. Using unclassified public sources, students research and present an analytical product to help limit risk for a government decision maker. Participants learn about and use publicly available data and intelligence analysis models.

POLT 878 - International Organization**Credits: 3**

This course is about cooperation at the international level. With a focus on international organizations, we examine what roles international institutions (both IGOs and NGOs) play in global governance and their effects in various issue areas. We examine their historical origins, functions, and the international and domestic political forces that impact their effectiveness. The course also considers the role of international organizations on world order including conflict resolution, peacekeeping, development, and human rights.

POLT 880 - International Environmental Politics, Policy, and Law**Credits: 3**

Explores international/global environmental politics and policymaking, multilateral negotiations, the role of science and technology in policymaking, state capacity, the making of international law, implementation, and compliance. Other issues include climate control, marine pollution, long-range air pollution, United States leadership in the global political arena, North-South divisions in global politics, environmental justice, sustainable development, and the role of the United Nations and other international organizations.

POLT 897B - Seminar in American Politics**Credits: 3**

Advanced analysis and individual research.

POLT 897C - Seminar in Comparative Politics**Credits: 3**

Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy, and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, and political leadership.

POLT 897E - Seminar in International Politics**Credits: 3**

Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations, NATO expansion and European security, the peace process in the Middle East, etc. See department listings for semester offerings.

POLT 897F - Seminar in Public Administration**Credits: 3**

Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

POLT 897I - Seminar in Political Thought**Credits: 3**

Advanced treatment and individual research.

POLT 898B - Seminar in American Politics**Credits: 3**

Advanced analysis and individual research.

POLT 898C - Seminar in Comparative Politics**Credits: 3**

Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy, and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, and political leadership.

POLT 898E - Seminar in International Politics**Credits: 3**

Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations, NATO expansion and European security, the peace process in the Middle East, etc. See department listings for semester offerings.

POLT 898F - Seminar in Public Administration**Credits: 3**

Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

POLT 898I - Seminar in Political Thought**Credits: 3**

Advanced treatment and individual research.

POLT 899 - Master's Thesis**Credits:** 3-6

Each student carries out original research that culminates in a master's thesis. Permission required. Cr/F.

POLT 900 - Political Science Pro-Seminar**Credits:** 3

Familiarizes students with political science as a profession. Briefly surveys the scope of the discipline in terms of the substantive fields and methodological approaches. Examines the logic of research design and explores diverse methods of inquiry (e.g., archival, experimental, case study, comparative analysis, field study, survey, etc.), including the process of generating a presentable research paper.

POLT 905 - Introduction to Statistical Analysis**Credits:** 3

Quantitative research, design and analysis methodology, and techniques for political science and public policy and administration.

POLT 906 - Foundations and Theories of Public Administration**Credits:** 3

Introduction to essential aspects of public and non-profit administration. Critical concepts and theoretical bases; operational nature of public and non-profit administration; contributions of key scholars and practitioners to the study and understanding of public and non-profit administration.

POLT 907 - Legal and Policy-Making Environment on Public and Non-Profit Sectors**Credits:** 3

Though the use of case studies, analysis and assessment of legal, institutional, social, political and economic settings within public and non-profit sectors.

POLT 908A - Capstone in Public Administration**Credits:** 3

In-Service.

POLT 908B - Capstone in Public Administration**Credits:** 6

Pre-Service.

POLT 909 - Organization and Management in Public and Non-profit Sectors**Credits:** 3

Introduction to key actors, theories, and concepts in the fields of organizational theory and behavior.

POLT 911 - Public Management Techniques**Credits:** 3

Introduction to analytic decision-making and planning techniques applicable to public sector management.

POLT 912 - Human Resource Management in Public and Non-profit Sectors**Credits:** 3

Examination of the administration, politics, and strategies of effective public human resource management.

POLT 914 - Financial Management and Budgeting in Public and Non-profit Sectors**Credits:** 3

Analysis, goal setting, and strategic planning in a governmental setting, with particular emphasis on budgetary processes as a means for controlling policy effectiveness.

POLT 918 - Non-Profit Management**Credits:** 3

Introduction to governance and management in the non-profit sector: finance, development, personnel management, strategic planning, and risk management.

POLT 995 - Independent Study**Credits:** 1-3

A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the faculty members of the department. Permission required.

POLT 996 - Independent Study**Credits:** 1-3

A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the Faculty members of the department. Permission required.

Psychology (PSYC)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

PSYC 894 - Advanced Research**Credits:** 4 or 8

Student designs and conducts original research that culminates in a paper of publishable quality. Completion of either this course or PSYC 899 satisfies the department's research requirement for the master's degree. May be taken for 4 credits per semester in each of two semesters or 8 credits in one semester. Maximum of 8 credits. Cr/F.

PSYC 899 - Master's Thesis**Credits:** 4 or 8

four credits per semester in each of two semesters or 8 credits in one semester. Maximum of 8 credits. Cr/F.

PSYC 901 - Graduate Pro-seminar**Credits:** 0

Students and graduate faculty in psychology meet periodically for a mutual exchange on current issues in psychology. Cr/F.

PSYC 902 - Graduate Pro-seminar**Credits:** 0

Students and graduate faculty in psychology meet periodically for a mutual exchange on current issues in psychology. Cr/F.

PSYC 904 - First-year Graduate Seminar**Credits:** 4

Coverage of fields of psychology represented in the department's graduate program and taught in the department's introductory psychology course that psychology graduate students teach during their third year in the program. Course is focused on providing common background among students when they enroll in advanced graduate seminars and on assuring they have certain foundational knowledge when they begin to teach the introductory psychology course. Course is required of all first-year psychology graduate students in fall semester. Taught in seminar format. PSYC majors only.

PSYC 905 - Research Methodology and Statistics I**Credits: 4**

A consideration of research techniques and problems of methodology in psychology. The first semester stresses the principles of statistical inference, correlational approaches, and their interrelatedness in design. Topics considered include probability theory, linear regression, function-free prediction, the theory underlying statistical inference, parametric and nonparametric tests of significance, and principles of analysis of variance. The second semester extends correlational approach to the techniques and methodology of multiple regression and considers the appropriate use and theoretical bases of complex designs. Prereq: undergraduate statistics and experimental psychology.

PSYC 906 - Research Methodology and Statistics II**Credits: 4**

A consideration of research techniques and problems of methodology in psychology. The first semester stresses the principles of statistical inference, correlational approaches, and their interrelatedness in design. Topics considered include probability theory, linear regression, function-free prediction, the theory underlying statistical inference, parametric and nonparametric tests of significance, and principles of analysis of variance. The second semester extends correlational approach to the techniques and methodology of multiple regression and considers the appropriate use and theoretical bases of complex designs. Prereq: undergraduate statistics and experimental psychology.

PSYC 907 - Research Methods and Statistics III**Credits: 4**

The application of multivariate methods of data analysis in psychological research: multiple regression, analysis of covariance, Hotelling's T2 multivariate analysis of variance, path analysis, discriminant functions, canonical correlation, factor analysis.

PSYC 909 - Advanced Seminar in Quantitative and Analytic Methods**Credits: 4**

Advanced treatment of methodological topics of current interest. Content varies: representative topics include field research, surveys, time series, causal analyses, log-linear models, formal and mathematical models, and computer simulation. May be repeated for credit.

PSYC 914 - Advanced Seminar in Cognition**Credits: 4**

An in-depth examination of one or more specific topics in cognition including issues in memory, attention, the use and development of language, and cognitive science. May be repeated for credit.

PSYC 917 - Advanced Seminar in Sensory and Perceptual Processes**Credits: 4**

Comprehensive examination of a specific topic in sensory and perceptual processes. May be repeated for credit.

PSYC 933 - Advanced Seminar in Physiological Psychology**Credits: 4**

In-depth examination of a specific topic in the neurosciences. Topics vary depending on interests of instructor and students. May be repeated for credit.

PSYC 945 - Advanced Seminar in Behavioral Analysis**Credits: 4**

Current empirical and theoretical issues in the analysis of behavior. May be repeated for credit.

PSYC 954 - Advanced Seminar in Social Psychology**Credits: 4**

Intensive coverage of the experimental and theoretical literature in a selected area of basic or applied social psychology. Students participate directly in the conduct of the seminar by means of individual topical discussions, development and/or execution of research designs, and critical assessment of the current state of the topic area under discussion. Illustrative topics: political behavior, para-linguistics and non-verbal communication, ethnic and racial prejudice, and environmental psychology. May be repeated for credit.

PSYC 974 - Advanced Seminar in the History and Theory of Psychology**Credits: 4**

In-depth examination of a specific topic in the history and/or theory of psychology. Topics vary each time the seminar is offered. May be repeated for credit.

PSYC 982 - Advanced Seminar in Developmental Psychology**Credits: 4**

In-depth analysis of one or several specific topics or issues in developmental psychology. May be repeated for credit.

PSYC 991 - Practicum and Seminar in the Teaching of Psychology**Credits: 6**

Practicum offers the student an opportunity to teach introductory psychology under close supervision from the staff. The seminar is coordinated with this experience and focuses on both practical and theoretical issues of significance in the teaching/learning process at the college level.

PSYC 992 - Practicum and Seminar in the Teaching of Psychology**Credits: 6**

Practicum offers the student an opportunity to teach introductory psychology under close supervision from the staff. The seminar is coordinated with this experience and focuses on both practical and theoretical issues of significance in the teaching/learning process at the college level.

PSYC 995 - Reading and Research**Credits: 1-4**

A) Cognition/Psycholinguistics; B) Developmental Psychology; C) History and Theory of Psychology; D) Learning and Behavior Analysis; E) Personality/Psychopathology; F) Physiological Psychology; G) Sensation/Perception; H) Social Psychology; I) Statistics/Methodology. As part of the development as an independent scholar, the student is encouraged to plan (1) broad reading in an area; (2) intensive investigation of a special problem; or (3) experimental testing of a particular question. Requires approval of both adviser and faculty member directing project. May be repeated for credit.

PSYC 998 - Problems and Issues**Credits: 4**

Seminar on a problem that has been the subject of specialized research and study by a member of the faculty. Topic and instructor vary. May be repeated for credit.

PSYC 999 - Doctoral Research**Credits: 0**

Cr/F.

Public Administration (PA)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

PA 801 - Courts and Public Policy**Credits:** 3

Impact of judicial decisions on public policy and influences on judicial decision making at the federal, state, and local levels. Also listed as POLT 801.

PA 802 - Grant-writing for Public and Non-profit Sectors**Credits:** 3

This class provides students with a comprehensive overview of the process for writing proposals for grant funding. Students will learn to research funding opportunities and write the various sections of a funding proposal. Students will learn the differences in seeking grants from foundation, corporate, and government funders will be explored. In addition to individual projects, the class will work as a group to research, write, and submit a funding proposal for a nonprofit or municipal government program.

PA 803 - Performance Management in Public and Non-Profit Organizations**Credits:** 3

This course will explore a major aspect of public management, an advanced management tool that can help managers gain efficiencies and increase accountability. Theoretical foundations and practical applications of performance measurement and management techniques will examine how managers, government and non-profit, might utilize performance measurement to make budgetary decisions and improve organizational performance.

PA 804 - Policy and Program Evaluation**Credits:** 3

Policy and program evaluation of federal, state, and local governmental enterprise; focuses on the politics, practices, and methods of evaluative investigation. Evaluation as a technique for providing rational information for budgetary and policy-making decisions.

PA 806 - State and Local Government**Credits:** 3

Advanced study of powers, politics, political cultures, and constitutional settings of American state and local government. Also listed as POLT #806.

PA 807 - Federalism and Intergovernmental Relations**Credits:** 3

This course will familiarize students with federalism and intergovernmental relations including conceptual/historical foundations, theoretical approaches, policy networks, and contemporary issues and challenges. Historic and current issues in federalism, political and policy challenges facing the three levels of government, and government's efforts to be responsive to citizens' needs and demands will be examined. By the end of the course, students will have developed solid comprehension of how intergovernmental relations impact policy decision making and delivery in the public and non-profit sectors. Also listed as POLT 807.

PA 808 - Administrative Law**Credits:** 3

Examines the legal rules governing regulatory agencies, in the US. Topics include regulatory adjudication and rulemaking, legislative and executive control over administrative agencies, judicial review and public participation. Course examines federal and state levels of government. Also listed as POLT 808.

PA 812 - Leadership Theory and Practice**Credits:** 3

Exploration of the major theoretical approaches to leadership, including students' and others' leadership skills, styles, roles, and practices. Students will refine their own conceptual and practical approaches to leadership in a variety of settings.

PA 815 - Art of Negotiation**Credits:** 3

Identification, analysis, evaluation and application of effective communication and negotiation skills. Course will include case studies and simulation/role-playing exercises.

PA 818 - Special Topics - Public Administration**Credits:** 1

Selected topics in public administration, emphasis on specific aspects of management in public and non-profit sectors.

PA 897F - Seminar in Public Administration**Credits:** 3

Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

PA 898F - Seminar in Public Administration**Credits:** 3

Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

PA 905 - Introduction to Statistical Analysis**Credits:** 3

Quantitative research, design and analysis methodology, and techniques for political science and public policy and administration.

PA 906 - Foundations and Theories of Public Administration**Credits:** 3

Introduction to essential aspects of public and non-profit administration. Critical concepts and theoretical bases; operational nature of public and non-profit administration; contributions of key scholars and practitioners to the study and understanding of public and non-profit administration.

PA 907 - Legal and Policy-Making Environment on Public and Non-Profit Sectors**Credits:** 3

Though the use of case studies, analysis and assessment of legal, institutional, social, political and economic settings within public and non-profit sectors.

PA 908A - Capstone in Public Administration**Credits:** 3

In-Service.

PA 908B - Capstone in Public Administration**Credits:** 6

Pre-Service.

PA 909 - Organization and Management in Public and Non-profit Sectors**Credits:** 3

Introduction to key actors, theories, and concepts in the fields of organizational theory and behavior.

PA 911 - Public Management Techniques**Credits:** 3

Introduction to analytic decision-making and planning techniques applicable to public sector management.

PA 912 - Human Resource Management in Public and Non-profit Sectors**Credits:** 3

Examination of the administration, politics, and strategies of effective public human resource management.

PA 914 - Financial Management and Budgeting in Public and Non-profit Sectors**Credits:** 3

Analysis, goal setting, and strategic planning in a governmental setting, with particular emphasis on budgetary processes as a means for controlling policy effectiveness.

PA 918 - Non-Profit Management**Credits:** 3

Introduction to governance and management in the non-profit sector: finance, development, personnel management, strategic planning, and risk management.

PA 995 - Independent Study**Credits:** 1-3

A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the faculty members of the department. Permission required.

Public Health (PHP)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

PHP 900 - Public Health Care Systems**Credits:** 3

The focus of this course is on the pattern of services in the United States and on the structure and function of their component parts. It examines the impact on the system of a wide range of external factors including social, political, economic, professional, legal, and technological forces.

PHP 901 - Epidemiology**Credits:** 3

Exploration of factors underlying the distribution and determinants of states of health in various human populations. Emphasis is placed on investigative techniques, epidemiologic methodology, and disease prevention. Unlike other core courses in the MPH Program which are 8 weeks in length, this course is 16 weeks in length.

PHP 902 - Environmental Health**Credits:** 3

This course offers a general introduction to the ecological basis of health and disease. It applies the principles and framework of ecosystems to human health problems associated with environmental hazards, including toxic and infectious agents that contaminate our air, water, food, the work place and other special environments. Links between environmental and occupational health effects will be explored within the public health model. Policy required for regulation and alternative strategies for prevention will be discussed.

PHP 903 - Biostatistics**Credits:** 3

This course introduces students to the principles of biostatistics. Students learn through classroom instruction, lab instruction and exercises, a variety of statistical methods in public health. Students review measures of central tendency, rates, and standardization, probability, sampling, hypothesis testing, comparisons, and simple, multiple and logistic regression techniques. Unlike other core courses in the MPH Program which are 8 weeks in length, this course is 16 weeks in length.

PHP 904 - Social and Behavioral Health**Credits:** 3

A graduate level course which provides fundamental concepts of the behavioral sciences as they illuminate public health. Since public health practice is the application of physical, biological and behavioral knowledge to living societies, a firm understanding of human social organization and behavior is essential. Individual and community responses to prevention, identification of symptoms, diagnoses, treatments, chronic ailments and rehabilitation are discussed. In each of these areas, the course explores the interaction between community, family, patient, and health care provider.

PHP 905 - Public Health Administration**Credits:** 3

This course focuses on public health managers, organizational culture, management process, management functions and roles, leadership, motivation, communication, and human resource management.

PHP 907 - Public Health Policy**Credits:** 3

An analysis of the public policy process, the development of public health policy in the United States, and a discussion of specific public health policy issues with international comparisons. This course begins with an analytical framework for analyzing the American political system and process. It is followed by a general introduction to health policy in the United States with examples of specific policies and programs. Students will be asked to examine specific public health policy in-depth.

PHP 908 - Public Health Ethics**Credits:** 3

This course examines selected ethical issues arising in public health policy and practice and ethical dilemmas faced by public health professionals, practitioners, and researchers. Students analyze competing personal, organizational, professional, and societal interests, values, and responsibilities. Case studies apply different models of ethical decision making and provide MPH students with an added opportunity to explore and clarify their values and those of their colleagues.

PHP 912 - Public Health Law**Credits:** 3

This course seeks to provide the legal basis for public health that is needed to effectively practice public health, especially with respect to understanding and enforcing compliance with public health regulations, and managing public health programs and organizations. The course introduces the core elements of law, legal practice and reasoning, and illustrates their application and use in public health.

PHP 914 - Public Health Policy Analysis**Credits:** 3

Analysis of the public policy outputs from the perspectives of effectiveness, efficiency, and equity by applying analytical tools to public health policies in the United States. This course begins by examining the major methods used to examine health policy outputs. The perspectives of effectiveness, efficiency and equity are used as a framework for the course. Students read and critique articles from health services research literature that use previously learned methodologies.

PHP #920 - Social Marketing**Credits:** 3

This course offers and introduces students to the vocabulary and tools of marketing public health programs and services. Expanding upon traditional principles of marketing and consumer behavior the student will be exposed to the theory, practice and challenges of marketing social change. The course also explores the current and emerging issues related to public health marketing.

PHP 922 - Public Health Economics**Credits:** 3

This course gives each student a hands-on opportunity to become familiar with a broad range of health economics issues and analyses. The objective is to help its graduates successfully compete for advancement in careers requiring knowledge of health policy analysis.

PHP 924 - Policy and Practice of Community Health Assessment**Credits:** 3

This course explores the process of community health assessment as a tool for bridging the gap between public health and the personal health care system. It provides an historical perspective of using population based measurements as a framework for health improvement initiatives. It examines several community health assessment methodologies and explores the complexity of developing a community-based health assessment.

PHP 926 - Evaluation in Public Health**Credits:** 3

An introduction to program evaluation as it relates to public health practice and research, primarily in the United States. Public health-specific examples are presented throughout the course. Includes discussion of striking a balance between scientific rigor and the practicalities often faced by program evaluators.

PHP #930 - Climate Change and Health**Credits:** 3

An overview of the climate system including its physical and chemical compounds, the greenhouse effect, forcing agents and dynamics at global, regional and local scales. Human dimensions of climate change will be considered in light of data and models. An environmental epidemiology framework for analyzing the direct and indirect impacts of climate variability to public health as well as appropriate public policies, such as monitoring the greenhouse gas emission reductions will be developed.

PHP #932 - Disease Ecology**Credits:** 3

Students will have an understanding of the basic structure and dynamics of: climate system, ecological systems, social systems. Also gained will be the understanding of epidemiological significance of co evolutionary processes linking climate system with ecological and social systems that influence the interaction between human beings and disease agents and the understanding of the relational significance of assessment frameworks including ecosystem health, ecosystem services, environmental epidemiology, epidemiological environment.

PHP 934 - Work Environment Policy and the Health of Workers**Credits:** 3

Overview of occupational safety and health policy in the U.S. Focus on the legal context, especially on OSHA, and provides an analytical framework for examining the role of social, economic, and political factors in the recognition and control of occupational hazards. Some attention to the more technical aspects of this field (e.g., industrial hygiene, ergonomics, general health and safety); emphasis on understanding current occupational health and safety policies and controversies.

PHP 936 - Global Public Health**Credits:** 3

Course is designed to provide students with an introduction to and overview of the key areas of global health by addressing the major determinants of health and how health status is measured to determine the burden of disease in the developing world.

PHP 938 - Health Education and Promotion**Credits:** 3

An in-depth review of approaches to health promotion and disease prevention intervention in different settings, used varied strategies, and for different target groups. Course is intended to be practical in nature focusing on the specifics of intervention development and delivery. Examples drawn from field of public health. Prereq: PHP 904 Social and Behavioral Health.

PHP 940 - Health and the Built Environment**Credits:** 3

Overview of relationships between where people live, work, learn and play (built environment) and their health. Promotes an interdisciplinary approach to address chronic public health problems such as heart disease, obesity and depression, as well as tackling environmental issues.

PHP 964 - Applied Epidemiology**Credits:** 3

Course provides a thorough understanding of essential statistical and epidemiological concepts and their effective application in everyday public health practice. Students are given numerous real-life examples to demonstrate the theory in practice. Prereq: PHP 901 and instructor permission. Public Health majors only.

PHP 985A - Special Topics in Policy and Management**Credits:** 1-3

Study of a special topic in Public Health Policy and Management. May be repeated up to a maximum of 3 credits. Prereq: permission.

PHP 985B - Special Topics in Public Health Ecology**Credits:** 1-3

Study of a special topic in Public Health Ecology. May be repeated up to a maximum of 3 credits. Prereq: permission.

PHP 990 - Field Study**Credits:** 3

This course provides a 16-week long opportunity for students to synthesize, integrate, and apply the skills and competencies they have acquired during enrollment in the MPH Program and apply them to a public health problem or project in a professional public health practice setting. Students are expected to spend a minimum of 40 hours in the organization (not including preparation time) exploring how that organization deals with a particular public health issue and working on a project for that organization. In addition, students present the findings of their work in a poster session following the conclusion of the course. This public health experience is conducted under the direction of a faculty member and a community public health mentor. This class meets one hour prior to the regularly scheduled core and elective courses in the MPH Program. Prereq: Completion of core courses and permission of course instructor and MPH Program Director.

PHP 995 - Independent Study**Credits:** 1-3

Directed readings and other activities to explore a specific topic related to public health. May be repeated up to a maximum of 3 credits. Prereq: Permission of faculty member and MPH Program Director.

PHP 996 - Applied Topics in the Essentials of Public Health**Credits:** 3

This course will require students to attend at least six approved workshops on concepts related to the Ten Essential Services of Public Health. After attending the required workshops, a student will write an integrating paper summarizing what s/he has learned across these workshops at it relates to the Ten Essential Services and identify the types of skills s/he will need to be more effective as a public health professional.

PHP 998 - Integrating Seminar**Credits:** 3

This final course in the MPH curriculum serves as the capstone to the MPH degree and provides the opportunity for students to work in teams, bringing both their individual and joint perspectives and expertise, to address a particular public health problem for a New Hampshire-based public health entity. This course incorporates substantive, analytical, administrative, and policy perspectives. Students make a formal presentation of recommendations at the conclusion of the course. This class meets one hour prior to the regularly scheduled core and elective courses in the MPH Program. Prereq: Completion of core courses and permission of course instructor and MPH Program Director.

Public Policy (PPOL)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

PPOL 822 - Media Strategy and Skills**Credits:** 3

Designed to equip students with the skills they will need as practitioners to advance public policy goals through the development and execution of responsive communications strategy. Students will gain an understanding of the media landscape and trends in journalism; how to identify media opportunities and target audiences; how to write to successfully communicate to various audiences; and basic skills to prepare for and give effective interviews to communicate policy messages.

PPOL 902 - Strategy and Practice of Public Policy**Credits:** 3

Introduces students to the real world of United States public policymaking while developing their skills as participants in the policymaking industry. It is structured around a set of case studies of current or recently resolved policy issues as well as a set of readings addressing how policy is made in general. Each student will pick a policy issue and will be required to produce a full set of written work on that issue.

PPOL 904 - Economics for Public Policy**Credits:** 3

Provides an overview of how economics can be used to analyze and design public policy. Basic analytical skills used in economic modeling, and supplication to specify policy areas and problems. At the end of the course, students will be able to use basic economic models to analyze policy problems. They will also be able to understand how market mechanisms work, when free markets perform well and when government intervention may improve outcomes.

PPOL 906 - Fundamentals of Policy Analysis**Credits:** 3

An introduction to public policy analysis and the role of rigorous research in the policymaking process. Fundamentals of the policymaking process; evaluation and design of research to inform policy decisions; effective team work to analyze issues and make policy recommendations; writing and speaking effectively to policymakers; analysis of research briefs and articles to evaluate the validity of their designs, conclusions, and potential use to policymakers.

PPOL 908 - Quantitative Methods for Policy Research**Credits:** 3

Provides an overview of basic quantitative analysis techniques that are common in public policy analysis. Students will be trained to design high quality research and conduct statistical analyses. By the end of the course, students will be able to carry out basic statistical analyses, evaluate the statistical analyses in research reports and journal articles, and communicate clearly the results of analyses to both professional and general audiences.

PPOL 910 - Policy Across Borders**Credits:** 3

Analysis of what we learn about policy, its outcomes and the research and analysis on which it is based, by comparing policies and outcomes across national borders and other jurisdictions. Students explore how institutional structures affect the influence of scientific and technical data and knowledge across different institutional contexts, and how and why political actors "venue shop" for organizations they deem more likely to afford them the influence and policy-making outcomes they seek.

PPOL 912 - Strategies for Policy Impact**Credits:** 3

How to develop and implement strategies that drive policy change. Students will learn how to analyze approaches to changing policy and then evaluate the most viable option for specific circumstances. Students will review different influence models, discuss which ones work best in varying situations and identify how influence models connect to policy campaigns. Students will review current campaigns, learn central elements of a successful campaign to change public policy, and create their own campaign plans.

PPOL 950 - Washington DC Colloquium**Credits: 3**

This intensive January-Term course focuses on practical skill building and experiential learning related to policy-making. The goals are: (i) familiarize students with public policy institutions and career paths across multiple sectors (e.g., government, non-profit organizations, think-tanks, research institutes, organizations that do international work); (ii) connect students to working professionals for networking and career-building opportunities; (iii) provide opportunities to interact with and question Washington, DC professionals, beginning to socialize students as public policy professionals.

PPOL 990 - Policy Capstone**Credits: 3**

Designed for students to demonstrate the integration of their learning experiences in the program. The final product will be a written report/paper and an oral presentation. Capstone projects will be completed under the direction of faculty mentors and outside experts. The purpose of the capstone is a demonstration of student capabilities and an opportunity to work with expert mentors aimed at enhancing post-graduation employment choices. There will be a capstone forum in which students will present their work to Carsey MPP faculty and students.

PPOL 990A - Policy Capstone Planning**Credits: 1**

One credit course to identify and plan for the Policy Capstone. To be taken in the second semester of the first year for full-time students. Topics to be covered in group meetings include description of a research or project prospectus, samples of capstone projects, and responsible conduct of research. Students will complete UNH training offered by the IRB and will learn about the IRB approval process. The final product is a prospectus for the capstone project, to be presented in writing and orally to MPP faculty and students.

PPOL 995 - Reading and Research**Credits: 3**

Independent study under the direction of a Carsey faculty member. Requires approval of the advisor and curriculum committee. May be repeated for credit.

PPOL 996 - Reading and Research**Credits: 3**

Independent study under the direction of a Carsey faculty member. Requires approval of the advisor and curriculum committee. May be repeated for credit.

PPOL 997 - Advanced Special Topics**Credits: 3**

Occasional or experimental offerings. May be repeated for credit.

PPOL 998 - Policy Internship**Credits: 3**

Actual experience in a policy setting. In some cases this will be a credit-bearing internship, supervised by a faculty member who will provide the academic structure to parallel the applied experience. In other cases a policy internship may not be appropriate for academic credit; in such cases the internship experience fulfills the requirement but does not provide credits. Carsey faculty will provide guidance and oversight for these internships as well. Cr/F.

PPOL 998A - Policy Internship**Credits: 0**

Actual experience in a policy setting. 998A is the noncredit internship. The internship experience fulfills the requirement but does not provide credits. Carsey faculty will provide guidance and oversight for these internships as well. Cr/F.

Recreation Management & Policy (RMP)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

RMP 800 - Concepts of Recreation and Leisure**Credits: 3**

An overview of historical and philosophical perspectives of the play, recreation, therapeutic recreation, and park and natural resource conservation movements. Students examine recreation leisure and recreation resources in contemporary society, particularly in the context of the development of social capital. Includes leisure values and ideals, the emergence and evolution of "free time" diversity, and public policy implications. Prereq: permission.

RMP 805 - Management and Policy in Therapeutic Recreation**Credits: 3**

Students acquire knowledge of current principles and procedures for assuming an administrative role in the therapeutic recreation profession. Includes issues and practices related to supervision, reimbursement, quality improvement programs, consultation, marketing, and more. Prereq: permission.

RMP 806 - Recreation Administration and Organizational Behavior**Credits: 3**

The organization and administration of public, private, and not-for-profit recreation agencies. The primary unit of analysis in this class is the recreation organization and the environment in which it operates. Emphasis is placed on organization, management, marketing, and financing applications, theories, and research. Prereq: RMP 800, permission.

RMP 811 - Recreation Resource Management**Credits: 3**

An examination of the supply and demand of natural resources for outdoor recreation uses, with emphasis on relationships between public and private roles and responsibilities. Historical, social, and environmental impacts of outdoor recreation use are discussed. Current principles and techniques of recreation resource planning and management are outlined. Prereq: permission.

RMP 820 - Adaptive Sports and Recreation Facilitation**Credits: 3**

This course takes a strengths-based approach to examining adaptive sports and recreation, with a focus on best practices and risk management in community-based settings. This is an experiential learning course, whereby students will learn how to design, plan, and facilitate a variety of adaptive sports for people with disabilities. Students will learn and apply processes for selecting, fitting, and adjusting adaptive sports and recreation equipment for individuals with disabilities. A special course fee will apply.

RMP 830 - Camp Administration and Leadership**Credits:** 3

Provides students with an understanding of administrative and organizational practices in structured camp settings. The theory, practice, and challenges of program planning for youth and adult development within the recreation context of camping. Explores current sociological, environmental, economical and legislative trends influencing contemporary camp management. Prereq: permission.

RMP 840 - Therapeutic Recreation Service Delivery in Community Settings**Credits:** 3

This course provides specialized knowledge and skills related to the practice of Recreational Therapy in a community setting. The course will encourage students to expand their understanding of philosophical constructs, public policy, and professional standards to reflect practice in community settings including schools, municipal recreation organizations, and community health program. Specific facilitation techniques and treatment modalities will be introduced as well as information specific to the therapeutic process as it is observed in these settings.

RMP 850 - Aging, Advocacy, and Active Learning**Credits:** 3

This course explores the impact of advocacy and social action programs for the aging adult. Course content is explored through the lens of active living emphasizing how leisure and recreation contribute to optimal experiences in later adulthood. Course content includes facilitating the learners' understanding of later life issues within the broader context of health and well-being at the local, state, and national levels. There is an applied action component to this course using a service learning framework.

RMP 860 - Program Administration in Recreational Sport**Credits:** 3

This course focuses on the administration and development of participant-based community sport and recreation programs. The course emphasizes the organizational, administrative, and planning competencies to effectively manage these programs. A focus on problems, and the development of research-oriented solutions related to the administration of community sport and recreation programs will also be emphasized.

RMP #868 - Theories of Youth Development**Credits:** 3

This course provides students with a foundation in the theories and philosophies associated with the field of youth development. In this course, students critically analyze the strengths, limitations, and potential applications of various theories, philosophies, and ideas. Examples include: Developmental Systems Theory, Ecological Systems Theory, protective factors, and developmental assests. Students work or volunteer with a youth program for the duration of the semester in order to facilitate application of course concepts.

RMP 870 - Management and Design of Recreation and Park Facilities**Credits:** 3

Provides students with an orientation to the theories, design, operation, and functions of recreational facilities. Topics include facility development, operational considerations, and auxiliary functions that impact the manager's role. Students gain insight into key areas of facility management through visitations to actual facilities. Prereq: RMP major; permission. Special fee.

RMP 872 - Law and Public Policy in Leisure Services**Credits:** 3

Topics including an overview of the nature of law and U.S. legal systems; the law of torts, contracts, civil liberties and rights; risk management and legal research are addressed in the context of recreation services and resources. Public policy and professional advocacy implications are examined as related to legislative and decisional systems. Prereq: RMP 800 and permission.

RMP 875 - Entrepreneurial and Commercial Recreation**Credits:** 3

Principles of business planning and development as applied to the private sector leisure services industry. Emphasizes knowledge of key commercial leisure services profiles and their intersection with allied professions such as hospitality and tourism. This course is designed to examine commercial recreation from both a macro and micro perspective. This multi-level approach helps prepare students to write a viable business plan for their own commercial recreation enterprise.

RMP 897 - Master's Project**Credits:** 3

Prereq: RMP 800, RMP 805 or RMP 806. Permission required.

RMP 899 - Master's Thesis**Credits:** 3

Prereq: RMP 800, RMP 805 or RMP 806, A graduate level statistics and graduate level methods course. Permission required. May be repeated for a maximum of 6 credits. Cr/F.

RMP 912 - Non-Profit Administration and Leadership**Credits:** 3

An overview of the creation, management, and administration of non-profit organizations and businesses. Examines legal requirements for charter and incorporation by state law and Federal guidelines from the Internal Revenue Service. Current trends and issues in non-profit sector business are explored and a survey of the wide diversity of non-profit sector organizations is included. Since a high percentage of recreation agencies are incorporated as non-profit organizations, specific applications are made to the field of leisure and recreation. Prereq: RMP 800, RMP 805 or RMP 806 or permission.

RMP 924 - Fund Development and Grantwriting**Credits:** 3

Students develop an understanding of the meaning of philanthropy, its importance in society, and its integral relationship to the fund development process. The social context for philanthropy, development, and fund raising and the changing practices for non-profit leadership are addressed. Presents and evaluates strategies and communication tools used to support fund development goals. Students develop abilities in grantwriting, requesting major donor support, structuring annual giving campaigns, and establishing special events. Prereq: RMP 800 or permission. Also listed as SW 957.

RMP 963 - Graduate Field Practicum**Credits:** 2

This course is designed to provide RMP graduate students with a supervised, professional field experience in an approved recreation, park, tourism, or health and human service agency. Students will conduct a 100-hour field practicum experience and complete academic assignments.

RMP 964 - Graduate Internship**Credits:** 3

Supervised, professional administrative work experience in an approved recreation, park, tourism, or health care agency. Students participate in a 14-week 560-hour internship experience after receiving approval from their academic adviser and the internship coordinator. Prereq: RMP 800, 805 or 806, permission. Cr/F.

RMP 970 - Teaching Practicum**Credits:** 3

Students work with a faculty mentor to investigate, observe, and practice teaching methods and learning theory. Includes the various instructional technologies as tools to enhance the teaching/learning process. The Teaching Practicum is designed for students who wish to assume part-time or adjunct University teaching positions upon completion of the Master's degree or who see themselves pursuing a future doctoral degree with higher education as a career goal. Prereq: RMP 800 and permission. Cr/F.

RMP 980 - Independent Study**Credits:** 1-3

Prereq: RMP 800 and RMP 805 or RMP 806, permission. May be repeated for a maximum of 6 credits.

RMP 995 - Colloquium Seminar**Credits:** 3

As a capstone course for the M.S. Degree in Recreation Management and Policy, this course is designed to invite students to bring content and ideas formed in previous coursework and experience to the consideration of opportunities and challenges in future professional practice. Central themes include ethical problem solving and issues and trends within the profession. Approaches to ethical inquiry, analysis of evidence and advocacy methodologies are addressed in the context of forming and articulating professional positions. The course is conducted as a colloquium with all participants contributing to the learning process. Prereq: RMP 800, RMP 805 or RMP 806, and permission.

RMP 998 - Special Topics**Credits:** 2-4

Resource Administration & Management (RAM)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

RAM #805 - Ecotourism: Managing for the Environment**Credits:** 4

Ecotourism by definition embraces both the environment and economics. A comprehensive framework for planning and managing ecotourism in order to both maximize the potential benefits and minimize the potential costs for people and the environment. Conducted in a seminar format, case studies used to assess the role of ecotourism in the sustainable development of natural resources. Prereq: introduction to tourism. (Also offered as TOUR #705.)

RAM 867 - Social Impact Assessment**Credits:** 4

A cross-disciplinary perspective on the issues, problems, and methods of Social Impact Assessment (SIA). The analytic approach and theoretical framework provided applied to the assessment of very diverse events—changes in the natural environment, local economy, or dominant technology. SIA is required of most U.S. and Canadian federal and state sponsored projects that come under the National Environmental Protection Act, to include tourism, park and recreation development, highways, reservoirs, timber production, hazardous waste disposal, as well as policy issues. SIA is also required for all projects funded by international donor agencies such as USIA, the World Bank, and private international development agencies.

RAM 877 - Topics in Community Planning**Credits:** 4

Advanced treatment of the concepts and tools required for effective local and regional planning to guide land use, capital investment in infrastructure, and organization for service delivery. Prereq: CEP 614 or permission. (Also offered as CEP 777.) (Offered every other year.)

RAM 896 - Investigations**Credits:** 2-4

A) Resource Administration; B) Resource Management; C) Resource Policy; D) Public Laws and Resources. Prereq: permission. May be repeated.

RAM 898 - Directed Research**Credits:** 4-6

Hours and credits to be arranged. Not available if credit obtained for RAM 899. A year-long course; an IA grade (continuous course) given at the end of the first semester. Prereq: permission. Cr/F.

RAM 899 - Master's Thesis**Credits:** 1-10

May be repeated for a maximum of 10 credits. Cr/F.

RAM 900 - Resource Administration and Management Internship**Credits:** 4

Practical administrative and management experience in an area of professional interest. Open only to graduate students in the RAM program. Cr/F.

RAM 911 - Natural and Environmental Resource Management**Credits:** 4

Fundamental economic, aesthetic, and ethical principles involved in the management of natural resources. Ways to apply these principles in the formulation and evaluation of resource management policies, including the management of specific renewable resources, soils, water, forests, and wildlife. Prereq: permission. (Also offered as RECO 911.) (Offered every other year.)

RAM #993 - Natural and Environmental Resources Seminar**Credits:** 2

Presentation and discussion of recent research, literature, and policy problems in the natural and social sciences influencing resource use. (Also offered as RECO 993.) Cr/F.

Resource Economics (RECO)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

RECO #800 - Marketing Communications Research: Methodological Foundations**Credits: 4**

Concepts, tools, and techniques to facilitate accurate product, service, and idea marketing communications. Specific applications to tourism and economic/community development initiatives are included. Prereq: Basic statistics course; or permission.

RECO 808 - Environmental Economics**Credits: 4**

Environmental pollution, the market economy, and optimal resource allocation; alternative control procedures; levels of environmental protection and public policy; property right issues. Prereq: intermediate microeconomic theory; permission.

RECO #811 - Marine Resource Economics**Credits: 4**

Economic overview of the marine environment; interactions/conflicts surrounding this multiple-use resource. Economics of fisheries; marine recreation; aquaculture; endangered species; non-market ecosystem services. Prereq: EREC 411, ECON 401 or ECON 402 or equivalent or permission. (Offered every other semester.)

RECO 856 - Rural and Regional Economic Development**Credits: 4**

Concepts and methods of delineating regional economies, methods of measuring activity, regional development, and public policies. Emphasis on empirical research studies. Prereq: intermediate economy theory or permission. (Offered every year.)

RECO 895 - Investigations**Credits: 2-4**

A) Agricultural Marketing; B) Agricultural Production and Farm Management; C) Community Development; D) Economics of Human Resources; E) Economics of Population and Food; F) Land Economics; G) Marine Economics; H) Rural Economic Development; I) Regional Economics; J) Water Economics. Special assignments in readings, investigations, or field problems. Prereq: permission. May be repeated.

RECO 898 - Directed Research**Credits: 4-6**

Hours and credits to be arranged. Not available if credit obtained for RECO 899. A year-long course; an IA grade continuous grading) given at the end of the first semester. Prereq: permission. Cr/F.

RECO 899 - Master's Thesis**Credits: 1-10**

May be repeated for a maximum of 10 credits. Cr/F.

RECO 911 - Natural and Environmental Resource Management**Credits: 4**

Fundamental economic, aesthetic, and ethical principles involved in the management of natural resources and ways to apply these principles in the formulation and evaluation of resource-management policies including the management of specific renewable resources, soils, water, forests, and wildlife. (Also offered as RAM 911.) Prereq: permission. (Offered every other year.)

RECO 993 - Natural and Environmental Resources Seminar**Credits: 1**

Presentation and discussion of recent research, literature, and policy problems in the natural and social sciences influencing resource use. (Also offered as RAM #993.) Cr/F.

Social Work (SW)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

SW 801 - Women and Aging**Credits: 3**

An overview of women as they age in the American culture, with a brief international overview. Ethnic and cross-cultural perspectives explored. Areas to be studied include biological aging, focusing on menopause; economics and women, including retirement issues; women in the media; lesbian relationships; and late marriages.

SW 805 - Child and Adolescent Risks and Resiliency: Program, Policy and Practice**Credits: 3**

Major social work policy and program questions in the field of child welfare introduced. The relationship between child welfare and the rest of the social work profession analyzed. Various types of child welfare services, some aspects of social and child welfare policy studied, as well as current research and practice issues in child welfare services.

SW 806 - Social Action in the Dominican Republic**Credits: 3**

This course examines issues of culture, poverty, social development and social justice in the Dominican Republic through both service learning work and through preparatory and reflective class sessions and discussions. Students will examine social and economic development issues within a global framework and will explore efforts to improve conditions on this island nation. The service learning component includes working on a designated construction project and volunteering in a local elementary school. Students will also collaborate with community leaders to learn more about social, cultural and historical issues and will engage in a variety of cross-cultural activities. Students will engage with the local Haitian immigrant community, tour local schools and orphanages, and visit historical areas including the Zona Colonial of Santo Domingo. The primary part of the class will take place during March spring break. Special fee.

Co-requisite: INCO 589

SW 812 - Understanding Developmental Disabilities**Credits: 3**

Analysis of the complex social contexts of people with developmental disabilities. Explores and questions traditional approaches and the current service system. Examines family and community services and resources.

SW 813 - School Social Work**Credits: 3**

The course examines the school as a social institution that serves to educate and socialize children into US society and the role of the social worker in the school setting. Readings, activities, and discussions provide practical skills and theory for school social work practice. The course content addresses the history of school social work, integrating social work values into a school setting, systemic needs within school settings, the importance of networking and professional collaboration, and working with diverse and at-risk youth and their families. Students also examine the role of social workers in helping students, schools, and families adjust to and cope with trauma, special education needs, and related topics.

SW 814 - Introduction to Addiction: Assessment and Intervention**Credits: 3**

Information and skills necessary to address issues of substance abuse with individuals, families and communities. Overview of the dynamics of addiction; the treatment and recovery process; and the role of social work professionals in the identification and treatment of addiction. Special populations (women, adolescents, elderly, gay/lesbian/ bisexual/ transgendered, ethnic/racial groups) discussed. Treatment approaches explored.

SW 815 - Practice with Gay, Lesbian, Bisexual, and Transgender People**Credits: 3**

Sexual minorities constitute the minority group a counselor most consistently encounters wherever he or she works. Addresses the task of counseling gay, lesbian, and bisexual people on both personal and professional levels for the counselor. Readings include theoretical, experimental, clinical, counseling, and personal perspectives, as well as providing an introduction to the gay/lesbian/bisexual subculture. Students explore and examine their own attitudes and assumptions regarding gays, lesbians, and bisexuals.

SW 816 - Addiction: Myth, Science and Policy**Credits: 3**

This course focuses on the science of addictions and co-occurring disorders and how myths and beliefs effect policy, programming and practice. Students get the opportunity to explore cultural myths, beliefs, stigma and prejudices regarding addictions (alcohol, illicit drugs, prescription drugs, as well as eating disorders, tobacco, and gambling), and co-occurring disorders that becomes national and state policy and programming.

SW 819 - Addiction Recovery**Credits: 3**

This course describes the theory, science and practice of recovery management; including addiction and co-occurring disorders emerging and innovative treatment models and practices, continuity of care and systems of care as they relate to long-term recovery. The integration of addiction and co-occurring treatment with mutual aid and self-help recovery resources. Processes that promote recovery, acute care models and the locus of service delivery. There will be a focus throughout on evidence based practices, emerging practices, innovative treatments and initiatives and long-term trajectories of recovery (population specific). Recovery-focused behavioral health care system transformation and recovery oriented systems of care are examined, as well as challenges and successes through links to the community and collaboration strategies for policy, political and fiscal change, as well as the future of addiction treatment and recovery and recovery-oriented systems of care with a broad range of approaches, models and initiatives.

SW 820 - Social Welfare Policy I**Credits: 3**

The aim of this course is to prepare students to act as informed human service professionals through a better understanding of social problems, social welfare policy, and the American social welfare system. Students are provided with an overview of the origins and development of social welfare policy in the United States, the political processes in our federal and state systems, and the values and ethics which shape our present social welfare system. The course also helps students examine ways they can influence policy formulation while advocating for human rights and social/economic justice.

SW 830 - Social Work Practice I**Credits: 3**

Basic concepts, theories, and skills of social work practice. Lectures and discussions, readings and written exercises, and laboratory and practice sessions. Students use the experiential parts of the course (laboratory and interview simulations) to apply the conceptual and theoretical knowledge.

Co-requisite: SW 880

SW 831 - Social Work Practice II: Practice in Small Groups and Community Organizations**Credits: 3**

Continuation of Social Work Practice I with the further aim of introducing students to social work with groups and communities as models of social work practice.

Co-requisite: SW 881

SW 840 - Implications of Race, Culture, and Oppression for Social Work Practice**Credits: 3**

This foundation course is designed to increase students awareness of historical, social, political, economic and cultural aspects of micro- and macro-level oppression directed at minorities. Course materials focus on insidious societal forces that shape and profoundly alter life experiences of large numbers of people, with special attention to social relationships that promote the welfare of some, while limiting opportunities and choices for others, including racial and ethnic minorities, children, women, the poor, persons with disabilities, GLBTQ individuals, and others. Students consider practice issues in multicultural SW.

SW 850 - Human Behavior and the Social Environment I**Credits: 3**

In this course, students learn about behavior and development and its context across the lifecycle. The semester addresses growth and development from the prenatal period through the end of life using social systems theory/person-in-the-environment as a conceptual framework. The different systems that impact individual development including family, community, and larger systems are examined. Human worth and social justice themes permeate course materials, class discussions, and activities.

SW 851 - Human Behavior and the Social Environment II**Credits: 3**

In this course, students learn about behavior and development and its context across the life cycle from a macro systems perspective. The macrosystems that impact individual development are examined. Societal forces that are often invisible shape and profoundly alter life experiences of larger numbers of people. HSBE II pays special attention to social relationships that promote welfare of some while limiting opportunities and choices for others. the semester explores the influence of class, gender, race, ethnicity, religion, age, sexual orientation, and other aspects of diversity on development and behavior of larger systems.

SW 860 - Research Methods in Social Work**Credits: 3**

Designed to acquaint degree students with the concepts and skills necessary to carry out research in social work practice. Particular emphasis placed on methodological issues related to research in a variety of practice contexts. Although the skills necessary to review research critically are examined, the primary emphasis is on preparing the student to carry out research related to practice.

SW 865 - Adventure Therapy: Facilitation and Processing of the Experience**Credits:** 3

This class will familiarize students with a variety of active assessment facilitation and processing skills which can be used with clients when engaging in adventure therapy. Students will be given multiple opportunities to practice these skills to gain a better understanding of their own facilitation and processing skills, and how to use adventure activities as a therapeutic tool in the clinical practice. Active participation required. Open to both social work and non-social work graduate students. Special fee.

SW 870 - Intimate Partner Violence**Credits:** 3

This course examines intimate partner violence or domestic violence from its historical roots to the present. In accordance with an historical and contextual approach, we examine theories that explain and describe the phenomenon, research that attempts to define it, as well as social policies, social movements, and intervention from a social work perspective. Intimate partner violence (IPV) also known as domestic violence, cuts across racial, ethnic, and class boundaries and impedes victim's well-being and social participation. IPV includes many physical assault, sexual assault, emotional, verbal, and economic abuse and coercive control.

SW 880 - Field Internship I**Credits:** 3

This two-semester requirement provides supervised learning and practice within social work programs in a wide range of program settings. Students spend 16 hours per week in the field. Individual field placements arranged with each student by the field coordinator. In order to receive credit, students must satisfactorily complete both SW 880 and SW 881. A concurrent integrative seminar is required. In this weekly seminar attention is given to the development of basic social work skills and techniques, legal and ethical issues, and the development of appropriate professional relationships. A primary goal is to integrate classroom learning with the field experience. Special fee. Cr/F.

Co-requisite: SW 830**SW 881 - Field Internship II****Credits:** 3

SW 881 is a continuation of SW 880, Field Internship I. Students must satisfactorily complete both field experience semesters to receive credit. Prereq: SW 880 (Field Internship I). Cr/F.

Co-requisite: SW 831**SW 885 - Study Abroad****Credits:** 3

Students in this course examine the historical development of social welfare in another country including an analysis of the underlying values and attitudes that dictate practice and policy decisions. The course includes agency site visits, lectures, themed readings and visits to important cultural sites. Only open to first and second year MSW students. Special fee. Cr/F.

Co-requisite: INCO 589**SW 897 - Special Topics in Social Work and Social Welfare****Credits:** 2 or 3

Seminar for graduate students. Topics may include: A) Drugs and Chemical Dependency; B) Intimate Partner Violence C) Social Action in Education Settings D) Social Action in the Dominican Republic. May be repeated for different topics. Special fee.

SW 899 - Master's Thesis**Credits:** 1-6

Each student carries out original research that culminates in a master's thesis. Students may enroll in 1 to 6 credits per semester. May be repeated up to a maximum of 6 credits. Permission required. Prereq: permission required. Cr/F.

SW 900 - Advanced Standing Practice and Field Seminar**Credits:** 3

Weekly seminar held concurrently with field placement designed to orient and adequately prepare advanced standing students for advanced practice and field courses. Bridges the undergraduate and graduate curriculum and reviews foundation year concepts, theories, and skills of social work practice and field. Exploration of social work identity and professional relationships with supervisors, colleagues, and agencies. Primary focus on social work values and ethics and the development of ethical decision-making skills including the importance of culturally competent practice. Only offered to advanced standing MSW students. Cr/F.

SW 926 - Social Welfare Policy II**Credits:** 3

This course is an extension of Social Welfare Policy I. Both courses view social welfare policy as the framework in which social work services are developed and delivered. That is, policies provide the context for direct practice. Social Welfare Policy II examines policy analysis as a process with underlying theory and methodology. This process emphasizes political advocacy in the pursuit of human rights, and social and economic justice. The course integrates policy and practice, in part, through student research and analysis of specific social problems and client populations relevant to the student's volunteer, work, and/or field internship experience. Prereq: SW 820.

SW 930 - Advanced General Practice III: Clinical Assessment and Intervention**Credits:** 3

Advanced generalist practice with individuals, families and groups is the first of the two required advanced practice classes. The major objective of the advanced generalist practice curriculum is to educate practitioners to work towards the restoration and enhancement of human functioning and prevention of maladaptive functioning. This course emphasizes a deepened understanding of the differential treatment process and an expanded knowledge of intervention approaches. The aim of the course is to further deepen knowledge and skills, particularly with a concentration on evidence based practices, interdisciplinary work and ethical practice. Prereq: SW 831.

Co-requisite: SW 982**SW 931 - Advanced Generalist Practice IV: Community and Administrative Practice****Credits:** 3

This macro social work course utilizes foundation year curriculum content to provide an advanced examination of social work practice in larger systems. Students develop knowledge, values, and skills in areas of community analysis, community organization, community capital, empowerment and the use of power, sustainable communities, evaluation of community interventions. Strategies of cultivation, mobilization and sustaining resources that empower underserved constituent groups are studied. Course content is rooted in both historical and current contexts in providing administrative and technological tools to undertake change efforts across organizational and community systems. Prereq: SW 930.

Co-requisite: SW 983

SW 952 - Human Behavior and the Social Environment III**Credits:** 3

Designed to acquaint master's degree students with the epidemiology, classification, and etiology of the major mental illnesses; with a primary objective to develop the student's diagnostic skills in the field of psychopathology. Students become familiar with historical and current mental health policy issues. At course conclusion students have an effective working knowledge of the bio-psycho-social basis of the major mental disorders, the behavioral symptomology that characterizes them, the use of psychotropic medication in treatment, and their classification according to the current DSM system. Prereq: SW 850 and SW 851.

SW 957 - Fund Development and Grantwriting**Credits:** 3

This course is designed to introduce students to various fundraising strategies to support nonprofit health and human service organizations. Students are provided with an overview of philanthropy and nonprofit organizations in the United States, effective fundraising and individual donor strategies, and ethical and legal issues related to fundraising. Student use a case-study approach for planning, developing, and writing successful grant proposals to fund health and human services programming.

SW 962 - Data Analysis and Statistics**Credits:** 3

Social science statistics is a set of methods used to organize and analyze data for the purpose of either answering research questions or testing social science theories with data. Course provides practical, data-oriented introduction to the methods of modern statistical analysis with a focus on understanding and interpretation rather than the details of calculation. Students learn more about the role of data analysis in research informed social work practice as well as practice informed research. Prereq: SW 860.

SW 965 - Program and Practice Evaluation**Credits:** 3

A one semester course, basic introduction to evaluation methods in the context of social work practice and social welfare. Students develop and conduct evaluations of practice, programs, and policies. Course provides skills required for practice and program evaluation. Prereq: SW 962.

SW #973 - Interventions with Groups**Credits:** 3

Principles of social work practice with groups are explored. Therapeutic focus is on helping the individual within the framework of a group setting. The purpose and usefulness of group work as a preventative method and as an intervention tool are analyzed. History, various theories, techniques of group facilitation and typologies of treatment and task groups are examined. Students actively participate in a group simulation called "class-as-a-group" to enhance their skills and understanding of group work.

SW 974 - Social Work Supervision**Credits:** 3

Prepares students for a supervisory role in human service agencies. Basic principles of administrative, supportive and educational supervision are reviewed and related to the student's own experiences in supervision or as a supervisor.

SW 975 - Theory and Practice of Family Therapy**Credits:** 3

This course is designed to provide students with an introduction to the theory and practice of family therapy. Major approaches to be examined include structural, strategic, systemic, brief, narrative family therapy, and social constructionism. Students have an opportunity to present cases they are currently working with in their internships and are able to practice family therapy techniques with the use of a team coaching them from behind a one-way mirror.

SW 979 - Social Work and the Law**Credits:** 3

Social work practitioners routinely encounter and interact with the legal system in their work. The course provides knowledge of, and learning about, the differences between the legal and social service networks, the realities of work involving the law, and legal issues, as well as an understanding of those aspects of the legal system most likely to impact clients and their families.

SW 982 - Field Internship III**Credits:** 4

This two semester requirement provides advanced practice experience in a wide range of social work settings. Students spend 24 hours per week in the field. Individual field placements are arranged with each student by the field coordinator. In order to receive course credit, students must satisfactorily complete both semesters (SW 982 and SW 983). A concurrent integrative seminar is also required. The goal of the weekly seminar is to assist students in conceptualizing and integrating the multiple theoretical issues and practice concepts of course work and the practicum. Students are expected to take major responsibility for the semester, using the instructor as a resource. Prereq: SW 881. Special fee. Cr/F.

Co-requisite: SW 930**SW 983 - Field Internship IV****Credits:** 4

This two semester requirement provides advanced practice experience in a wide range of social work settings. Students spend 24 hours per week in the field. Individual field placements are arranged with each student by the field coordinator. In order to receive course credit, students must satisfactorily complete both semesters. A concurrent integrative seminar is also required. The goal of the workshop-style weekly seminar is to assist students in conceptualizing and integrating the multiple theoretical issues and practice concepts of course work and the practicum. Students are expected to take major responsibility for the semester, using the instructor as a resource. Prereq: SW 982. Cr/F.

Co-requisite: SW 931**SW 992 - Special Projects and Independent Study****Credits:** 1-3

Projects, research and reading programs in areas of concentration. Sixty days advance approval of the student's plan of study by adviser and proposed instructor required. Prereq: 24 cr. in M.S.W. coursework. May be repeated to maximum of 6 credits. Special fee. Cr/F.

Sociology (SOC)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

SOC 815 - Criminological Theory**Credits: 4**

Introduces graduate students and advanced undergraduates to the major theoretical literature in crime and delinquency. Covers both classical and contemporary theory, with empirical assessments of theories, including macro- and micro-level control, strain, and learning theories as well as recent developments in biosocial, deterrence, labeling, and critical/feminist theories.

SOC 820 - Sociology of Drug Use**Credits: 4**

Examines licit and illicit drug use from a sociological perspective. Draws primarily from the sociology of mental health and criminology to explore a variety of drug-related topics including: historical and current U.S. drug trends, dominant theoretical approaches about the initiation into, and continued use of drugs, drug-related crime, therapeutic use of drugs, prevention and treatment of drug problems, and drug-related policies.

SOC 825 - Social Demography**Credits: 4**

Social demography examines the linkages between changes in the size, composition and distribution of the population and changes in social, environmental, economic and political factors. The course examines demographic methods and the materials and the analytical techniques used by demographers to analyze population redistribution, fertility, work, marriage, migration and mortality. The policy implications of demographic change will be examined with attention to the United States as well as the developed and developing world.

SOC 830 - Communities and the Environment**Credits: 4**

People and the natural environments in which they live fundamentally structure communities around the globe. Economic change, expanding development, and human migration are transforming social and environmental conditions in both rural and urban settings, altering the identities of many communities as well as their relationships with the natural world. The importance of these emerging social and environmental issues has made them a focus for social science inquiry. This course exposes students to a range of sociological concepts, theories, and research approaches related to the study of communities and environmental issues. Some of the substantive themes that are covered include: population dynamics and environmental change; social capital and social networks; political economy and community development; collective action and social movements; science, technology, and environmental risks; and environmental racism and justice. The principal assignment for the course will be a research project where students investigate a community or environmental issue of their own interest.

SOC 833 - Gender-Based Violence: US and International Perspectives**Credits: 4**

Students examine the spectrum of gender-based violence occurring in the United States and Europe. Four main areas are examined: (1) Theoretical and methodological issues inherent in researching gender-based violence. (2) Different types of gender-based violence including sexual and relationship violence, harassment, pornography, and human trafficking. (3) The historical economic, and cultural contexts that facilitate gender-based violence. (4) Prevention and intervention efforts to reduce gender-based violence.

SOC #835 - Sociology of Community**Credits: 4**

This course analyzes "community" from a sociological perspective. Community is one of the fundamental concepts in the sociological literature; this course covers those aspects of the concept that are concerned with geographic communities: neighborhoods, communities, cities, etc. It considers how American communities have changed over time and what the current characteristics are, and how these characteristics are related to the "quality of life" in the communities. Students study theoretical and empirical approaches to studying communities, particularly but not exclusively American communities. Among specific areas of community research covered are: spatial inequality and concentrated poverty; what housing research shows about the importance of community to outcomes for families and children; the impact of community on health; and community development as a strategy for community change.

SOC 840 - Sociology of Mental Health**Credits: 4**

Introduces students to different sociological approaches for studying and understanding mental health and illness. Students examine the social distribution of mental illness in the United State and the social-structural factors that help to explain mental health variations. Also addresses issues surrounding mental health treatment, systems, and policies for the mentally ill.

SOC #842 - Sociology and Social Policy**Credits: 4**

Social policy and public policy defined: description of the policy making process. The political sociology of the policy-making process; who makes policy and who influences policy, under what conditions, and with what effect. Definition of social policy research and the various roles social scientist can adopt for policy-relevant work. Students are responsible for critiquing the readings and for preparing a substantial research paper.

SOC 845 - Race, Ethnicity, and Inequality**Credits: 4**

Sociological perspectives on race and ethnic relations for graduate and advanced undergraduate students. Topics include the creation of racial and ethnic identities; the nature and extent of segregation; education, employment, and wealth inequalities; and the effects of state policy. Course emphasizes both theoretical and empirical assessments.

SOC 873 - Childhood and Social Policy**Credits: 4**

This course will expose students to a variety of sociological perspectives on childhood in American society. Focus will be on the analysis of how social institutions, like the modern American family, school, economic system, justice system and communications media affect children. Assumes a prior understanding of important sociological concepts, critical thinking skills and social science writing ability.

SOC 876 - Family Violence Research Seminar**Credits: 4**

Analysis of abusive relationships within the family, especially physical and sexual abuse of children and spouses. Each student designs and conducts and empirical study to test a theory purporting to explain intra-family violence, the consequences of violence for families and society, or a study of what might prevent family violence. Permission required.

SOC 880 - Social Conflict**Credits: 4**

Analysis of the social conditions associated with the major forms of conflict management in human societies: discipline, rebellion, vengeance, negotiation, mediation, law, therapy, supernaturalism, and avoidance.

SOC 888 - Advanced Medical Sociology**Credits:** 4

This course is intended to provide an in-depth introduction to the major theoretical frameworks of medical sociology and empirical research examining social factors that influence individual's health and illness. We will take a critical approach in our examination of: the distribution of health and illness (by socioeconomic status, sex/gender, and race/ethnicity); medicalization and social control; and the social construction of health and illness. Most of the learning in this course will take place through shared facilitation of class discussions based on the reading.

SOC 894 - Evaluation Research**Credits:** 4

This course is designed to cover major methodological and practical issues in the field of evaluation research, including the definition and meaning of evaluation; the purposes of evaluation; the design and conduct of evaluation studies; evidence-based policy writing; and the uses of evaluation results. This is an advanced undergraduate-level and graduate-level course. The prerequisite for the course is successful coursework in methods of research and statistical analysis.

SOC 897 - Special Topics**Credits:** 4

Occasional or experimental offerings. May be repeated for different topics.

SOC 899 - Master's Thesis**Credits:** 1-10

Students typically complete 6 credits, however, it can be taken up to 10 credits when permitted by the department by petition. Cr/F.

SOC 900 - Pro-seminar**Credits:** 2

An introduction to the discipline of sociology and to the graduate program. Topics include writing for professional audiences, publishing, applying for support, TA workshop, writing a thesis or dissertation. Meetings with faculty members throughout the semester. Cr/F.

SOC 901 - Sociological Methods I: Intermediate Social Statistics**Credits:** 4

Application of statistical methods to the analysis of social data, with particular emphasis on multiple regression and related topics.

SOC 902 - Sociological Methods II: Research Design**Credits:** 4

Systematic investigation of each step in the design and implementation of sociological research. Selected techniques of data collection and analyses are pursued. Prereq: methods of social research; social statistics;/or their equivalents or permission.

SOC 903 - Sociological Methods III: Advanced Social Statistics**Credits:** 4

Multivariate statistical methods for the analysis of social data. Topics include problem-solving with multiple regression, categorical-variable models, dynamic models, and others.

SOC 904 - Sociological Methods IV: Qualitative and Historical Research Methods**Credits:** 4

An introduction to qualitative and historical methods of data gathering and analysis in the social sciences. The seminar is intended as an intensive workshop training in such techniques as participant observation, in-depth interviewing, content analysis, and archival exploration. Students conduct qualitative and/or historical research and are responsible for designing an individual project, collecting and analyzing appropriate data, and writing a research paper.

SOC 911 - Sociological Theory I**Credits:** 4

The content, presuppositions, and implications of the body of classical sociological theory, exemplifying the full range of sociological inquiry.

SOC 912 - Sociological Theory II**Credits:** 4

The content, presuppositions, and implications of contemporary sociological theory. Students engage in theory construction and analysis and in this endeavor are encouraged to develop their particular interests in substantive areas. Prereq: SOC 911.

SOC 921 - Crime and Conflict**Credits:** 4

Serves as the core course for the Crime and Conflict concentration. Theories and patterns of crime; the social origins of violent and nonviolent conflict; the role of social factors in the justice system; alternative forms of crime control and conflict management.

SOC 975 - Sociology of the Family**Credits:** 4

Major approaches in the sociological study of families. Individuals in families, family relationships, and families as groups and the interrelationships among these levels. Interactional and systemic properties of marriage, parent-child relations, and extended family relations.

SOC 980 - Social Stratification**Credits:** 4

Introduces students to the core of theoretical, methodological, and substantive issues in social stratification. Readings include classical and contemporary theories of stratification and work exploring the sources and consequences of stratification. Inequalities based on class, race, and gender examined.

SOC #988 - Medical Sociology: Health, Healing, and Society**Credits:** 4

Social context of wellness, illness, and healing; stratification and health; mortality and morbidity in relation to class, race, ethnicity, religion, gender, and age; social control functions of medicine: medicalization and de-medicalization; interaction of physicians and patients; medical occupations; mental health and mental illness; stress and illness; medical care systems in various countries.

SOC 990 - Teaching Sociology Seminar**Credits:** 4

Helps graduate students explore teaching techniques and improve their teaching skills. Topics include: setting course goals, designing lectures, evaluating student course work, leading discussion, and experimenting with innovative teaching techniques. (Also offered as GRAD 974.)

SOC 995 - Reading and Research**Credits:** 2-8

A student prepared by training and experience to do the independent work under the guidance of an instructor may register. Prereq: 16 graduate hours of sociology and permission. Hours and credit to be arranged. May be repeated for different topics.

SOC 996 - Reading and Research**Credits:** 2-8

A student prepared by training and experience to do the independent work under the guidance of an instructor may register. Prereq: 16 graduate hours of sociology and permission. Hours and credit to be arranged. May be repeated for different topics.

SOC 997 - Advanced Special Topics**Credits:** 2 or 4

Occasional or experimental offerings.

SOC 999 - Doctoral Research**Credits:** 0

Cr/F.

Spanish (SPAN)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

SPAN 890 - Topics in Second Language Acquisition/Pedagogy/Methodology**Credits:** 3

A) Introduction to Second Language Acquisition, B) Internet Technologies and Second Language Learning. Special fee. May be taken more than once if no duplication of content.

SPAN 897 - Topics in Hispanic Literature and Cultural Studies**Credits:** 3

A) Medieval Spanish Literature, B) Spanish Literature of the Renaissance and the Golden Age, C) Spanish Literature of the 18th and 19th Centuries, D) Spanish Literature of the 20th Century (Poetry/Theater/Prose), E) Contemporary Spanish Literature, F) Spanish Cultural Studies, G) Latin American Literature of the 16th and 17th Centuries, H) Latin American Literature of the 18th and 19th Centuries, I) 20th Century Latin American Literature (Poetry/Theater/Prose), J) Contemporary Latin American Literature, K) Cyberliterature and Cyberculture, L) Transatlantic Studies, M) Spanish and Latin American Philosophy and Essay, N) Indigenous Cultural Expression of the Americas, O) Hispanic Film Studies, P) U.S. Hispanic Cultural Studies, Q) Latin American Cultural Studies, R) Senior Seminar, S) Other. Special fee. May be taken more than once for credit if no duplication of content.

SPAN 898 - Topics in Hispanic Linguistics and Cultural Studies**Credits:** 3

a) History of the Spanish Language, B) Study of Spanish Mood and Aspect, C) Sociolinguistics of Spanish, D) Discourse Analysis, E) Politeness and Pragmatics, F) Bilingualism and Spanish in the U.S., G) Spanish Pronouns, H) Regional and Social Variation in Spanish Phonetics, I) Other. Prereq: permission of instructor. Special fee. May be taken more than once for credit if no duplication of content.

SPAN 899 - Master's Thesis**Credits:** 1-6

Cr/F.

SPAN 901 - Bibliography and Methods of Research**Credits:** 3

Required of all graduate students, to be taken concurrently with all graduate work from first to last semester during the program of study. An introduction to standard bibliographical techniques and to form and style in the preparation and writing of research findings. Preparation bibliographical essay is the final requirement for graduation. IA (continuous grading). Special fee.

SPAN 903 - Applied Linguistics**Credits:** 3

Required of all graduate assistants teaching in the departmental program. Discussion of current methodology and linguistic approaches to the teaching of Spanish. Instruction in the use of media, technology and the Language Resource Center. Readings, discussion, class observation and teaching portfolio. IA (continuous grading). Special fee.

SPAN 995 - Independent Study**Credits:** 1-3

Guided individual study with training in bibliography and organization of materials. Topics selected by instructor and student in conference. Barring duplication of content, may be repeated for credit.

SPAN 997 - Graduate Seminar**Credits:** 3

Selected topics in Spanish linguistics, literature and cultural studies. Special fee.

Technology (TECH)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

TECH 820 - Emerging Technologies and Project-Based Learning (PBL) for Teachers: Focus on Nanotechnology**Credits:** 3

The science and engineering of nanotechnology is the technology topic of this course. Seminars about nanotechnology and its connections to physical science, biology, earth science, math, and engineering will be delivered in the mornings and afternoons. These seminars will be at the first year graduate student level. Additionally, students will learn about the fundamentals of project-based learning, and design project elements directly connected to the nanotechnology topics for implementation in their classroom. These project elements will be implemented in the classroom and become part of the student's PBL portfolio.

TECH 850 - Intellectual Asset Management for Engineers and Scientists**Credits:** 3

This course provides an introduction to the most important topic for business in the 21st century—intellectual assets. Students receive an overview in practical, real-world aspects of managing intellectual assets (copyright, patents, trademarks, trade secrets, etc.). Students taking this course will be exposed to lectures, guest presentations, and case studies aimed at increasing their understanding of intellectual property strategies and related legal issues; technology assessment; technology valuation; licensing issues, strategies and negotiation techniques; business planning and start-up company development; and strategies for attracting investment for new ideas. The instructors and guest speakers for the course are involved in managing, protecting, investing in, or commercializing intellectual property assets in real world settings such as university technology transfer offices, patent law firms, venture capital firms, start-up companies, and related settings.

TECH 880 - Intellectual Property Law for Engineers & Scientists**Credits:** 3

This course will cover the major doctrines of trade secrets, patents, copyrights, and trademarks, including what kinds of information qualify for protection, what must be done to obtain that protection, and the underlying policy choices made by legislators and courts.

Zoology (ZOO)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

ZOOL #808 - Stream Ecology**Credits: 4**

Ecological relationships of organisms in flowing water; streams as ecosystems. Lectures on physical and chemical features of streams, floral and faunal communities, and factors controlling populations of benthic invertebrates. Laboratory exercises employ both field and laboratory experimental techniques. Weekly seminars on original research papers. Special fee. (Not offered every year.)

ZOOL 810 - Ichthyology**Credits: 4**

An introduction to the evolution, systematics, anatomy, physiology, and ecology of fishes, with an emphasis on New England species. Prereq: principles of biology or equivalent. Lab. (Offered alternate years.) Special fee.

ZOOL 833 - Behavioral Ecology**Credits: 4**

Behavioral adaptations of animals to their environment including the evolution of behavior and behavioral genetics; foraging and competition for resources; reproductive ecology, mating systems and parental care; and the evolution of cooperative behavior. Examples include both vertebrates and invertebrates. Emphasis is on critical understanding of concepts as exhibited in oral and written exercises. Students conduct independent investigations. Prereq: animal behavior or ecology or evolution course. Lab. (Offered in alternate years.)

ZOOL 836 - Genes and Behavior**Credits: 4**

Genes and behavior examines the genetic underpinnings of animal behavior, and how behavior evolves on a genetic level. The course primarily relies on readings from the primary literature, using examples from laboratory model organisms, animals in their natural habitats, and humans. Topics include aggressiveness, social behavior, personality, parental care, communication, mating behavior, novelty seeking behavior, and foraging. This interdisciplinary course examines these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology, and neurobiology. Prereq: GEN 604 and ZOOL 713 or equivalent.

ZOOL 845 - Biology and Diversity of Insects**Credits: 4**

The lecture examines the unique biologies and structure of insects, the most diverse group of organisms. The laboratory project is based on past public requests for an understanding of aquatic insect biodiversity in streams. Experience in sampling, sorting, and identifying aquatic insects is developed, and an understanding of biodiversity indices is developed for a formal report and presentation. Prereq: BIOL 411 and 412 or equivalent. Special fee. (Not offered every year.)

ZOOL 850 - Biological Oceanography**Credits: 4**

Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. Field trips on R/V Gulf Challenger and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. (Also offered as ESCI 850.) Special fee. Lab. (Not offered every year.)

ZOOL 872 - Fisheries Biology**Credits: 3**

Principles of fisheries science, with emphasis on techniques used to assess the biological characteristics of exploited fish populations and the use of such information for fisheries management. Prereq: ZOOL 810; permission. (Not offered every year.)

ZOOL 873 - Physiology of Fish**Credits: 4**

Investigation of the physiological processes responsible for maintaining homeostasis in fishes. Focus is on the function and regulation of the major organ systems during stress and environmental adaptation. Topics include reproduction, osmoregulation, digestion, endocrinology and sensory perception.

ZOOL 877 - Neuroethology**Credits: 3**

Survey of fundamental concepts and recent discoveries in neurobiology. Topics include structure and function of neurons, development, cellular basis of behavior (sensory and motor systems), neuropharmacology, and neural plasticity (learning). Prereq: principles of biology I and II or permission. Physiology also desirable.

ZOOL 895 - Advanced Studies**Credits: 1-4**

Independent study in various areas, including but not limited to: animal behavior; departmental biology; ecology; electron microscopy; evolution; genetics; histology; history of biology; invertebrate biology; neurobiology and behavior; physiology; teaching practices; underwater research; vertebrate biology; biological techniques. Course sections for advanced work, individual or group seminar. May include reading, laboratory work, organized seminars, and conferences. Prereq: permission of department chairperson and staff concerned.

ZOOL 899 - Master's Thesis**Credits: 1-10**

Prereq: permission of department chairperson and prospective supervisor. May be repeated up to a maximum of 10 credits. Cr/F.

ZOOL 997 - Seminar**Credits: 1-2**

Reports on recent zoological literature. Subject fields are those listed under ZOOL 895 and ZOOL 896; not all areas available every semester. Cr/F.

ZOOL 998 - Seminar**Credits: 1-2**

Reports on recent zoological literature. Subject fields are those listed under ZOOL 895 and ZOOL 896; not all areas available every semester. Cr/F.

ZOOL 999 - Doctoral Research**Credits: 0**

Cr/F.

Faculty Listing

The faculty listing in the catalogs are static and updated annually in the Fall. The 2018-2019 faculty listing in the catalogs will be updated in Fall 2018. The Fall 2017 faculty listing will appear in the 2018-2019 catalogs until that time.

A

Aber, John D

PROFESSOR

Natural Resources & The Environment

B.S., 1971, M.F.S., 1973, Ph.D., Yale University, 1976

Afolayan, Funso S

ASSOCIATE PROFESSOR

History

B.A., 1980, M.A., University of Ife, Nigeria, 1984

Ph.D., Obafemi Awolowo University, Nigeria, 1991

Aikens, Melissa L

ASSISTANT PROFESSOR

Biological Sciences

A.B., Bowdoin College, 2000

M.F.S., Yale University, 2004

Ph.D., University of Virginia, 2013

Aktekin, Tevfik

ASSOCIATE PROFESSOR

Decisions Sciences

B.S., Yildiz Technical University, Turkey, 2002

M.B.A., 2004, Ph.D., George Washington University, 2009

Alexander, Lee

RESEARCH ASSOCIATE PROFESSOR EMERITUS

B.S., Marietta College, 1968

M.S., University of New Hampshire, 1980

Aliouche, El-Hachemi

ASSOCIATE PROFESSOR

Hospitality Management

B.S., 1980, M.A., 1982, Ph.D., University of New Hampshire, 1992

M.B.A., University of Pennsylvania, 1995

Amato-Wierda, Carmela C

ASSOCIATE PROFESSOR

Dean's Office - CEPS

B.A., Harvard University, 1988

Ph.D., Rensselaer Polytechnic Institute, 1993

Andam, Cheryl Marie P

ASSISTANT PROFESSOR

Molecular, Cellular, & Biomedical

B.S., University of The Phillipines, Philippines, 1998

M.S., State University of New York at Binghamton, 2007

Ph.D., University of Connecticut, 2011

Andrade, Arturo S

ASSISTANT PROFESSOR

Biological Sciences

B.S., University of Michoacan, Mexico, 2001

Ph.D., National Polytechnic Institute of Toulouse, France, 2008

Andrew, David S

PROFESSOR EMERITUS

B.A., 1965, M.A., University of Michigan, 1968

Ph.D., Washington University, 1977

Andrew, Michael D

PROFESSOR EMERITUS

B.S., Cornell University, 1960

M.A.T., 1961, Ed.D., Harvard University, 1969

Annicchiarico, Michael J

PROFESSOR

Music

B.M., University of New Hampshire, 1976

M.F.A., 1981, Ph.D., Brandeis University, 1993

Arthanat, Sajay

ASSOCIATE PROFESSOR

Occupational Therapy

B.S., Santosh College Occupational Therapy, India, 1997

C.A.G.S., 2004, Ph.D., State University of New York at Buffalo, 2007

Asbjornsen, Heidi

ASSOCIATE PROFESSOR

Natural Resources & The Environment

B.A., Carleton College, 1989

M.S., 1993, Ph.D., Yale University, 1999

Ashcraft, Catherine M

ASSISTANT PROFESSOR

Natural Resources & The Environment

B.A., University of Pennsylvania, 1998

M., Yale University, 2002

Ph.D., Massachusetts Institute of Technology, 2011

Atallah, Shady S

ASSISTANT PROFESSOR

Natural Resources & The Environment

B.S., Holy Spirit University of Kaslik, Lebanon, 2003

M.S., American University of Beirut, 2006

M.S., University of California, 2009

Ph.D., Cornell University, 2014

MENGR, Holy Spirit University of Kaslik, Lebanon,

Aytur, Semra A

ASSOCIATE PROFESSOR

Health Management & Policy

B.A., Brown University, 1991

M.P.H., Boston University, 1996

Ph.D., University of North Carolina, 2005

B

Babbitt, Kimberly J

ASSOCIATE DEAN

Dean's Office - LS & A

B.S., University of New Hampshire, 1984

M.S., Texas A & M University, 1988

Ph.D., University of Florida, 1996

Baber, Kristine M

ASSOCIATE PROFESSOR EMERITA

B.A., Southern Illinois University - Carbondale, 1970

M.A., 1981, Ph.D., University of Connecticut, 1983

Bachrach, David S

PROFESSOR

History

B.A., Carleton College, 1994

M.A., 1997, Ph.D., University of Notre Dame, 2001

Bailey, Brigitte G

PROFESSOR

English

B.A., University of Virginia, 1977

A.M., 1980, Ph.D., Harvard University, 1985

Baker, Alan L

ASSOCIATE PROFESSOR

Biological Sciences

B.A., State University of New York at Binghamton, 1965

Ph.D., University of Minnesota, 1973

Baldwin, Kenneth C

PROFESSOR EMERITUS

B.S., Northeastern University, 1973

M.S., University of New Hampshire, 1977

Ph.D., University of Rhode Island, 1982

Ballestero, Thomas P

ASSOCIATE PROFESSOR

Civil and Environmental Engineering

B.S., 1975, M.S., Pennsylvania State University, 1977

Ph.D., Colorado State University, 1981

Balling, Ludwig C

PROFESSOR EMERITUS

B.A., Oberlin College, 1960

M.A., 1961, Ph.D., Harvard University, 1965

Banach, Mary

ASSOCIATE PROFESSOR

Social Work

B.A., University of Wisconsin - Milwaukee, 1975

M.S.W., New York University, 1978

D.S.W., Columbia University in the City of New York, 1995

Bao, Xiaoyan

ASSISTANT PROFESSOR

Accounting and Finance

B.A., Dongbei University, China, 1977

M.Acc., Southern Illinois University, 2003

Ph.D., University of Nebraska, 2013

Barber, Heather

ASSOCIATE PROFESSOR

Kinesiology

B.S., St. Lawrence University, 1978

M.S., Pennsylvania State University, 1982

Ph.D., University of Oregon, 1992

Barber, Nelson A

ASSOCIATE PROFESSOR

Hospitality Management

B.S., San Jose State University, 1978

A.O.S., Culinary Institute of America, 2004

M.S., Purdue University, 2005

Ph.D., Texas Tech University, 2008

Barcelona, Robert J

ASSOCIATE PROFESSOR

Recreation Management & Policy

B.A., University of Mississippi, 1993

M.S., 1995, Ph.D., Indiana University - Bloomington, 2001

Barkey, Dale P

PROFESSOR

Chemical Engineering

B.A., Clark University, 1979

M.S., University of Cincinnati, 1982

Ph.D., University of California - Berkeley, 1987

Barnett, Carole K

ASSOCIATE PROFESSOR

Management

B.A., 1989, M.A., 1992, Ph.D., University of Michigan, 1994

Barrows, Clayton W

PROFESSOR

Hospitality Management

B.S., 1982, M.S., 1987, Ed.D., University of Massachusetts - Amherst, 1990

Barth, Brian M

ASSISTANT PROFESSOR

Molecular, Cellular, & Biomedical

B.S., 2004, M.S., Colorado State University, 2005

Ph.D., University of Alaska, 2009

Bartos, Radim

PROFESSOR

Computer Science

M.S., Czech Technical University, Czech Republic, 1987

M.S., 1996, Ph.D., University of Denver, 1997

Basterra, Maria

PROFESSOR

Mathematics & Statistics

B.S., University of Texas at Austin, 1992

M.S., 1993, Ph.D., University of Chicago, 1998

Bauer, Christopher F

PROFESSOR

Chemistry

B.S., University of Notre Dame, 1974

M.S., University of Illinois at Urbana-Champaign, 1976

Ph.D., Colorado State University, 1979

Baughman, Reagan A

ASSOCIATE PROFESSOR

Economics

B.A., Drew University, 1996

M.A., 1999, Ph.D., Syracuse University, 2001

Beasley, Joan B

RESEARCH ASSOCIATE PROFESSOR

Institute on Disability

B.A., City University of New York, 1976

M.Ed., Northeastern University, 1981

Ph.D., Brandeis University, 2000

Becker, Mimi Larsen

ASSOCIATE PROFESSOR EMERITUS
B.A., Carleton College, 1957
M.A., 1989, Ph.D., Duke University, 1993

Bedker, Patricia D

ASSOCIATE PROFESSOR
Biological Sciences
B.S., University of Massachusetts - Amherst, 1976
M.S., University of New Hampshire, 1980
Ph.D., Cornell University, 1985

Beemer, Cristy A

ASSOCIATE PROFESSOR
English
B.A., Hofstra University, 1993
B.A., State University of New York, 1996
B.A., 2000, M.A., State University of New York at New Paltz, 2002
Ph.D., Miami University - Ohio, 2008

Begis, Maggie D

CLINICAL ASSISTANT PROFESSOR
Agriculture, Nutrition, & Food System
B.S., 1998, M.S., Pennsylvania State University, 2001
Ph.D., Boston University, 2009

Begum, Momotaz

ASSISTANT PROFESSOR
Computer Science
B.S., Bangladesh University of Engin, 2003
M.S., Memorial University - Canada, 2005
Ph.D., Univ of Waterloo, 2010

Bell, Brent J

ASSOCIATE PROFESSOR
Kinesiology
B.A., University of New Hampshire, 1989
M.S., New England College, 1997
Ph.D., University of New Hampshire, 2005

Bell, Erin S

ASSOCIATE PROFESSOR
Civil and Environmental Engineering
B.C.E., Georgia Institute of Technology, 1996
M.S., 1998, Ph.D., Tufts University, 2003

Beller-McKenna, Daniel

ASSOCIATE PROFESSOR
Music
B.A., 1985, M.M., Temple University, 1988
Ph.D., Harvard University, 1994

Benassi, Victor A

PROFESSOR EMERITUS
B.S., California State College in Pe, 1969
M.A., City University of New York, 1973
Ph.D., City College, New York, NY, 1974

Bennett, Albert B

PROFESSOR EMERITUS
B.S., Maine Maritime Academy, 1954
B.S., 1958, M.A., University of Maine, 1959
Ed.D., University of Michigan, 1966

Bennett, Jessie L

ASSISTANT PROFESSOR
Recreation Management & Policy
B.S., Green Mountain College, 2004
M.S., Brigham Young University, 2010
Ph.D., Indiana University - Bloomington, 2013

Benoit, Jean

PROFESSOR
Civil and Environmental Engineering
B.S., University of Montreal, Canada, 1977
M.S., 1980, Ph.D., Stanford University, 1984

Berda, Erik B

ASSOCIATE PROFESSOR
Chemistry
B.S., Pennsylvania State University, 2003
Ph.D., University of Florida, 2008

Bergeron, R Daniel

PROFESSOR EMERITUS
B.S., 1966, Ph.D., Brown University, 1973

Berglund, Per

PROFESSOR
Physics
B.S., Lund University, Sweden, 1988
Ph.D., University of Texas at Austin, 1993

Berlinsky, David L

PROFESSOR
Agriculture, Nutrition, & Food System
B.S., Michigan State University, 1977
M.S., University of New Hampshire, 1981
Ph.D., University of Rhode Island, 1989

Berndtson, William E

PROFESSOR EMERITUS
B.S., University of Connecticut, 1966
Ph.D., Cornell University, 1971

Bigornia, Sherman J

ASSISTANT PROFESSOR
Agriculture, Nutrition, & Food System
M.A., 2004, Ph.D., Boston University, 2012
B.S., University of California - San Diego,

Birch, Francis S

PROFESSOR EMERITUS
A.B., Harvard University, 1958
M.S., University of Wisconsin, 1964
Ph.D., Princeton University, 1969

Bloser, Peter F

RESEARCH ASSOCIATE PROFESSOR
Space Science Center
A.B., Princeton University, 1994
Ph.D., Harvard University, 2000

Boettcher, Margaret S

ASSOCIATE PROFESSOR
Earth Sciences
B.S., Brown University, 1998
Ph.D., Massachusetts Institute of Technology, 2005

Bolker, Jessica A

PROFESSOR
Biological Sciences
B.S., Yale University, 1986
Ph.D., University of California - Berkeley, 1993

Bolster, W Jeffrey

PROFESSOR EMERITUS
B.A., Trinity College - Conn, 1976
M.A., Brown University, 1984
Ph.D., Johns Hopkins University, 1992

Bonica, Mark J

ASSISTANT PROFESSOR
Health Management & Policy
B.A., University of Massachusetts - Amherst, 1992
M.S., Univ Colorado/Denver, 1999
M.B.A., University of Massachusetts - Amherst, 2000
Ph.D., George Mason University, 2013

Bornstein, Steven P

ASSOCIATE PROFESSOR
Communication Sciences & Disorders
B.S., 1975, M.A., Northeastern University, 1977
Ph.D., University of Connecticut, 1981

Bostic, Heidi L

DEAN
Dean's Office - Liberal Arts
B.A., University of Nebraska, 1993
M.A., 1994, Ph.D., Purdue University, 2000

Bothner, Wallace A

PROFESSOR EMERITUS
B.A., State University of New York at Binghamton, 1963
Ph.D., University of Wyoming, 1967

Boudreau, Marc A

ASSISTANT PROFESSOR
Chemistry
B.S., Mount Allison University, 1997
B.S., University of Victoria, Canada, 2001
Ph.D., University of Alberta, Canada, 2007

Boulton, Elizabeth P

ASSOCIATE PROFESSOR
Agriculture, Nutrition, & Food System
D.V.M., University of Georgia, 1980

Boysen, Andrew A

PROFESSOR
Music
B.M., University of Iowa, 1991
M.M., Northwestern University, 1993
D.F.A., 1998, D.M.A., University of Rochester, 1998

Brettschneider, Marla B

PROFESSOR
Political Science
B.A., State University of New York at Binghamton, 1986
M.A., 1988, Ph.D., New York University, 1993

Brewer, Jennifer F

ASSOCIATE PROFESSOR
Geography
A.B., 1989, B.A., University of Michigan, 1989
M.S., University of Maine, 2002
Ph.D., Clark University, 2007

Brick, Danielle J

ASSISTANT PROFESSOR
Marketing
B.A., Amherst College, 2008
Ph.D., Duke University, 2016

Brito, Andre Fonseca De

ASSOCIATE PROFESSOR
Agriculture, Nutrition, & Food System
D.V.M., 1996, M.S., Federal University of Minas Gerais, Brazil, 1999
Ph.D., University of Wisconsin - Madison, 2004

Britton, Dennis A

ASSOCIATE PROFESSOR
English
B.A., University of Southern California, 1998
M.A., 2000, Ph.D., University of Wisconsin, 2007

Bromberg, Daniel E

ASSOCIATE PROFESSOR
Political Science
B.A., University at Albany, 2001
M.P.A., University of Vermont, 2006
Ph.D., Rutgers University, 2009

Broussard, C Anne

ASSOCIATE DEAN
Dean's Office - Health & Human Svcs
B.A., University of Texas at Austin, 1974
M.S.W., Louisiana State University, 1977
Ph.D., Washington State University, 1986

Brown, Benjamin Cliff

ASSOCIATE PROFESSOR
Sociology
B.A., Earlham College, 1987
M.A., 1992, Ph.D., Emory University, 1996

Brown, Warren R

ASSOCIATE PROFESSOR EMERITUS
B.A., Willamette University, 1966
M.A., 1972, Ph.D., Claremont Graduate University, 1977

Bryce, Julia G

PROFESSOR
Earth Sciences
B.A., University of Virginia, 1993
Ph.D., University of California - Santa Barbara, 1998

Bstieler, Ludwig A

PROFESSOR
Marketing
M.S., 1989, Ph.D., University of Innsbruck, Austria, 1997

Buchbinder, Orly

ASSISTANT PROFESSOR
 Mathematics & Statistics
 B.S., 1998, M.S., 2005, Ph.D., Technion- Israel Institute of Technology, Israel, 2010

Burakowski, Elizabeth A

RESEARCH ASSISTANT PROFESSOR
 Earth Systems Research Center
 B.A., Wellesley College, 2003
 M.S., 2007, Ph.D., University of New Hampshire, 2013

Burdick, David M

RESEARCH ASSOCIATE PROFESSOR
 Natural Resources & The Environment
 B.S., Hobart and William Smith College, 1977
 Ph.D., Louisiana State University, 1988

Burdin, Rachel S

ASSISTANT PROFESSOR
 English
 B.A., University of North Carolina at Chapel Hill, 2010
 M.A., 2014, Ph.D., Ohio State University, 2016

Burger, John F

PROFESSOR EMERITUS
 B.A., Grinnell College, 1962
 M.S., 1965, Ph.D., University of Arizona, 1971

Burke, Joanne D

CLINICAL PROFESSOR
 Agriculture, Nutrition, & Food System
 B.S., University of Rhode Island, 1975
 M.Ed., Tufts University, 1977
 Ph.D., University of New Hampshire, 2001

Butkiewicz, Thomas J

RESEARCH ASSISTANT PROFESSOR
 Center for Coastal & Ocean Mapping
 B.S., Ithaca College, 2005
 M.S., 2007, Ph.D., University of North Carolina, 2010

C**Calarco, John R**

PROFESSOR EMERITUS
 B.S., George Washington University, 1963
 M.S., 1965, Ph.D., University of Illinois at Urbana-Champaign, 1969

Calculator, Stephen N

PROFESSOR EMERITUS
 B.A., State University of New York at Oswego, 1974
 M.S., State University of New York at Geneseo, 1975
 Ph.D., University of Wisconsin, 1980

Calder, Brian R

RESEARCH ASSOCIATE PROFESSOR
 Center for Coastal & Ocean Mapping
 M.S., 1994, Ph.D., Heriot-Watt University, Edinburgh, 1997

Came, Rosemarie E

ASSOCIATE PROFESSOR
 Earth Sciences
 B.S., 1994, M.A., Boston College, 1998
 M.A., 2002, Ph.D., Massachusetts Institute of Technology, 2005

Campagna, Rachel L

ASSISTANT PROFESSOR
 Management
 B.A., Allegheny College, 2000
 M., Ohio State University, 2005
 Ph.D., Washington University - St Louis, 2011

Cappiello, Joyce D

ASSISTANT PROFESSOR
 Nursing
 B.S., Marycrest College, 1971
 M.S., Boston College, 1977
 Ph.D., Swansea University, 2010

Caputo, Christine A

ASSISTANT PROFESSOR
 Chemistry
 B.S., Carleton University, 2001
 M.S., McGill University, Canada, 2004
 Ph.D., University of Western Ontario, Canada, 2009

Carey, Gale B

PROFESSOR EMERITA
 B.S., University of Massachusetts - Amherst, 1974
 M.S., University of Wisconsin, 1976
 Ph.D., University of California - Davis, 1981

Cariens, Benjamin S

ASSOCIATE PROFESSOR
 Art and Art History
 B.A., College of William and Mary, 1991
 M.F.A., Boston University, 1993
 MTS, Harvard University, 1999

Carnicelli, Thomas A

PROFESSOR EMERITUS
 A.B., Princeton University, 1958
 M.A., 1960, Ph.D., Harvard University, 1966

Caron, Rosemary M

PROFESSOR
 Health Management & Policy
 B.A., Regis College, 1990
 Ph.D., Dartmouth College, 1996
 M.P.H., Boston University, 1998

Carr, Russell T

PROFESSOR
 Chemical Engineering
 B.S., Brigham Young University, 1980
 M.S., 1983, Ph.D., University of Rochester, 1984

Carroll, John E

PROFESSOR EMERITUS
 A.B., La Tech Univ, 1966
 M.A., Western Michigan University, 1968
 Ph.D., Michigan State University, 1974

Carter, Elizabeth A

ASSISTANT PROFESSOR
Political Science
B.A., Whitman College, 1997
M.A., 2003, M.P.A., University of Washington, 2004
M.A., 2005, Ph.D., University of California - Berkeley, 2012

Carter, Michael J

ASSOCIATE PROFESSOR
Electrical & Computer Eng Dept
B.S.E., University of Michigan, 1975
M.S., Stanford University, 1976
Ph.D., University of Michigan, 1984

Carter, Vernon B

ASSOCIATE PROFESSOR
Social Work
A.A., Orange County Community College, 1968
B.A., State University of New York, 1970
M.S.W., University of New Hampshire, 1998
Ph.D., Boston College, 2003

Cashman, Holly R

ASSOCIATE PROFESSOR
Languages, Literatures, & Cultures
B.A., Hood College, 1994
M.A., 1997, Ph.D., University of Michigan, 2001

Celikkol, Barbaros

PROFESSOR EMERITUS
B.S., Elon University, 1964
M.S., Stevens Institute of Technology, 1967
Ph.D., University of New Hampshire, 1972

Chamberlin, Kent A

PROFESSOR
Electrical & Computer Eng Dept
B.S.E.E., 1974, M.S.E.E., 1976, Ph.D., Ohio University, 1982

Chandler, Donald S

PROFESSOR
Biological Sciences
A.A., Shasta College, 1969
B.S., University of California - Davis, 1971
M.S., University of Arizona, 1973
Ph.D., Ohio State University, 1976

Chandran, Benjamin D G

PROFESSOR
Physics - Joint Positions
B.A., Yale University, 1990
M.A., 1994, Ph.D., Princeton University, 1997

Charntikov, Sergios

ASSISTANT PROFESSOR
Psychology
M.A., 2002, M.A., California State University, S, 2009
Ph.D., University of Nebraska, 2015

Charpentier, Michel H

ASSOCIATE PROFESSOR
Computer Science
B.S., 1993, M.S., 1993, Ph.D., National Polytechnic Institute of Toulouse, France, 1997

Chasteen, N Dennis

PROFESSOR EMERITUS
A.S., Mott Community College, 1962
A.B., University of Michigan, 1965
M.S., 1966, Ph.D., University of Illinois at Urbana-Champaign, 1969

Chaston, John M

ASSOCIATE PROFESSOR
Languages, Literatures, & Cultures
B.A., 1980, M.A., Brigham Young University, 1982
Ph.D., University of Texas, 1987

Chavajay, Juan Pablo

ASSOCIATE PROFESSOR
Psychology
M.A., University de San Carlos, Guatemala, 1989
M.A., 1995, Ph.D., University of California - Santa Cruz, 1999

Chavez, Daniel

ASSISTANT PROFESSOR
Languages, Literatures, & Cultures
B.S., Instituto Tech Monterrey, 1991
M.A., 1994, M.A., Ohio University, 1999
Ph.D., University of Michigan, 2002

Chen, Jianhong

ASSISTANT PROFESSOR
Management
B.A., 2006, M.A., Shandong University, China, 2009
Ph.D., Drexel University, 2014

Chen, Xuanmao

ASSISTANT PROFESSOR
Molecular, Cellular, & Biomedical
B.S., Nanchang University, China, 1997
M.S., Fudan University, China, 2000
Ph.D., University of Tuebingen, Germany, 2006

Chini, Gregory P

PROFESSOR
Mechanical Engineering
B.S., University of Virginia, 1993
M.S., 1996, Ph.D., Cornell University, 1999

Chiu, Monica Elizabeth

INTERIM ASSOCIATE VP COMMUNITY EQUITY DIVERSITY
English
B.A., St. Catherine University, 1987
M.A., State University of New York at Binghamton, 1992
Ph.D., Emory University, 1996

Cho, Eun Kyeong

ASSOCIATE PROFESSOR
Education
B.A., 1991, M.A., Ewha Womans University, Korea, 1993
Ed.M., 2001, Ed.D., Columbia University in the City of New York, 2005

Christie, Andrew D

ASSOCIATE PROFESSOR
Philosophy
A.B., Princeton University, 1974
M.S.L., Yale University, 1979
Ph.D., Massachusetts Institute of Technology, 1983

Chu, Brian Wei-Kuo

PROFESSOR
Art and Art History
B.F.A., 1991, M.F.A., Queens College of the City University of New York, 1993

Chu, Feixia

ASSOCIATE PROFESSOR
Molecular, Cellular, & Biomedical
B.S., Wuhan University, China, 1995
M.S., University of South Florida, 1998
Ph.D., University of California - San Francisco, 2004

Cicccone, Stephen J

ASSOCIATE PROFESSOR
Accounting and Finance
B.S., 1994, M.S., University of Florida, 1994
Ph.D., Florida State University, 2000

Clark, Mary M

PROFESSOR EMERITA
B.A., University of New Hampshire, 1962
Ph.D., University of Massachusetts - Amherst, 1978

Clyde, William C

PROFESSOR
Earth Sciences
B.A., Princeton University, 1990
M.S., 1993, Ph.D., University of Michigan, 1997

Coffin, Jaed M

ASSISTANT PROFESSOR
English
B.A., Middlebury College, 2002
M.F.A., University of Southern Maine, 2009

Cohn, Ellen S

PROFESSOR
Psychology
B.A., Clark University, 1974
M.A., 1976, Ph.D., Temple University, 1978

Collins, John J

ASSOCIATE PROFESSOR
Molecular, Cellular, & Biomedical
B.A., Colgate University, 1976
Ph.D., University of Wisconsin, 1984

Collins, Karen E

ASSOCIATE PROFESSOR
Kinesiology
A.B., Princeton University, 1994
M.S., University of New Hampshire, 1998
Ph.D., University of North Carolina, 2002

Collins, Michael Robin

PROFESSOR
Civil and Environmental Engineering
B.S., 1970, M.S., Virginia Polytechnic Institute and State University, 1972
Ph.D., University of Arizona, 1985

Congalton, Russell G

PROFESSOR
Natural Resources & The Environment
B.S., Rutgers University, 1979
M.S., 1981, Ph.D., Virginia Polytechnic Institute and State University, 1984

Connell, James J

ASSOCIATE PROFESSOR
Physics - Joint Positions
B.A., 1981, M.A., 1983, Ph.D., Washington University - St Louis, 1988

Connelly, Vincent J

ASSOCIATE PROFESSOR
Education
B.A., Loyola University - Maryland, 1988
M.S.Ed., 1993, Ed.D., Johns Hopkins University, 2004

Conway, Karen Smith

PROFESSOR
Economics
B.A., Eastern Illinois University, 1982
Ph.D., University of North Carolina at Chapel Hill, 1987

Cook, Jenni Carbaugh

PROFESSOR
Music
B.M., Bradley University, 1995
M.M., 1997, D.M.A., University of Illinois at Urbana-Champaign, 2001

Cook, Raymond A

ASSOCIATE PROFESSOR
Civil and Environmental Engineering
A.B., 1981, B.S., University of Illinois at Urbana-Champaign, 1981
M.S., 1991, Ph.D., Cornell University, 1992

Cook, Summer B

ASSOCIATE PROFESSOR
Kinesiology
B.S., East Stroudsburg University, P, 1999
M.S., 2002, Ph.D., Syracuse University, 2009

Cooper, Barbara T

PROFESSOR EMERITA
B.A., 1966, M.A., 1967, Ph.D., University of Wisconsin, 1974

Coppens, Andrew D

ASSISTANT PROFESSOR
Education
B.S., University of New Hampshire, 2004
M.S., 2010, Ph.D., University of California, 2015

Cote, Richard H

PROFESSOR
Molecular, Cellular, & Biomedical
B.S., Tufts University, 1974
Ph.D., University of Wisconsin, 1980

Couse, Leslie J

EXECUTIVE DIRECTOR-ENGAGEMENT & FACULTY DEVELOPMENT
 Engagement and Faculty Development
 B.S.Ed., State University of New York at Cortland, 1980
 M.S.Ed., State University of New York at Brockport, 1980
 M.S., Russell Sage College, 1993
 Ph.D., Syracuse University, 2001

Craig, Patricia J

ASSOCIATE PROFESSOR
 Recreation Management & Policy
 B.S., University of Scranton, 1987
 M.Ed., Temple University, 1997
 Ph.D., University of New Hampshire, 2010

Crepeau, Elizabeth L

PROFESSOR EMERITA
 B.S., 1966, M.A., 1988, Ph.D., University of New Hampshire, 1994

Croce, Ronald V

PROFESSOR
 Kinesiology
 B.S., Brooklyn College of the City University of New York, 1973
 M.Ed., Temple University, 1975
 Ph.D., University of New Mexico, 1983

Crow, Garrett E

PROFESSOR EMERITUS
 A.B., Taylor University, 1965
 M.S., 1968, Ph.D., Michigan State University, 1974

Cullen, Kelly L

ASSOCIATE PROFESSOR
 Natural Resources & The Environment
 B.A., Ithaca College, 1992
 M.S., West Virginia University, 1996
 Ph.D., Colorado State University, 1999

Culligan, Kevin M

RESEARCH ASSISTANT PROFESSOR
 Molecular, Cellular, & Biomedical
 B.S., University of California - San Diego, 1994
 Ph.D., Oregon State University, 2000

Curran-Celentano, Joanne

PROFESSOR
 Agriculture, Nutrition, & Food System
 B.S., 1976, M.S., Rutgers University, 1978
 Ph.D., University of Illinois at Urbana-Champaign, 1982

D**Daniel, Jo Sias**

PROFESSOR
 Civil and Environmental Engineering
 B.S., University of New Hampshire, 1994
 M.S., 1996, Ph.D., North Carolina State University, 2001

Dave, Eshan V

ASSOCIATE PROFESSOR
 Civil and Environmental Engineering
 B.E., Sardar Patel University, India, 2001
 M.S., 2003, Ph.D., University of Illinois at Urbana-Champaign, 2009

Davis, John Matthew

ASSOCIATE PROFESSOR
 Earth Sciences
 B.S., Montana State University, 1987
 M.S., 1990, Ph.D., New Mexico Institute of Mining and Technology, 1994

Davis, Thomas M

PROFESSOR
 Agriculture, Nutrition, & Food System
 B.S., California Polytechnic State University - San Luis Obispo, 1980
 Ph.D., University of California - Davis, 1985

Del Hierro, Marcos J

ASSISTANT PROFESSOR
 English
 B.A., Baylor University, 2006
 M.A., El Paso Univ of Texas, 2009
 Ph.D., Texas A & M University, 2014

DeMitchell, Todd A

PROFESSOR
 Education
 B.A., 1969, M.A.T., University of La Verne, 1973
 Ed.D., University of Southern California, 1979
 M.A., University of California - Davis, 1990

Denis, Clyde L

PROFESSOR EMERITUS
 B.S., University of Illinois at Urbana-Champaign, 1973
 M.S., 1976, Ph.D., University of Washington, 1982

Denman, Margaret-Love G

ASSOCIATE PROFESSOR EMERITA
 B.A., 1961, M.A., University of Mississippi, 1967

DeTurk, Mark S

ASSOCIATE PROFESSOR
 Music
 B.S.E., Princeton University, 1972
 B.M., University of Wisconsin, 1975
 M.M., Ohio State University, 1982
 Ph.D., University of Wisconsin, 1988

Devasher, Divya Madhavi

ASSISTANT PROFESSOR
 Political Science
 B.A., Stanford University, 2006
 Ph.D., Yale University, 2014

Dibb, Jack E

RESEARCH ASSOCIATE PROFESSOR
 Earth Systems Research Center
 B.S., University of Puget Sound, 1981
 Ph.D., 1983, M.A., State University of New York at Binghamton, 1988

Diefendorf, Jeffrey M

PROFESSOR EMERITUS
 A.B., Stanford University, 1967
 M.A., 1968, Ph.D., University of California - Berkeley, 1975

Dietz, Laura M

ASSISTANT PROFESSOR
 Computer Science
 Ph.D., Max Planck Institute, 2011

Dijkstra, Jennifer A

RESEARCH ASSISTANT PROFESSOR
Center for Coastal & Ocean Mapping
B.A., University of New Brunswick, C, 1995
M.S., University of Bremen, Germany, 2000
Ph.D., University of New Hampshire, 2007

Diller, Ann

PROFESSOR EMERITA
B.A., Maryville College -TN, 1960
M.A., Univ of Tulsa, 1962
Ed.D., Harvard University, 1971

Dillon, Michele M

INTERIM DEAN
Sociology
B.Soc.Sci., 1980, M.Soc.Sci., University College Dublin, Ireland, 1983
M.A., 1987, Ph.D., University of California - Berkeley, 1989

Dinapoli, Pamela P

PROFESSOR
Nursing
B.S.N., Thomas Jefferson University of, 1981
M.S.N., University of Pennsylvania, 1984
Ph.D., University of Massachusetts - Lowell, 2000

Dion, Maeve L

ASSISTANT PROFESSOR
Security Studies
B.A., 1996, B.S., Eckerd College, 1996
J.D., George Mason University, 2006

Dobbins, Lori E

PROFESSOR
Music
B.A., San Jose State University, 1980
M.F.A., California Institute of the Arts, 1982
Ph.D., University of California - Berkeley, 1990

Dolan, Elizabeth M

ASSOCIATE PROFESSOR EMERITA
B.A., University of California - Santa Barbara, 1971
M.A., Michigan State University, 1973
Ph.D., Virginia Polytechnic Institute and State University, 1980

Donahue, Ann Elizabeth

ASSOCIATE PROFESSOR
Student Academic Services
B.A., University of New Hampshire, 1994
M.L.S., Southern Connecticut State University, 1995
ALM, Harvard University, 2005

Dorsey, Kurk

PROFESSOR
History
B.A., Cornell University, 1987
M.A., Northwestern University, 1989
Ph.D., Yale University, 1994

Dorsey, Marion Girard

ASSOCIATE PROFESSOR
History
B.A., Stanford University, 1993
J.D., Harvard University, 1997
M.A., 1999, M.Phil., 2001, Ph.D., Yale University, 2002

Dowd, Eleanne Solorzano

ASSOCIATE PROFESSOR
Decisions Sciences
B.S., 1993, M.S., University of Florida, 1995
Ph.D., University of South Carolina, 1999

Drake, Allen D

ASSOCIATE PROFESSOR EMERITUS
B.S., University of Rhode Island, 1967
S.M., Massachusetts Institute of Technology, 1968
A.M., Harvard University, 1971
Ph.D., Tufts University, 1978

Drugan, Robert C

PROFESSOR
Psychology
B.A., Susquehanna University, 1979
M.A., 1981, Ph.D., University of Colorado at Boulder, 1984

Drumheller, Grant H

PROFESSOR
Art and Art History
B.F.A., 1976, M.F.A., Boston University, 1978

Druskat, Vanessa G U

ASSOCIATE PROFESSOR
Management
B.A., Indiana University - Bloomington, 1982
M.A., Columbia University in the City of New York, 1988
Ph.D., Boston University, 1996

Du, Shuili

ASSOCIATE PROFESSOR
Marketing
B.A., Tsinghua Univ Beijing, China, 1996
M.A., Fudan University, China, 2002
D.B.A, Boston University, 2007

Dubnick, Melvin J

PROFESSOR
Political Science
B.S., Colorado State University, 1968
M.A., 1969, Ph.D., University of Colorado at Boulder, 1974

Ducey, Mark J

PROFESSOR
Natural Resources & The Environment
B.A., 1990, M.F.S., 1992, Ph.D., Yale University, 1996

Duncan, Cynthia M

PROFESSOR EMERITA
B.A., Stanford University, 1970
M.A., 1981, Ph.D., 1985, Ph.D., University of Kentucky, 1985

Dutta, Devkamal

ASSOCIATE PROFESSOR
 Management
 B.Eng., Birla Inst of Tech, 1986
 M.A.F., Indian Institute of Finance, 1991
 Ph.D., University of Western Ontario, Canada, 2007

Dwyer, Joseph Richard

PROFESSOR
 Physics - Joint Positions
 B.S., University of California, 1986
 Ph.D., 1994, M.S., University of Chicago, 1998

E**Earle, Andrew G**

ASSISTANT PROFESSOR
 Management
 B.A., Western Washington University, 2002
 M.A., Washington State University, 2006
 M.B.A., 2008, Ph.D., University of Oregon, 2013

Eaton, Alan T

EXTENSION STATE SPECIALIST/PROFESSOR EMERITUS
 B.S., University of Massachusetts - Amherst, 1972
 M.S., Virginia Polytechnic Institute and State University, 1975
 Ph.D., North Carolina State University, 1978

Echt, Olof E

PROFESSOR EMERITUS
 Diploma, Free University of Berlin, Germany, 1975
 Ph.D., University of Konstanz, Germany, 1979

Eckert, Robert T

PROFESSOR EMERITUS
 B.S., 1967, M.S., SUNY College of Environmental Science and Forestry, 1974
 Ph.D., Ohio State University, 1978

Edwards, Katie M

ASSOCIATE PROFESSOR
 Psychology
 B.S., Athens State University, 2005
 M.S., 2007, Ph.D., Ohio University, 2011

Eggers, Walter F

PROFESSOR EMERITUS
 B.A., Duke University, 1964
 Ph.D., University of North Carolina at Chapel Hill, 1971

Elmslie, Bruce T

PROFESSOR
 Economics
 B.S., Westminster College - Utah, 1983
 Ph.D., University of Utah, 1988

Elsawa, Sherine F

ASSISTANT PROFESSOR
 Molecular, Cellular, & Biomedical
 B.S., Alexandria University, 1992
 M.S., Florida Intl University, 1998
 Ph.D., University of North Carolina, 2003

Emison, Patricia A

PROFESSOR
 Art and Art History
 B.A., Bryn Mawr College, 1978
 M.A., 1980, M.Phil., 1982, Ph.D., Columbia University in the City of New York, 1985

England, Richard W

PROFESSOR EMERITUS
 B.A., Oakland University, 1965
 M.A., 1967, Ph.D., University of Michigan, 1974

Erickson, Peter S

PROFESSOR
 Agriculture, Nutrition, & Food System
 B.S., University of Massachusetts - Amherst, 1982
 M.S., University of Maine, 1984
 Ph.D., University of Illinois, 1989

Ernakovich, Jessica G

ASSISTANT PROFESSOR
 Natural Resources & The Environment
 B.S., Calif State Polytechnic Univ a, 2002
 Ph.D., Colorado State University, 2014

Eshbach, Robert W

ASSOCIATE PROFESSOR
 Music
 B.A., Yale University, 1973
 M.M., The New England Conservatory of Music, 1976

Etebari, Ahmad

PROFESSOR
 Accounting and Finance
 B.A., Teheran Business College, Iran, 1973
 M.B.A., Texas A & M University, 1975
 Ph.D., University of North Texas, 1979

Evans, Elizabeth J

CLINICAL ASSISTANT PROFESSOR
 Nursing
 B.S., 2002, M.S., 2004, DNP, University of New Hampshire, 2015

F**Fagerberg, Wayne R**

PROFESSOR EMERITUS
 B.S., University of Wyoming, 1967
 M.A., 1972, Ph.D., University of South Florida, 1975

Fairchild, Elizabeth A

RESEARCH ASSOCIATE PROFESSOR
 Biological Sciences
 B.A., 1991, M.S., 1998, Ph.D., University of New Hampshire, 2002

Falvey, Janet E

PROFESSOR EMERITA
 B.S., University of Maryland, 1977
 M.A., University of New Hampshire, 1980
 Ph.D., Pennsylvania State University, 1983

Fan, Stephen S T

PROFESSOR EMERITUS
 B.S., 1957, M.S., 1960, Ph.D., Stanford University, 1962

Farag, Ihab H

PROFESSOR EMERITUS
B.S., Cairo University, Egypt, 1967
M.S., 1970, D.Sc., Massachusetts Institute of Technology, 1976

Farrugia, Charles J

RESEARCH PROFESSOR
Space Science Center
B.S., University of Malta, 1966
Diploma, University of London, United Kingdom, 1978
M.S., University of Bern, Switzerland, 1978
Diploma, University of Munich, Germany, 1982
Ph.D., University of Bern, Switzerland, 1984

Feintuch, Burt

PROFESSOR
Center for the Humanities
B.A., Pennsylvania State University, 1971
M.A., 1972, Ph.D., University of Pennsylvania, 1975

Feldman, David V

ASSOCIATE PROFESSOR
Mathematics & Statistics
B.A., Yale University, 1977
Ph.D., Wesleyan University, 1987

Ferber, Michael K

PROFESSOR EMERITUS
B.A., Swarthmore College, 1966
M.A., 1969, Ph.D., Harvard University, 1975

Ferguson, Michael D

ASSISTANT PROFESSOR
Recreation Management & Policy
B.S., 2009, M.S., West Virginia University, 2012
Ph.D., Pennsylvania State University, 2016

Fernald, Peter S

PROFESSOR EMERITUS
A.B., Amherst College, 1958
M.S., Springfield College, 1959
Ph.D., Purdue University, 1963

Ferrara, Michael

DEAN
Dean's Office - Health & Human Svcs
B.S., Ithaca College, 1980
M.A., Michigan State University, 1983
Ph.D., Pennsylvania State University, 1990

Fetzer, Susan Jane

PROFESSOR
Nursing
B.A., 1973, B.S.N., University of Connecticut, 1975
M.S.N., University of Alabama, 1979
M.B.A., Southern New Hampshire University, 1990
Ph.D., Adelphi University, 1998

Finkelhor, David

PROFESSOR
Sociology
B.A., 1968, M.Ed., Harvard University, 1971
Ph.D., University of New Hampshire, 1978

Fischer, Shawna M

ASSISTANT PROFESSOR
Physics
B.S., Occidental College, 2005
M.S., 2008, Ph.D., Brown University, 2013

Fisher, Lester A

PROFESSOR EMERITUS
B.A., University of Maine, 1966
M.A., University of New Hampshire, 1970
Ph.D., Brown University, 1976

Fitzpatrick, Ellen F

PROFESSOR
History
B.A., Hampshire College, 1974
Ph.D., Brandeis University, 1981

Forbes, Terry G

RESEARCH PROFESSOR EMERITUS
B.S., Purdue University, 1968
Ph.D., 1970, M.S., University of Colorado at Boulder, 1978

Foster, Diane L

PROFESSOR
Mechanical Engineering
B.S., University of Massachusetts - Amherst, 1989
M.S., University of Maine, 1991
Ph.D., Oregon State University, 1996

Foxall, Thomas L

PROFESSOR
Biological Sciences
B.S., Lebanon Valley College, 1968
M.S., University of Bridgeport, 1977
Ph.D., University of New Hampshire, 1980

Frankel, Barbara R

ASSOCIATE PROFESSOR
Human Development & Family Studies
B.A., University of Wisconsin, 1970
M.S., University of Louisville, 1976
Ph.D., Purdue University, 1988

Freedman, Diane P

PROFESSOR
English
A.B., 1977, M.A.T., Cornell University, 1978
M.A., Boston University, 1982
Ph.D., University of Washington, 1989

Frey, Serita D

PROFESSOR
Natural Resources & The Environment
B.A., 1988, M.S., University of Virginia, 1992
Ph.D., Colorado State University, 1999

Frierson, Cathy A

PROFESSOR
History
B.A., University of North Carolina at Chapel Hill, 1975
A.M., 1978, Ph.D., Harvard University, 1985

Frolking, Stephen E

RESEARCH PROFESSOR
Earth Systems Research Center
B.S., 1980, Ph.D., 1983, M.S., University of New Hampshire, 1993

Fuld, Kenneth

DEAN AND PROFESSOR EMERITUS
B.A., Northeastern University, 1971
Ph.D., Dartmouth College, 1976

Fussell, Barry K

PROFESSOR
Mechanical Engineering
B.S., 1975, M.S., 1980, Ph.D., Ohio State University, 1987

G**Galvin, Antoinette B**

RESEARCH PROFESSOR
Space Science Center
B.S., Purdue University, 1974
Ph.D., 1976, M.S., University of Maryland, 1982

Garcia-Rasilla, Carmen

ASSOCIATE PROFESSOR
Languages, Literatures, & Cultures
Ph.D., Universidad de Valladolid, Spain, 1990
M.A., 1991, Ph.D., Johns Hopkins University, 1997

Gardner, James V

RESEARCH PROFESSOR
Center for Coastal & Ocean Mapping
B.S., San Diego State Univ, 1967
M.A., 1969, Ph.D., Columbia University in the City of New York, 1973

Gardner, Kevin H

PROFESSOR
Civil and Environmental Engineering
B.S., Union College, 1989
M.S., 1991, Ph.D., Clarkson University, 1996

Garland, Virginia E

ASSOCIATE PROFESSOR EMERITA
B.A., University of South Carolina, 1969
M.A.T., Harvard University, 1972
Ph.D., University of Connecticut, 1981

Garnas, Jeffrey R

ASSISTANT PROFESSOR
Natural Resources & The Environment
B.A., University of Colorado at Boulder, 1999
M.S., University of Maine, 2005
Ph.D., Dartmouth College, 2009

Gass, Michael A

PROFESSOR
Kinesiology
B.A., St. Olaf College, 1978
M.A., University of Northern Colorado, 1979
Ph.D., University of Colorado at Boulder, 1986

Ge, Liming

PROFESSOR
Mathematics & Statistics
B.S., Beijing University, China, 1984
M.S., Qufu Normal University, China, 1987
Ph.D., University of Pennsylvania, 1995

Germaschewski, Kai K

ASSOCIATE PROFESSOR
Physics
Diploma, 1998, Ph.D., Heinrich Heine University Dösseldorf, Germany, 2001

Germaschewski, Yin

ASSISTANT PROFESSOR
Economics
B.A., Wuhan University, China, 2003
M.A., University of New Hampshire, 2005
M.A., 2010, Ph.D., Indiana University, 2013

Ghayoomi, Majid

PROFESSOR
Civil and Environmental Engineering
B.S., University of Tehran, Iran, 2004
M.S., Shariff University of Technology, Iran, 2006
Ph.D., University of Colorado at Boulder, 2011

Gibson, Brett M

ASSOCIATE DEAN
Dean's Office - Liberal Arts
B.A., University of Minnesota, 1991
M.S., Bucknell University, 1995
Ph.D., University of Nebraska, 1999

Gibson, John F

ASSOCIATE PROFESSOR
Mathematics & Statistics
B.A., St. John's College, 1988
Ph.D., Cornell University, 2002

Givan, Curtis V

PROFESSOR EMERITUS
A.B., 1960, M.A., Stanford University, 1961
Ph.D., Harvard University, 1968

Glass, Christopher

RESEARCH PROFESSOR
Ocean Process Analysis Lab
B.S., Queen's University, Belfast, 1979
Ph.D., University of Glasgow, United Kingdom, 1985

Glauber, Rebecca K

ASSOCIATE PROFESSOR
Sociology
B.A., University of Massachusetts - Amherst, 2000
M.A., 2005, Ph.D., New York University, 2007

Glutting, Joan H

CLINICAL ASSOCIATE PROFESSOR
Psychology
B.A., University of New Hampshire, 1987
M.A., 1993, Ph.D., Vanderbilt University, 1995

Glynn, Christopher D

ASSISTANT PROFESSOR
Decisions Sciences
M.S., 2014, Ph.D., Duke University, 2016

Gold, Janet N

PROFESSOR EMERITA
B.A., Albertus Magnus College, 1971
M.Ed., Worcester State College, 1981
Ph.D., University of Massachusetts - Amherst, 1990

Goldberg, Michael D

PROFESSOR
Economics
B.S., Lehigh University, 1980
Ph.D., New York University, 1991

Golinski, Jan V

PROFESSOR
History
B.A., 1979, M.A., Cambridge University, England, 1983
Ph.D., University of Leeds, United Kingdom, 1984

Goodman, Raymond J

PROFESSOR EMERITUS
B.S., Texas State University, 1967
M.P.A., 1975, Ph.D., Cornell University, 1979

Goodridge, Lyndon E

PROFESSOR EMERITUS
B.S., 1965, M.S., University of Georgia, 1966
Ph.D., Purdue University, 1971

Goodspeed, Charles H

ASSOCIATE PROFESSOR EMERITUS
B.S.C.E., 1967, M.S.C.E., Worcester Polytechnic Institute, 1969
Ph.D., University of Cincinnati, 1972

Gottwald, Sheryl R

CLINICAL ASSISTANT PROFESSOR
Communication Sciences & Disorders
B.S., Northeastern University, 1976
M.S., Pennsylvania State University, 1977
Ph.D., Temple University, 1990

Gould, Eliga H

PROFESSOR
History
A.B., Princeton University, 1983
M.Sc., University of Edinburgh, United Kingdom, 1987
M.A., 1988, Ph.D., Johns Hopkins University, 1993

Graham, Karen J

PROFESSOR
Mathematics & Statistics
B.A., State University of New York at Cortland, 1975
M.S., University of New Hampshire, 1983
M.A., State University of New York at Cortland, 1986
Ph.D., University of New Hampshire, 1986

Graham, Suzanne E

ASSOCIATE PROFESSOR
Education
B.S., Brown University, 1985
Ed.M., 1990, Ed.D., Harvard University, 1997

Grandy, Andrew Stuart

ASSOCIATE PROFESSOR
Natural Resources & The Environment
B.S., The Evergreen State College, O, 1995
M.S., University of Maine, 1998
Ph.D., Michigan State University, 2005

Greenberg, Arthur

PROFESSOR
Chemistry
B.S., Fairleigh Dickinson University, 1967
M.A., 1970, Ph.D., Princeton University, 1971

Greenslade, Kathryn J

ASSISTANT PROFESSOR
Communication Sciences & Disorders
B.S., Vanderbilt University, 2001
M.S., University of Arizona, 2007
Ph.D., University of Washington, 2015

Greenslade, Margaret E

ASSOCIATE PROFESSOR
Chemistry
B.A., Bryn Mawr College, 1998
Ph.D., University of Pennsylvania, 2005

Grenier, Michelle A

ASSOCIATE PROFESSOR
Kinesiology
B.S., University of Massachusetts - Amherst, 1978
M.S., 1995, Ph.D., University of New Hampshire, 2004

Gress, David L

PROFESSOR EMERITUS
A.S., Vincennes University, 1963
B.S., 1966, M.S., 1968, Ph.D., Purdue University, 1976

Griffith, Jennifer A

ASSISTANT PROFESSOR
Management
B.A., 2008, M.S., 2011, Ph.D., University of Oklahoma, 2013

Grimm, Curt D

RESEARCH ASSOCIATE PROFESSOR
Carsey School
B.A., University of New Hampshire, 1979
M.A., 1985, Ph.D., State University of New York at Binghamton, 1991

Grinde, Roger B

ASSOCIATE PROFESSOR
Decisions Sciences
B.A., Carroll College, 1984
M.S., Oregon State University, 1986
Ph.D., Pennsylvania State University, 1993

Griswold, Lou Ann

ASSOCIATE PROFESSOR
Occupational Therapy
B.S., 1979, M.S., Colorado State University, 1986
Ph.D., University of New Hampshire, 1995

Grizzle, Raymond Edward

RESEARCH PROFESSOR
Biological Sciences
B.S., Florida State University, 1972
M.S., University of Central Florida, 1981
Ph.D., Rutgers University, 1988

Gross, Charles W

PROFESSOR EMERITUS
B.A., 1965, M.B.A., Michigan State University, 1967
Ph.D., University of Colorado at Boulder, 1972

Gross, Todd Stuart

PROFESSOR
Mechanical Engineering
B.S., Carnegie Mellon University, 1975
Ph.D., Northwestern University, 1981

Gruen, Thomas W

PROFESSOR
Marketing
B.A., Gordon College, 1977
M.B.A., 1980, M.S., Indiana University, 1995
M.A., Gordon College, 1997
Ph.D., Indiana University, 1997

Guerdat, Kate G

ASSOCIATE STATE SPECIALIST
Youth and Family
Ed.D., North Carolina State University, 2011

Guerdat, Todd C

ASSISTANT PROFESSOR
Agriculture, Nutrition, & Food System
B.S., University of North Carolina, 1999
M.S., 2008, Ph.D., North Carolina State University, 2012

Gullace, Nicoletta F

ASSOCIATE PROFESSOR
History
B.A., University of Rochester, 1983
M.A., 1987, Ph.D., University of California - Berkeley, 1993

Gunlogson, Elizabeth M

ASSOCIATE PROFESSOR
Music
B.A., Luther College, 1993
M.M., Indiana University, 1996
D.M., Florida State University, 2006

Gunn, John Steven

RESEARCH ASSISTANT PROFESSOR
Natural Resources & The Environment
B.S., University of Maine, 1991
M.F.S., Yale University, 1996
Ph.D., University of New Brunswick, C, 2004

Guo, Lin

ASSOCIATE PROFESSOR
Marketing
B.A., 2001, M.A., Renmin University of China, 2004
Ph.D., University of Arizona, 2010

Gupta, Nivedita Ranbir

PROFESSOR
Chemical Engineering
B.S.E.T., Indian Institutes of Technology, India, 1993
Ph.D., Pennsylvania State University, 1999

Gwebu, Kholekile L

ASSOCIATE PROFESSOR
Decisions Sciences
B.S., National University of Lesotho, South Africa, 1998
M.B.A., 2002, Ph.D., Kent State University, 2006

H**Hackett, Robin Michelle**

ASSOCIATE PROFESSOR
English
B.A., University of California - Davis, 1986
M.A., Sonoma State University, 1993
Ph.D., City University of New York, 2000

Hadwin, Donald W

PROFESSOR
Mathematics & Statistics
B.S., Michigan State University, 1967
M.A., University of Wisconsin, 1968
Ph.D., Indiana University - Purdue University Fort Wayne, 1975

Hageman, Elizabeth H

PROFESSOR EMERITA
B.S., Simmons College, 1963
M.A., Barnard College, 1964
Ph.D., University of North Carolina, 1971

Haines, Thomas W

ASSOCIATE PROFESSOR
English
B.A., Dartmouth College, 1990
M.J., University of California - Berkeley, 1994

Hale, Iago L

ASSOCIATE PROFESSOR
Agriculture, Nutrition, & Food System
B.A., Dartmouth College, 1997
M.S., 2007, Ph.D., University of California - Davis, 2011

Hall, Carrie L

ASSISTANT PROFESSOR
Biological Sciences
A.A., Community College of the Air Force, 2002
B.S., 2006, M.S., Univ of Tulsa, 2008
Ph.D., Idaho State University, 2011

Halliday, Aria S

ASSISTANT PROFESSOR
Women's Studies Program
M.A., Purdue University, 2004
B.A., Davidson College, 2014
Ph.D., Purdue University, 2017

Halpern, Jeffrey M

ASSISTANT PROFESSOR
Chemical Engineering
B.S., 2003, Ph.D., Case Western Reserve University, 2010

Halstead, John M

PROFESSOR
Natural Resources & The Environment
B.A., University of Notre Dame, 1976
M.S., University of Massachusetts - Amherst, 1981
Ph.D., Virginia Polytechnic Institute and State University, 1989

Hambacher, Elyse L

ASSISTANT PROFESSOR
Education
B.A., University of Florida, 2005
M.A., Columbia University in the City of New York, 2006
Ph.D., University of Florida, 2013

Hamilton, Lawrence C

PROFESSOR
Sociology
B.A., University of California - Santa Barbara, 1970
M.A., 1974, Ph.D., University of Colorado at Boulder, 1978

Haney, James F

PROFESSOR
Biological Sciences
B.A., 1961, M.A., Miami University - Ohio, 1963
Ph.D., University of Toronto, Canada, 1970

Hardy, Stephen H

PROFESSOR EMERITUS
A.B., Bowdoin College, 1970
M.S., 1976, M.A., 1978, Ph.D., University of Massachusetts - Amherst, 1980

Harkless, Gene E

ASSOCIATE PROFESSOR
Nursing
B.S.N., Duke University, 1976
M.S.N., Vanderbilt University, 1980
D.N.Sc., Boston University, 1991

Harris, Benjamin

PROFESSOR
Psychology
B.A., Hampshire College, 1971
M.A., 1973, Ph.D., Vanderbilt University, 1975

Harris, J William

PROFESSOR
History
B.S., Massachusetts Institute of Technology, 1968
M.A., 1976, Ph.D., Johns Hopkins University, 1982

Harris, Larry

PROFESSOR
Biological Sciences
B.A., 1965, Ph.D., University of California - Berkeley, 1970

Hartman, Cindy L

ASSISTANT PROFESSOR
Recreation Management & Policy
M.S., 2011, Ph.D., Clemson University, 2015
B.S., Texas A & M University,

Harvey, N Paul

PROFESSOR
Management
B.S., University of Connecticut, 2000
M.B.A., State University of New York at Binghamton, 2002
Ph.D., Florida State University, 2006

Haskins, Robert C

PROFESSOR
Music
B.M., 1982, M.M., Johns Hopkins University, 1984
Diploma, Guildhall School M&D, London, 1986
M.M., Johns Hopkins University, 1992
M.A., 1996, D.M.A., 1997, Ph.D., University of Rochester, 2004

Hasseldine, David J

PROFESSOR
Accounting and Finance
B.C., 1985, M.C., University of Canterbury, New Zealand, 1987
Ph.D., Indiana University, 1997

Hatcher, Philip John

PROFESSOR
Computer Science
B.S., 1978, M.S., Purdue University, 1979
Ph.D., Illinois Institute of Technology, 1985

He, Zhaozhao

ASSISTANT PROFESSOR
Accounting and Finance
B.S., Shanghai University of International Business and Economics, China, 2008
M.B.A., University of Central Arkansas, 2009
Ph.D., University of Kansas, 2016

Hebert, David J

PROFESSOR EMERITUS
B.S., University of Maine, 1962
M.Ed., Duquesne University, 1964
Ph.D., Kent State University, 1967

Henry, Robert M

ASSOCIATE PROFESSOR
Civil and Environmental Engineering
B.S., 1973, M.S., 1974, Ph.D., University of Pennsylvania, 1980

Herold, Marc W

ASSOCIATE PROFESSOR
Economics
M.Sc., University of Zurich, Switzerland, 1966
M.B.A., Swiss Federal Institute of Technology, Switzerland, 1968
M.B.A., 1970, Ph.D., University of California - Berkeley, 1979

Hersman, F William

PROFESSOR

Physics

B.S., University of Cincinnati, 1977

Ph.D., Massachusetts Institute of Technology, 1982

Hertz, Susan M

ASSOCIATE PROFESSOR

English

B.A., University of New Hampshire, 1978

Hibschweiler, Rita A

PROFESSOR

Mathematics & Statistics

B.A., 1979, M.A., State University of New York at Buffalo, 1981

Ph.D., University at Albany, 1988

Hight, Eleanor M

PROFESSOR EMERITA

B.A., Skidmore College, 1970

A.A., 1977, A.M., 1977, Ph.D., Harvard University, 1986

Hiley, David R

PROFESSOR EMERITUS

B.A., Auburn University, 1966

M.A., 1969, Ph.D., University of Georgia, 1972

Hiller, Marc D

ASSOCIATE PROFESSOR

Health Management & Policy

B.S., 1972, M.P.H., 1974, Ph.D., University of Pittsburgh, 1978

Hinson, Edward K

ASSOCIATE PROFESSOR

Mathematics & Statistics

B.S., University of Florida, 1979

M.S., 1982, Ph.D., Northwestern University, 1985

Hobbie, Erik A

RESEARCH PROFESSOR

Earth Systems Research Center

B.S., Yale University, 1987

M.S., 1994, Ph.D., University of Virginia, 1997

Hojjat, Seyed Ali

ASSISTANT PROFESSOR

Decisions Sciences

B.S., Shariff University of Technology, Iran, 2009

M.B.A., UMass- Dartmouth, 2011

Ph.D., University of California - Irvine, 2016

Holtrop, Maurik W

PROFESSOR

Physics

B.S., University of New Hampshire, 1987

Ph.D., Massachusetts Institute of Technology, 1995

Hood, Craig A

PROFESSOR EMERITUS

B.A., Boston University, 1975

B.A., Pennsylvania State University, 1979

M.F.A., Indiana University - Bloomington, 1981

Hopkins, Lori J

ASSOCIATE PROFESSOR

Languages, Literatures, & Cultures

B.A., University of Virginia, 1984

M.A., 1987, Ph.D., University of Wisconsin - Madison, 1993

Horvath, Jaroslav

ASSISTANT PROFESSOR

Economics

B.S., 2011, M.S., East Carolina University, 2011

M.A., 2012, Ph.D., Ohio State University, 2016

Hoskin, Marilyn B

DEAN AND PROFESSOR EMERITA

B.A., Mount Holyoke College, 1967

M.A., 1968, Ph.D., University of California - Los Angeles, 1973

Houston, Barbara E

PROFESSOR EMERITA

B.A., 1963, M.A., 1966, Ph.D., University of Western Ontario, Canada, 1977

Houtenville, Andrew James

ASSOCIATE PROFESSOR

Economics Dept-Shared Position

B.A., Stockton University, 1988

M.A., 1991, Ph.D., University of New Hampshire, 1997

Howard, Daniel R

ASSISTANT PROFESSOR

Biological Sciences

A.A., Coll of The Sequoias, 1999

M.S., Northeastern State University, 2004

Ph.D., Univ of Tulsa, 2007

Howard, Theodore E

ASSOCIATE DEAN

Dean's Office - LS & A

B.S., University of Maine, 1972

M.F., Duke University, 1974

Ph.D., Oregon State University, 1982

Howell, William H

PROFESSOR EMERITUS

B.A., Otterbein College, 1969

M.S., 1975, Ph.D., University of Rhode Island, 1980

Howey, Meghan L

PROFESSOR

Anthropology

B.A., University of Delaware, 2000

M.A., 2002, Ph.D., University of Michigan, 2006

Hrabak, Estelle M

ASSOCIATE PROFESSOR

Molecular, Cellular, & Biomedical

B.S., Michigan State University, 1978

Ph.D., University of Wisconsin, 1992

Huang, Chia-Lin

RESEARCH ASSISTANT PROFESSOR

Space Science Center

Ph.D., Boston University, 2007

Huang, Ju-Chin

PROFESSOR

Economics

B.S., National Taiwan University, Taiwan, 1985

M.S., 1988, Ph.D., North Carolina State University, 1994

Huddleston, Mark W

UNH PRESIDENT EMERITUS

UNH President's Office

B.A., State University of New York at Buffalo, 1972

M.A., 1973, Ph.D., University of Wisconsin - Madison, 1978

Hughes Clarke, John E

PROFESSOR

Earth Sciences - Joint Positions

B.A., Oxford Univ-Eng, 1983

M.S., Southampton University, UK, 1984

Ph.D., Dalhousie University, Canada, 1988

Humphreys, Elizabeth P

RESEARCH ASSISTANT PROFESSOR

Institute on Disability

A.A., Cape Cod Comm College, 1976

B.A., Westfield State College, 1979

M.Ed., University of New Hampshire, 1997

Ph.D., University of North Carolina at Chapel Hill, 2013

I**Innis, Daniel E**

PROFESSOR

Hospitality Management

B.B.A., Ohio University, 1985

M.B.A., Miami University - Ohio, 1986

Ph.D., Ohio State University, 1991

Isenberg, Philip A

RESEARCH PROFESSOR

Space Science Center

B.S., Massachusetts Institute of Technology, 1971

Ph.D., 1976, M.S., University of Chicago, 1976

J**Jacobs, Jennifer M**

PROFESSOR

Civil and Environmental Engineering

B.S., Brown University, 1987

M.S., Tufts University, 1993

Ph.D., Cornell University, 1997

Jahnke, Leland S

PROFESSOR EMERITUS

B.A., 1961, M.A., 1966, M.S., 1968, Ph.D., University of Minnesota, 1973

Jamison, Tyler B

ASSISTANT PROFESSOR

Human Development & Family Studies

B.A., Miami University - Ohio, 2006

M.S., 2008, Ph.D., University of Missouri - Columbia, 2012

Janson-Sand, Colette H

ASSOCIATE PROFESSOR EMERITA

B.A., Bridgewater State University, 1967

M.S., 1970, Ph.D., University of New Hampshire, 1980

Jeong, Kyung Jae

ASSISTANT PROFESSOR

Chemical Engineering

B.S., Seoul National University, Korea, 2001

Ph.D., Purdue University, 2008

Jerard, Robert B

PROFESSOR EMERITUS

B.S., University of Vermont, 1969

M.S., Massachusetts Institute of Technology, 1970

Ph.D., University of Utah, 1977

Jin, Hong

ASSISTANT PROFESSOR

Computer Science

B.S., Shanghai University, China, 1997

M.S., 2001, Ph.D., University of Windsor, Ontario, Canada, 2010

Johnson, Jeremiah W

ASSISTANT PROFESSOR

Mathematics

B.S., 2000, M.S., 2002, Ph.D., University of New Hampshire, 2010

Johnson, Joel E

ASSOCIATE PROFESSOR

Earth Sciences

B.S., University of Minnesota Duluth, 1996

M.S., University of Illinois at Urbana-Champaign, 1998

Ph.D., Oregon State University, 2004

Johnson, Kenneth M

PROFESSOR

Sociology

B.A., University of Michigan, 1972

M.A., 1975, Ph.D., University of North Carolina, 1980

Johnson, Paul C

ASSOCIATE PROFESSOR EMERITUS

B.S., Emory and Henry College, 1968

Ph.D., Cornell University, 1974

Johnson, Richard P

PROFESSOR

Chemistry

B.S., 1972, Ph.D., Syracuse University, 1976

Jolley, Robert E

ASSOCIATE PROFESSOR EMERITUS

B.A., Allegheny College, 1966

M.S.W., Boston University, 1972

Ph.D., Smith College, 1982

Jonas, Michael

ASSOCIATE PROFESSOR

Computer Science

B.S., 1987, M.S., College of William and Mary, 1989

Ph.D., Tufts University, 2003

Jones, Lisa M

RESEARCH ASSOCIATE PROFESSOR
Psychology
B.A., University of Virginia, 1992
M.A., 1997, Ph.D., University of Rhode Island, 1999

Jones, Stephen H

RESEARCH ASSOCIATE PROFESSOR
Natural Resources & The Environment
B.S., University of Maine, 1976
M.S., 1980, Ph.D., University of Wisconsin, 1983

Jorgensen, Nathan A

ASSISTANT PROFESSOR
Music
B.M., University of Kansas, 1999
M.M., University of Missouri - Columbia, 2003
D.M.A., University of Kansas, 2010

K**Kaen, Fred R**

PROFESSOR EMERITUS
B.S., Lehigh University, 1963
M.B.A., 1968, Ph.D., University of Michigan, 1972

Kalargyrou, Valentini

ASSOCIATE PROFESSOR
Hospitality Management
B.B.A., Athens University of Economics and Business, 1990
M.Sc., 2005, Ph.D., University of Nevada - Las Vegas, 2009

Kalinowski, Michael

ASSOCIATE PROFESSOR EMERITUS
B.A., Bennington College, 1970
M.Ed., 1972, Ed.D., University of Massachusetts - Amherst, 1976

Kallmerten, Pamela S

CLINICAL ASSOCIATE PROFESSOR
Nursing
B.S., Colby-Sawyer College, New Lond, 1989
M.S., Northeastern University, 1997
DNP, University of New Hampshire, 2016

Kaufmann, Richard L

PROFESSOR EMERITUS
B.S., California Institute of Technology, 1957
M.S., 1958, Ph.D., Yale University, 1960

Kayaalp, Mehmet

ASSISTANT PROFESSOR
Electrical & Computer Eng Dept
B.S., 2008, M.S., TOBB Univer of Econ & Engineer, 2010
Ph.D., State University of New York at Binghamton, 2015

Kayser, John R

ASSOCIATE PROFESSOR
Political Science
B.A., University of New Hampshire, 1962
M.A., Ohio State University, 1964
Ph.D., Claremont Graduate University, 1969

Kazura, Kerry

ASSOCIATE PROFESSOR
Human Development & Family Studies
B.A., University of Southern Maine, 1989
M.S., 1992, Ph.D., Auburn University, 1995

Kempster, William G

PROFESSOR
Music
B.A., University of New England, 1978
D.M.A., University of Alberta, Canada, 1999

Kerns, Georgia M

ASSOCIATE PROFESSOR EMERITA
B.S.E., 1969, M.Ed., University of Delaware, 1975
M.Ed., University of New Hampshire, 1983
Ph.D., University of Kansas, 1987

Khanlari, Moein

ASSISTANT PROFESSOR
Marketing
B.S., Shariff University of Technology, Iran, 2005
M.B.A., University of Tehran, Iran, 2009
Ph.D., University of Alberta, Canada, 2016

Kies, Christopher R

PROFESSOR
Music
B.M., The New England Conservatory of Music, 1973
M.F.A., 1977, Ph.D., Brandeis University, 1984

Kim, Bo Rin

ASSISTANT PROFESSOR
Social Work
B.A., Yonsei University, Seoul, Korea, 2003
M.A., Seoul National University, Korea, 2005
M.S.W., 2007, Ph.D., University of Michigan, 2014

Kim, Inchan

ASSISTANT PROFESSOR
Decisions Sciences
B.B.A., Hyupsung University, S Korea, 2006
M.S., Yonsei University, Seoul, Korea, 2009
Ph.D., University of Oklahoma, 2015

Kim, Soo Hyon

ASSISTANT PROFESSOR
English
B.A., Korea University, Seoul, 2005
M.A., University of Illinois at Urbana-Champaign, 2008
Ph.D., Michigan State University, 2013

Kim, Young Jo

ASSISTANT PROFESSOR
Chemical Engineering
Ph.D., University of Missouri - Columbia, 2010

Kinner, Nancy E

PROFESSOR
Civil and Environmental Engineering
B.A., Cornell University, 1976
M.S., 1980, Ph.D., University of New Hampshire, 1983

Kinsey, Brad L

PROFESSOR
 Mechanical Engineering
 B.S., University of Michigan, 1992
 M.S., 1998, Ph.D., Northwestern University, 2001

Kirkpatrick, John T

SENIOR VICE PROVOST & DEAN OF STUDENTS
 Dean of Students
 B.A., Colby College, 1977
 M.A., 1979, Ph.D., University of New Hampshire, 1983

Kirsch, Nicholas J

ASSOCIATE PROFESSOR
 Electrical & Computer Eng Dept
 B.S., University of Wisconsin - Madison, 2003
 M.S., 2006, Ph.D., Drexel University, 2009

Kistler, Lynn M

PROFESSOR
 Physics - Joint Positions
 B.S., Harvey Mudd College, 1981
 M.S., 1983, Ph.D., University of Maryland, 1987

Klein, Anita S

ASSOCIATE PROFESSOR
 Biological Sciences
 B.A., University of Rochester, 1975
 Ph.D., Michigan State University, 1981

Knezevic, Marko

ASSOCIATE PROFESSOR
 Mechanical Engineering
 B.S., 2004, M.S., University of Novi Sad, Serbia, 2004
 Ph.D., Drexel University, 2009

Konzett, Delia C

PROFESSOR
 English
 B.A., Georgia State University, 1989
 M.A., 1991, Ph.D., University of Chicago, 1997

Korkolis, Ioannis

ASSOCIATE PROFESSOR
 Mechanical Engineering
 Diploma, 1998, M.S., National Tech Univ. of Athens, 2002
 Ph.D., University of Texas at Austin, 2009

Kovach, Adrienne I

ASSISTANT PROFESSOR
 Natural Resources & The Environment
 B.S., University of Kansas, 1990
 Ph.D., North Carolina State University, 1998

Kraft, L Gordon

PROFESSOR EMERITUS
 B.S., University of Pennsylvania, 1971
 M.S., University of New Hampshire, 1973
 Ph.D., University of Connecticut, 1977

Krasner, James N

PROFESSOR
 English
 B.A., Hampshire College, 1983
 M.A., University of Pennsylvania, 1985
 Ph.D., University of Pittsburgh, 1989

Krysiak, Barbara H

ASSOCIATE PROFESSOR EMERITA
 B.Ed., University of Massachusetts - Lowell, 1958
 M.Ed., 1963, C.A.G.S., Boston University, 1974
 Ed.D., Northeastern University, 1981

Krzanowski, James E

PROFESSOR
 Mechanical Engineering
 B.E., Stevens Institute of Technology, 1978
 M.S., 1981, Ph.D., Massachusetts Institute of Technology, 1983

Kucharek, Harald A

RESEARCH PROFESSOR
 Space Science Center
 Ph.D., Technical University of Munich, 1984
 M.S., University of Regensburg, Germany, 1986
 Ph.D., Technical University of Munich, 1989

Kukenberger, Michael R

ASSISTANT PROFESSOR
 Management
 B.A., University of Maine, 1998
 M.B.A., University of New Hampshire, 2005
 Ph.D., University of Connecticut, 2012

Kun, Andrew L

ASSOCIATE PROFESSOR
 Electrical & Computer Eng Dept
 B.S., 1992, M.S., 1994, Ph.D., University of New Hampshire, 1997

Kwiatkowski, Kyle P

ASSISTANT PROFESSOR
 Civil and Environmental Engineering
 B.S., Syracuse University, 2009
 M.S., University of Colorado at Boulder, 2015

L**LaCourse, John R**

PROFESSOR
 Electrical & Computer Eng Dept
 B.A., 1974, M.S., 1977, Ph.D., University of Connecticut, 1981

Laflamme, David J

RESEARCH ASSISTANT PROFESSOR
 Inst for Health Policy & Practice
 B.S., Plymouth State University, 1989
 M.P.H., Tulane University, 1997
 Ph.D., Johns Hopkins University, 2003

Laird, Jo

ASSOCIATE PROFESSOR
 Earth Sciences
 B.A., University of California - San Diego, 1969
 Ph.D., California Institute of Technology, 1977

Lammers, Richard B

RESEARCH ASSISTANT PROFESSOR
Earth Systems Research Center
B.S., 1989, M.S., 1990, Ph.D., University of Toronto, Canada, 1998

Lane, Peter J

PROFESSOR
Management
B.A., University of New Hampshire, 1981
M.B.A., University of Massachusetts - Amherst, 1992
Ph.D., University of Connecticut, 1996

Lanier, Douglas M

PROFESSOR
English
B.A., Stetson University, 1977
M.A., 1980, Ph.D., Duke University, 1988

LaRoche, Dain P

ASSOCIATE PROFESSOR
Kinesiology
B.S., University of New Hampshire, 1996
M.S., University of Massachusetts - Amherst, 1998
Ph.D., University of Utah, 2004

Lashmore, David S

RESEARCH PROFESSOR
Material Science Program
B.S., University of Florida, 1969
M.S., Michigan Tech Univ, 1970
Ph.D., University of Virginia, 1977

Laudano, Andrew P

ASSOCIATE PROFESSOR EMERITUS
B.S., 1974, M.S., Southern Connecticut State University, 1976
Ph.D., University of California - San Diego, 1981

Laue, Thomas M

PROFESSOR EMERITUS
B.A., Johns Hopkins University, 1971
Ph.D., University of Connecticut, 1981

LaValley, Kenneth J

DEAN
Administration
B.S., University of New Hampshire, 1993
M.S., 1996, Ph.D., University of Rhode Island, 2005

Lee, Jade C

ASSISTANT PROFESSOR
Education
B.A., Stanford University, 2000
M.A., Brooklyn College of the City University of New York, 2002
Ph.D., Emory University, 2011

Lee, Lina

PROFESSOR
Languages, Literatures, & Cultures
B.A., Fu Jen Catholic University, China, 1979
M.A., University of North Texas, 1986
Ph.D., University of Texas at Austin, 1992

Lee, Martin A

PROFESSOR EMERITUS
B.S., Stanford University, 1966
Ph.D., University of Chicago, 1971

Lee, Thomas D

ASSOCIATE PROFESSOR
Natural Resources & The Environment
B.S., SUNY College of Environmental Science and Forestry, 1973
M.S., University of Alberta, Canada, 1976
Ph.D., University of Illinois at Urbana-Champaign, 1980

Leese, Michael S

ASSISTANT PROFESSOR
History
B.A., 2003, M.A., University of Connecticut, 2004
Ph.D., University of Michigan, 2014

Leichtman, Michelle D

PROFESSOR
Psychology
B.A., Wellesley College, 1985
M.A., 1991, Ph.D., Cornell University, 1994

Lema, Kimberly Jeanne

RESEARCH ASSOCIATE PROFESSOR
Family Research Lab
B.A., 1994, M.A., Rhode Island College, 1996
Ph.D., University of Rhode Island, 1999

Lepler, Jessica M

ASSOCIATE PROFESSOR
History
B.A., Tulane University, 2000
M.A., 2005, Ph.D., Brandeis University, 2008

Lessard, Marc R

ASSOCIATE PROFESSOR
Physics - Joint Positions
Ph.D., Dartmouth College, 1997
B.S., University of New Hampshire,

Lesser, Michael P

RESEARCH PROFESSOR
Molecular, Cellular, & Biomedical
A.S., George Washington University, 1977
B.A., 1983, M.S., University of New Hampshire, 1985
Ph.D., University of Maine, 1989

Letscher, Robert T

ASSISTANT PROFESSOR
Earth Sciences - Joint Positions

Lewis, Frederick C

ASSOCIATE PROFESSOR EMERITUS
B.S., 1963, M.S., Southern Connecticut State University, 1967
Ph.D., Ohio State University, 1970

Lewis, James B

ASSOCIATE PROFESSOR
Health Management & Policy
B.A., University of Pittsburgh, 1972
M.M., Northwestern University, 1974
D.Sc., Johns Hopkins University, 1985

Li, Gonghu

ASSOCIATE PROFESSOR
Chemistry
B.S., Hebei Normal University, China, 1997
M.S., Chinese Academy of Sciences, China, 2000
Ph.D., University of Iowa, 2005

Li, Huimin

ASSISTANT PROFESSOR
Accounting and Finance
B.S., Southwestern University of Finance and Economics, 2005
M.Sc., Southern Illinois University, 2007
Ph.D., Georgia State University, 2014

Li, Jun

ASSOCIATE PROFESSOR
Management
B.S., 1995, M.S., Beijing University, China, 1999
Ph.D., Texas A & M University, 2004

Li, Linyuan

PROFESSOR
Mathematics & Statistics
B.S., Xuzhou Teachers College, China, 1985
M.S., East China Normal University, China, 1988
M.S., University of New Mexico, 1997
Ph.D., Michigan State University, 2002

Li, Yaning

ASSOCIATE PROFESSOR
Mechanical Engineering
B.S., Shanghai Jiao Tong University, China, 2000
M.S., 2006, Ph.D., University of Michigan, 2007

Licciardi, Joseph M

PROFESSOR
Earth Sciences
B.A., State University of New York at Geneseo, 1992
M.S., 1995, Ph.D., Oregon State University, 2000

Lieber, Rochelle

PROFESSOR
English
A.B., Vassar College, 1976
Ph.D., Massachusetts Institute of Technology, 1980

Lightbody, Anne F

ASSOCIATE PROFESSOR
Earth Sciences
B.S., 1999, M.S., Yale University, 1999
M.S., 2004, Ph.D., Massachusetts Institute of Technology, 2007

Linder, Ernst

PROFESSOR
Mathematics & Statistics
Diploma, University of Zurich, Switzerland, 1978
M.S., Union College - New York, 1980
Ph.D., Pennsylvania State University, 1987

Lindsay, Bruce E

PROFESSOR EMERITUS
B.A., King's College - Pennsylvania, 1971
M.S., 1973, Ph.D., University of Massachusetts - Amherst, 1976

Lippmann, Thomas C

ASSOCIATE PROFESSOR
Earth Sciences
B.A., Linfield College, 1985
M.S., 1989, Ph.D., Oregon State University, 1992

Litvaitis, John A

PROFESSOR EMERITUS
B.S., University of New Hampshire, 1975
M.S., Oklahoma State University, 1978
Ph.D., University of Maine, 1984

Litvaitis, Marianne K

PROFESSOR
Natural Resources & The Environment
B.S., 1980, M.S., Clemson University, 1982
Ph.D., University of Maine, 1985

Liu, Ningyu

ASSOCIATE PROFESSOR
Physics
B.S., 1998, M.S., Zhejiang University, China, 2001
Ph.D., Pennsylvania State University, 2006

Liu, Yixin

ASSOCIATE PROFESSOR
Accounting and Finance
B.A., Nankai University, China, 1998
M.S., Southern Illinois University, 2000
Ph.D., University of Iowa, 2007

Lockwood, Mary Katherine K

CLINICAL ASSOCIATE PROFESSOR
Molecular, Cellular, & Biomedical
B.S., Davidson College, 1977
M.S., Pennsylvania State University, 1981
Ph.D., University of California, 1989

Lofty, John

PROFESSOR EMERITUS
B.Ed., University of London, United Kingdom, 1969
M.A., Tennessee State University, 1978
Ph.D., University of Michigan, 1986

Lopate, Clifford

RESEARCH ASSOCIATE PROFESSOR
Space Science Center
B.A., Swarthmore College, 1982
Ph.D., 1983, M.S., University of Chicago, 1988

Lord, Susan A

CLINICAL ASSOCIATE PROFESSOR
Social Work
B.A., University of New Hampshire, 1975
M.S.W., Smith College, 1979
Ph.D., University of New Hampshire, 2004

Loy, James Brent

PROFESSOR EMERITUS
B.S., Oklahoma State University, 1963
M.S., 1965, Ph.D., Colorado State University, 1967

Lu, Yan

ASSOCIATE PROFESSOR

History

B.A., Fudan University, China, 1982

M.A., Michigan State University, 1989

M.A., 1993, Ph.D., Cornell University, 1996

Lugaz, Noe E

RESEARCH ASSOCIATE PROFESSOR

Space Science Center

M.S., 2003, Ph.D., University of Michigan, 2007

Lyon, Alynna J

ASSOCIATE PROFESSOR

Political Science

B.A., 1991, M.A., New Mexico State University at Alamogordo, 1993

Ph.D., University of South Carolina, 1999

Lyon, Mark E

ASSOCIATE PROFESSOR

Mathematics & Statistics

B.S., 2002, M.S., Brigham Young University, 2003

Ph.D., California Institute of Technology, 2009

Lyons, Anthony P

RESEARCH PROFESSOR

Center for Coastal & Ocean Mapping

M.S., 1991, Ph.D., Texas A & M University, 1995

M**MacFarlane, Lisa**

PROFESSOR

English

A.B., Princeton University, 1979

M.A., 1983, Ph.D., University of Michigan, 1987

Macmanes, Matthew D

ASSISTANT PROFESSOR

Molecular, Cellular, & Biomedical

A.A.S., Broome Comm College, 1999

B.S., University of Michigan, 2005

Ph.D., University of California - Berkeley, 2011

Magnifico, Alecia M

ASSISTANT PROFESSOR

English

B.A., Swarthmore College, 2000

M.S., 2007, Ph.D., University of Wisconsin - Madison, 2010

Mair, Robert G

PROFESSOR

Psychology

A.B., 1972, Sc.M., 1975, Ph.D., Brown University, 1979

Malley, James P

PROFESSOR

Civil and Environmental Engineering

B.S., Rutgers University, 1980

M.S., 1984, B.S., 1987, Ph.D., University of Massachusetts - Amherst, 1988

Mallory, Bruce L

PROFESSOR EMERITUS

B.A., 1971, M.Ed., Allegheny College, 1972

Ph.D., George Peabody College of Vanderbilt University, 1979

Malone, Mary Frances

ASSOCIATE PROFESSOR

Political Science

B.A., Saint Joseph's University, 1995

M.A., 2000, Ph.D., 2004, Ph.D., University of Pittsburgh, 2004

Manalo, Alberto B

ASSOCIATE PROFESSOR

Natural Resources & The Environment

B.S., University of The Phillipines, Phillipines, 1976

M.S., 1978, Ph.D., Kansas State University, 1985

Margolin, Aaron B

PROFESSOR

Molecular, Cellular, & Biomedical

B.S., 1982, Ph.D., University of Arizona, 1986

Marti-Olivella, Jaume

ASSOCIATE PROFESSOR

Languages, Literatures, & Cultures

Licenciatura, Univ of Barcelona, 1976

M.A., University of Illinois at Urbana-Champaign, 1978

Licenciatura, Univ of Barcelona, 1983

Ph.D., University of Illinois at Urbana-Champaign, 1988

Martin, Mary E

RESEARCH ASSISTANT PROFESSOR

Earth Systems Research Center

A.A.S., 1977, Ph.D., University of New Hampshire, 1994

Marx, Jerry D

ASSOCIATE PROFESSOR

Social Work

B.S., University of Southern Maine, 1981

M.S.W., 1984, D.S.W., Boston College, 1994

Mathieson, Arthur C

EMERITUS PROFESSOR

B.S., 1960, M.S., University of California - Los Angeles, 1961

Ph.D., University of British Columbia, Canada, 1965

Mathur, Virendra K

PROFESSOR EMERITUS

B.S., Angra University, India, 1949

B.S., Banaras Hindu University, 1953

M.S., 1961, Ph.D., University of Missouri - Rolla, 1970

Matteucci, Ann-Marie E

ASSISTANT PROFESSOR

Health Management & Policy

B.A., 1991, M.H.A., University of New Hampshire, 1996

M.A., 2013, Ph.D., Brandeis University, 2015

Mattingly, David M

ASSISTANT PROFESSOR

Physics

B.A., Dartmouth College, 1996

Ph.D., University of Maryland, 2003

Mattingly, Marybeth J

RESEARCH ASSISTANT PROFESSOR
Carsey School
B.A., Dartmouth College, 1996
M.A., 2000, Ph.D., University of Maryland, 2005

Mautz, William W

PROFESSOR EMERITUS
B.S., Wisconsin Conservatory of Music, 1965
M.S., 1967, Ph.D., Michigan State University, 1969

Mayer, John D

PROFESSOR
Psychology
B.A., University of Michigan, 1975
M.A., 1979, Ph.D., Case Western Reserve University, 1982

Mayer, Larry A

PROFESSOR
Earth Sciences - Joint Positions
B.S., University of Rhode Island, 1973
Ph.D., University of California, 1979

Mayne, Howard R

PROFESSOR
Chemistry
B.S., 1974, M.S., 1975, Ph.D., University of Manchester, England, 1977

McBride, Mekeel D

PROFESSOR
English
B.A., Mills College (Calif), 1972

McConnell, Mark L

PROFESSOR
Physics - Joint Positions
B.S., Case Western Reserve University, 1980
Ph.D., University of New Hampshire, 1987

McCrone, Sharon M

INTERIM ASSOCIATE DEAN
Mathematics & Statistics
A.B., Dartmouth College, 1988
M.S., 1992, Ph.D., University of New Hampshire, 1997

McCurdy, Kathryn J

CLINICAL ASSISTANT PROFESSOR
Education
B.A., University of Kansas, 2004
M.A., University of Michigan, 2005
Ph.D., University of New Hampshire, 2016

McDowell, William H

PROFESSOR
Natural Resources & The Environment
B.A., Amherst College, 1975
Ph.D., Cornell University, 1982

McGaughy, Jill A

PROFESSOR
Psychology
B.A., Bradley University, 1991
M.A., 1993, Ph.D., Ohio State University, 1998

McGrath, Robert J

ASSOCIATE PROFESSOR
Health Management & Policy
B.S., University of New Hampshire, 1996
M.S., Harvard University, 1998
M.A., 2000, Ph.D., Brandeis University, 2006

McHugh, John P

ASSOCIATE PROFESSOR
Mechanical Engineering
B.S., 1978, Ph.D., University of Michigan, 1986

McKinsey, Martin S

ASSOCIATE PROFESSOR
English
B.A., Hampshire College, 1977
M.A., Syracuse University, 1990
M.A., 1998, Ph.D., University of Virginia, 2001

McMahon, Gregory

ASSOCIATE PROFESSOR
Classics, Humanities & Ital Studies
B.A., University of Kansas, 1975
M.A., Miami University - Ohio, 1979
Ph.D., University of Chicago, 1988

Mebert, Carolyn J

ASSOCIATE PROFESSOR
Psychology
B.A., 1974, Ph.D., Boston University, 1978

Medina, Ricardo A

ASSOCIATE PROFESSOR
Civil and Environmental Engineering
B.S., Christian Brothers University, 1997
M.S., 1999, Ph.D., Stanford University, 2003

Meiton, Fredrik A

ASSISTANT PROFESSOR
History
B.A., Lund University, Sweden, 2006
M.Phil., Oxford Univ-Eng, 2008
Ph.D., New York University, 2015

Mellyn, Elizabeth W

ASSOCIATE PROFESSOR
History
B.A., University of Chicago, 1999
M.A., 2002, Ph.D., Harvard University, 2007

Meredith, Dawn C

PROFESSOR
Physics
B.A., St. John's College, 1980
M.S., 1984, Ph.D., California Institute of Technology, 1987

Merenda, Michael J

PROFESSOR
Management
B.B.A., 1970, M.B.A., Northeastern University, 1972
Ph.D., University of Massachusetts - Amherst, 1978

Merton, Andrew H

PROFESSOR EMERITUS
B.A., University of New Hampshire, 1967

Messner, Richard A

ASSOCIATE PROFESSOR
Electrical & Computer Eng Dept
B.S., 1979, M.S., Clarkson College, 1981
Ph.D., Clarkson University, 1984

Miksis-Olds, Jennifer L

RESEARCH PROFESSOR
Marine Sciences & Ocean Engineering
B.A., Harvard University, 1996
M.S., UMass- Dartmouth, 2000
Ph.D., University of Rhode Island, 2006

Miletkov, Mihail K

ASSOCIATE PROFESSOR
Accounting and Finance
B.B.A., 2002, Ph.D., University of Georgia, 2008

Miller, Glen P

PROFESSOR
Chemistry
B.S.Chem., 1987, Ph.D., Clarkson University, 1991

Miller, John P

ASSOCIATE PROFESSOR
Kinesiology
B.S., Brooklyn College of the City University of New York, 1981
M.S., Long Island University, 1983
Ph.D., University of Maryland, 1992

Miller, Lisa C

ASSOCIATE PROFESSOR
English
B.A., 1980, M.A., University of New Hampshire, 1988

Miller, W Thomas

PROFESSOR EMERITUS
B.S., 1972, M.S., 1974, Ph.D., Pennsylvania State University, 1977

Minocha, Subhash C

PROFESSOR
Biological Sciences
B.S., 1968, M.S., Panjab University, India, 1969
Ph.D., University of Washington, 1974

Mo, Weiwei

ASSISTANT PROFESSOR
Civil and Environmental Engineering
B.S., Shanghai Jiao Tong University, China, 2008
M.S., 2011, Ph.D., University of South Florida, 2012

Moebius, Eberhard S

PROFESSOR EMERITUS
Diploma, 1973, Ph.D., Ruhr University Bochum, Germany, 1977

Mohr, Robert D

ASSOCIATE PROFESSOR
Economics
B.A., University of Virginia, 1993
M.S., 1998, Ph.D., University of Texas at Austin, 2001

Moore, Gregg E

RESEARCH ASSOCIATE PROFESSOR
Biological Sciences
B.S., Tufts University, 1994
M.S., 1997, Ph.D., Boston University, 2003

Moore, Joseph J

CLINICAL PROFESSOR EMERITUS
B.S., Trinity College - Conn, 1966
D.V.M., University of Pennsylvania, 1970

Moore, Sean D

ASSOCIATE PROFESSOR
English
B.A., University of Massachusetts - Amherst, 1991
M.A., Georgetown University, 1995
Ph.D., Duke University, 2003

Morgan, Ann L

ASSOCIATE PROFESSOR EMERITA
B.A., Hanover College, 1974
M.S., Pennsylvania State University, 1976

Morton, Cory M

ASSISTANT PROFESSOR
Social Work
B.A., University of Tennessee, 2000
M.S.W., East Tn State University, 2007
Ph.D., Rutgers University, 2012

Moses, Jennifer K

PROFESSOR
Art and Art History
B.F.A., Temple University, 1983
M.F.A., Indiana University - Bloomington, 1987

Moses, Mark D

CLINICAL ASSOCIATE PROFESSOR
Human Development & Family Studies
B.A., Northeastern University, 1971
M.Ed., Springfield College, 1972
C.A.G.S., University of New Hampshire, 1977
Ph.D., Ohio University, 1979

Mosher, David C

PROFESSOR
Earth Sciences - Joint Positions
B.S., Acadia Univ, 1983
M.S., Memorial University - Canada, 1987
Ph.D., Dalhousie University, Canada, 1993

Mouser, Paula J

ASSOCIATE PROFESSOR
Civil and Environmental Engineering
B.S., Utah State University, 1998
M.S., 2003, Ph.D., University of Vermont, 2006

Moyer, Judith N

RESEARCH ASSISTANT PROFESSOR EMERITA
B.A., 1968, M.A.T., 1970, M.A., 1995, Ph.D., University of New Hampshire, 2000

Mulligan, Shelley E

ASSOCIATE PROFESSOR
Occupational Therapy
B.S., University of Western Ontario, Canada, 1985
M.S., Colorado State University, 1990
Ph.D., University of Washington, 1997

Murphy, Sharon A

ASSOCIATE PROFESSOR EMERITA
B.A., State University of New York at Plattsburgh, 1973
M., Adelphi University, 1985
Certificate, University of Wisconsin - Madison, 1997
Ph.D., Arizona State University, 1998

N**Nash, Jonathan D**

ASSISTANT PROFESSOR
Accounting and Finance
B.S.B.A., Rogers Williams University, 2008
M.S.A., University of Connecticut, 2010
Ph.D., Florida State University, 2016

Naumes, William

ASSOCIATE PROFESSOR EMERITUS
B.S., 1967, M.B.A., Cornell University, 1968
Ph.D., Stanford University, 1971

Neal, Catherine A

FULL EXTENSION STATE SPECIALIST/PROFESSOR
Food and Agriculture
B.S., University of Massachusetts - Amherst, 1976
M.S., 1981, Ph.D., Cornell University, 1983

Neefus, Christopher D

PROFESSOR
Biological Sciences
B.A., Boston University, 1971
Ph.D., University of New Hampshire, 1982

Nesbitt, Kimberly T

ASSISTANT PROFESSOR
Human Development & Family Studies
B.A., University of Kansas, 2003
M.S., 2007, Ph.D., North Carolina State University, 2010

Newkirk, Thomas R

PROFESSOR EMERITUS
B.A., Oberlin College, 1970
M.Ed., University of Massachusetts - Boston, 1973
Ph.D., University of Texas, 1977

Nikshych, Dmitri

PROFESSOR
Mathematics & Statistics
B.S., 1994, M.S., National Technical University, Ukraine, 1996
Ph.D., University of California - Los Angeles, 2001

Niman, Neil B

ASSOCIATE DEAN
Dean's Office
B.A., University of California - Santa Cruz, 1978
M.A., University of California - Riverside, 1980
Ph.D., University of Texas, 1985

Nisbet, Jane A

SENIOR VICE PROVOST FOR RESEARCH
Research Office Central Operations
B.S., Simmons College, 1977
M.S., 1980, Ph.D., University of Wisconsin, 1983

Nolte, Kerry L

ASSISTANT PROFESSOR
Nursing
B.S., Northeastern University, 2006
M.S., University of New Hampshire, 2009
Ph.D., Northeastern University, 2016

Nordgren, Eric A

PROFESSOR EMERITUS
B.S.Ch.E., California Polytechnic State University - San Luis Obispo, 1956
Ph.D., University of Michigan, 1964

O**O'Brien, Alyssa J**

ASSISTANT PROFESSOR
Nursing
B.S., 2003, M.S., University of New Hampshire, 2008
Ph.D., University of California, 2015

O'Brien, Edward J

PROFESSOR
Psychology
B.A., Framingham State College, 1978
M.A., State University of New York at Oswego, 1980
Ph.D., University of Massachusetts - Amherst, 1984

O'Hern, Matthew S

ASSISTANT PROFESSOR
Marketing
B.A., Grinnell College, 1990
M.A., 1998, M.B.A., Indiana University, 2000
Ph.D., University of Wisconsin, 2009

Ogembo, Justus M

ASSOCIATE PROFESSOR
Education
B.A., Kenyatta University, Kenya, 1986
M.A., University of Nairobi, Kenya, 1990
Ph.D., Harvard University, 1997

Oja, Sharon N

PROFESSOR EMERITUS
B.A., Macalester College, 1966
M.A., 1971, Ph.D., University of Minnesota, 1977

Ollinger, Scott V

PROFESSOR
Natural Resources & The Environment
B.S., State University of New York, 1989
M.S., 1992, Ph.D., University of New Hampshire, 2000

Onosko, Joseph J

ASSOCIATE PROFESSOR
Education
B.S., 1979, M.S., 1984, Ph.D., University of Wisconsin - Madison, 1988

Ormecci Matoglu, Melda

ASSISTANT PROFESSOR

Decisions Sciences

B.S., Bogazici University, Turkey, 1999

M.S., 2001, Ph.D., Georgia Institute of Technology, 2006

Orovich, Nicholas N

PROFESSOR

Music

B.A., University of Wisconsin - Madison, 1976

M.M., The New England Conservatory of Music, 1978

Ortmeier, Christina M

ASSOCIATE PROFESSOR

English

B.A., University of Massachusetts - Amherst, 1995

M.A.T., 1998, Ph.D., University of New Hampshire, 2007

Ozabaci, Deniz

ASSISTANT PROFESSOR

Economics

B.S., State University of New York at New Palz, 2007

B.S., Istanbul Technical University, Turkey, 2007

Ph.D., 2014, M.A., State University of New York at Binghamton, 2014

P**Palace, Michael W**

ASSOCIATE PROFESSOR

Earth Sciences - Joint Positions

B.A., 1992, M.S., University of Virginia, 1995

Ph.D., University of New Hampshire, 2006

Paterson, Susanne F

ASSOCIATE PROFESSOR

English

B.A., University of East Anglia, United Kingdom, 1989

M.A., Purdue University, 1992

Ph.D., University of Texas at Austin, 2001

Payne, Thomas L

ASSOCIATE PROFESSOR

English

B.A., Princeton University, 1984

M.F.A., Columbia University in the City of New York, 1996

M.F.A., Princeton University, 2006

Pazicni, Samuel

ASSOCIATE PROFESSOR

Chemistry

B.A., Washington & Jefferson College, 2001

M.S., 2003, Ph.D., University of Wisconsin, 2006

Pekins, Peter J

PROFESSOR

Natural Resources & The Environment

B.A., State University of New York at Plattsburgh, 1976

M.S., University of New Hampshire, 1981

Ph.D., Utah State University, 1988

Pelletier, Donna M

CLINICAL ASSOCIATE PROFESSOR

Nursing

B.S., University of Massachusetts - Amherst, 1977

M.S., University of New Hampshire, 2000

DNP, University of Massachusetts - Amherst, 2011

Perkins, Donna M

CLINICAL ASSOCIATE PROFESSOR

Justice Studies Program

B.A., University of Southern Maine, 1997

M.A., 2000, M.S., 2003, Ph.D., University of New Hampshire, 2003

Pescosolido, Anthony T

ASSOCIATE PROFESSOR

Management

B.A., Harvard University, 1991

Ph.D., Case Western Reserve University, 2001

Petrik, Marek

ASSISTANT PROFESSOR

Computer Science

B.S., Univerzita Komenskeho, Bratislava, Slovakia, 2005

M.S., University of Massachusetts - Amherst, 2008

M.S., University of Massachusetts - Boston, 2008

Ph.D., University of Massachusetts - Amherst, 2010

Pfeiffer, Bruce E

ASSOCIATE PROFESSOR

Marketing

B.S., University of Colorado at Boulder, 1991

M.B.A., Rockhurst University, 1997

M.S., University of Colorado at Boulder, 2005

Ph.D., University of Cincinnati, 2008

Pillemer, David B

PROFESSOR

Psychology

B.A., University of Chicago, 1972

Ed.D., Harvard University, 1979

Pistole, Thomas G

PROFESSOR EMERITUS

Ph.D., 1964, M.S., Wayne State University, 1966

Ph.D., University of Utah, 1969

Plachetzki, David C

ASSISTANT PROFESSOR

Molecular, Cellular, & Biomedical

B.S., 1996, M.S., Northern Michigan Univ, 2000

Ph.D., University of California - Santa Barbara, 2009

Planalp, Roy P

ASSOCIATE PROFESSOR

Chemistry

B.S., Massachusetts Institute of Technology, 1979

Ph.D., University of California - Berkeley, 1983

Plante, Catherine Craycraft

ASSOCIATE PROFESSOR
Accounting and Finance
B.A., University of Cincinnati, 1983
M.A., University of Missouri - Columbia, 1985
Ph.D., Ohio State University, 1991

Pohl, Karsten

PROFESSOR
Physics
Diploma, Ludwig Maximilian University of Munich, Germany, 1990
Ph.D., University of Pennsylvania, 1997

Polasky, Janet L

PROFESSOR
History
B.A., Carleton College, 1973
M.A., 1974, Ph.D., Stanford University, 1978

Poleatewich, Anissa M

ASSISTANT PROFESSOR
Agriculture, Nutrition, & Food System
B.A., Wheaton College (Mass), 2002
M.S., 2005, Ph.D., Pennsylvania State University, 2010

Pollard, James E

ASSOCIATE PROFESSOR EMERITUS
A.B., Duke University, 1965
Ph.D., University of Florida, 1969

Potter, Sharyn J

PROFESSOR
Sociology
B.S., State University of New York, 1989
M.P.H., 1994, Ph.D., Emory University, 1998

Powell, Lou G

PROFESSOR EMERITA
B.S., Winthrop University, 1972
M.S., Florida State University, 1975
O, Indiana University, 1981

Prelli, Lawrence J

PROFESSOR
Communication
B.S., State University of New York at Brockport, 1977
M.A., University at Albany, 1979
Ph.D., Pennsylvania State University, 1984
M.S., University of New Hampshire, 1998

Pringle, James M

PROFESSOR
Earth Sciences - Joint Positions
B.S., Dartmouth College, 1990
Ph.D., Massachusetts Institute of Technology, 1998

Puccilli, Patricia A

CLINICAL ASSOCIATE PROFESSOR
Nursing
B.S., 2005, M.S., 2007, DNP, University of New Hampshire, 2015

Putnam, Charles T

CLINICAL PROFESSOR
Dean's Office - Liberal Arts
B.A., Yale University, 1979
J.D., University of Connecticut, 1985

Q**Quin, Langdon C**

ASSOCIATE PROFESSOR EMERITUS
B.A., Washington and Lee University, 1970
M.F.A., Yale University, 1976

Quinn, Timothy J

ASSOCIATE PROFESSOR
Kinesiology
B.S., Bradley University, 1979
M.A., 1983, Ph.D., Michigan State University, 1987

R**Raeder, Joachim**

PROFESSOR
Physics - Joint Positions
Diploma, 1985, Ph.D., University of Cologne, Germany, 1989

Ragland, Linda G

ASSISTANT PROFESSOR
Accounting and Finance
B.S., 1993, M.Acc., University of Tennessee, 1999
Ph.D., University of South Florida, 2011

Ramadanovic, Petar

PROFESSOR
English
B.A., University of Belgrade, Serbia, 1989
M.A., 1993, Ph.D., State University of New York at Binghamton, 1997

Ramage, Amy E

ASSISTANT PROFESSOR
Communication Sciences & Disorders
B.S., Texas Tech University, 1993
Ph.D., 1995, M.S., University of Arizona, 1995

Ramsay, James D

PROFESSOR
Security Studies
B.S., 1984, Ph.D., 2014, M.A., University of Wisconsin,

Reagan, Emilie N

ASSISTANT PROFESSOR
Education
B.S., Georgetown University, 2003
M.S., Saint Joseph's University, 2005
Ph.D., Boston College, 2011

Reardon, Lawrence C

ASSOCIATE PROFESSOR
Political Science
B.A., Johns Hopkins University, 1979
M.I.A., 1983, M.Phil., 1986, Ph.D., Columbia University in the City of New York, 1991

Rebellion, Cesar J

PROFESSOR

Sociology

B.A., Rice University, 1996

M.A., 1999, Ph.D., Emory University, 2002

Rehan, Sandra M

ASSISTANT PROFESSOR

Biological Sciences

B.S., 2007, Ph.D., Brock University, 2011

Reid, R Dan

ASSOCIATE PROFESSOR EMERITUS

B.A., University of Maryland, 1976

M.B.A., Angelo State University, 1978

Ph.D., Ohio State University, 1987

Reilly, Ruth A

CLINICAL ASSOCIATE PROFESSOR

Agriculture, Nutrition, & Food System

B.S., Florida State University, 1965

M.O.E., 1989, Ph.D., University of New Hampshire, 1998

Reinhold, Vernon

RESEARCH PROFESSOR

Molecular, Cellular, & Biomedical

B.S., 1959, M.S., University of New Hampshire, 1961

Ph.D., University of Vermont, 1965

Remar, Daniel A G

ASSISTANT PROFESSOR

Hospitality Management

B.S., 2003, M.A., Boston University, 2012

Ph.D., University of South Carolina, 2015

Richards, Harry J

DEAN AND ASSOCIATE PROFESSOR EMERITUS

B.A., State University of New York at Potsdam, 1968

M.S., University at Albany, 1969

Ph.D., Florida State University, 1978

Ripley, David K

PROFESSOR

Music

B.A., Harvard University, 1970

M.M., The New England Conservatory of Music, 1977

Rivard, David A

PROFESSOR

English

B.A., University of Massachusetts - Dartmouth, 1975

M.F.A., University of Arizona, 1982

M.F.A., University of Massachusetts - Dartmouth, 1983

Robb, Judith A

ASSOCIATE PROFESSOR EMERITA

A.B., Connecticut College, 1967

M.A., University of South Florida, 1969

Ed.D., University of Rochester, 1982

Roberts, John M

ASSOCIATE PROFESSOR EMERITUS

B.S., Washington State University, 1974

M.S., 1975, Ph.D., Purdue University, 1977

Robertson, Robert A

ASSOCIATE PROFESSOR

Natural Resources & The Environment

B.A., Western Illinois University, 1981

M.A., Oregon State University, 1984

Ph.D., University of Illinois at Urbana-Champaign, 1990

Robin, Donald A

PROFESSOR

Communication Sciences & Disorders

B.A., Boston University, 1976

M.S., University of Redlands, 1981

Ph.D., Case Western Reserve University, 1984

Rock, Barrett N

PROFESSOR EMERITUS

B.A., University of Vermont, 1966

M.S., 1970, Ph.D., University of Maryland, 1972

Rodgers, Frank G

PROFESSOR EMERITUS

B.S., 1969, Ph.D., University of Surrey, United Kingdom, 1977

M.S., Institute of Biology, London, United Kingdom, 1977

Rodriguez, Julia E

ASSOCIATE PROFESSOR

History

B.A., 1989, M.A., The New School, 1992

M.Phil., 1995, Ph.D., Columbia University in the City of New York, 2000

Ross, Robert S

ASSISTANT PROFESSOR

Psychology

B.A., Fairleigh Dickinson University, 1997

M.A., 1999, Ph.D., Boston University, 2006

Rowe, Rebecca J

ASSOCIATE PROFESSOR

Natural Resources & The Environment

B.A., Bowdoin College, 1997

Ph.D., University of Chicago, 2006

Rubini, Loris

ASSISTANT PROFESSOR

Economics

B.A., 1999, M.S., Universidad de San Andrés, Buenos Aires, Argentina, 2001

Ph.D., Arizona State University, 2010

Rucinski, Andrzej

PROFESSOR EMERITUS

M.S., Odessa College, 1973

Ph.D., Gdansk University of Technology, Poland, 1982

B.S., Xi'an Jiaotong University, China, 2002

Ruml, Wheeler

PROFESSOR

Computer Science

A.S./B.S., 1993, Ph.D., Harvard University, 2002

Russell, Robert D

ASSOCIATE PROFESSOR EMERITUS

B.A., Yale University, 1965

M.S., 1967, Ph.D., Stanford University, 1972

Ryan, James M

PROFESSOR

Physics

B.S., University of California - Riverside, 1970

M.S., University of California - San Diego, 1974

Ph.D., University of California - Riverside, 1978

Rzhanov, Yuri

RESEARCH PROFESSOR

Center for Coastal & Ocean Mapping

M.S., Novosibirsk State University, 1978

Ph.D., Academy of Science of Russia, 1983

S**Sabin, Mihaela C**

ASSOCIATE PROFESSOR

Computer Science

B.S., 1984, M.S., Politehnica University of Bucharest, Romania, 1984

M.S.T., 2003, Ph.D., University of New Hampshire, 2003

Sable, Janet R

PROFESSOR EMERITA

B.A., University of Michigan, 1975

M.S., Northeastern University, 1981

Ed.D., Boston University, 1989

Safford, Thomas G

ASSOCIATE PROFESSOR

Sociology

B.A., University of North Carolina at Chapel Hill, 1989

M.A., Stanford University, 1995

Ph.D., Cornell University, 2004

Salisbury, Joseph E

RESEARCH ASSOCIATE PROFESSOR

Ocean Process Analysis Lab

B.A., 1980, M.S., University of Southern Maine, 1990

Ph.D., University of New Hampshire, 2003

Salloway, Jeffrey Colman

PROFESSOR EMERITUS

B.A., Tufts University, 1963

M.A., 1965, Ph.D., Boston University, 1969

Salvio, Paula M

PROFESSOR

Education

B.A., Fordham University, 1981

M.A., Wesleyan University, 1983

Ph.D., University of Rochester, 1989

Salyer, Lucy E

ASSOCIATE PROFESSOR

History

B.A., University of California - San Diego, 1979

M.A., 1983, Ph.D., University of California - Berkeley, 1989

Samuels, Joanne G

ASSOCIATE PROFESSOR

Nursing

B.S.N., Northeastern University, 1978

M.S., Boston University, 1984

Ph.D., University of Massachusetts - Amherst, 2007

Scala, Dante J

PROFESSOR

Political Science

B.A., Villanova University, 1990

M.A., 1993, Ph.D., University of Chicago, 2000

Schnepf, Scott K

PROFESSOR EMERITUS

B.A., Augustana College (Sd), 1975

M.F.A., Kansas State University, 1981

Schram, Thomas H

ASSOCIATE PROFESSOR

Education

B.A., Dartmouth College, 1978

B.A., University of Wyoming, 1982

M.Ed., 1987, Ph.D., University of Oregon, 1990

Schuh, Mary Clare

RESEARCH ASSOCIATE PROFESSOR

Institute on Disability

B.A., State University of New York at Geneseo, 1984

M.A., Syracuse University, 1987

M.F.A., 1987, Ph.D., University of New Hampshire, 2002

Schwab, Charles George

PROFESSOR EMERITUS

B.S., 1969, M.S., 1970, Ph.D., University of Wisconsin, 1974

Schwadron, Nathan A

PROFESSOR

Physics - Joint Positions

B.A., Oberlin College, 1990

Ph.D., University of Michigan, 1997

Scott, Michelle P

PROFESSOR EMERITA

B.A., Wellesley College, 1961

M.A., 1980, Ph.D., Harvard University, 1984

Seal, Samantha L

ASSISTANT PROFESSOR

English

B.A., Washington University - St Louis, 2006

M.A., 2010, M.Phil., 2010, Ph.D., Yale University, 2012

Seaman, Jayson O

ASSOCIATE PROFESSOR

Kinesiology

B.A., New England College, 1994

M.S., 1999, Ph.D., University of New Hampshire, 2006

Seavey, John W

PROFESSOR EMERITUS

A.B., Bates College, 1966

M.A., 1968, Ph.D., University of Arizona, 1973

M.P.H., Harvard University, 1979

Seidel, Lee F

PROFESSOR EMERITUS

A.B., Hobart and William Smith College, 1967

M.P.A., 1972, Ph.D., Pennsylvania State University, 1976

Seiler, David E

PROFESSOR EMERITUS
B.M., 1965, M.M., University of Wisconsin - Madison, 1979

Seitz, William Rudolf

PROFESSOR
Chemistry
A.B., Princeton University, 1965
Ph.D., Massachusetts Institute of Technology, 1970

Senier, Siobhan

PROFESSOR
English
A.B., Bowdoin College, 1987
M.A., 1992, Ph.D., University of Illinois at Urbana-Champaign, 1997

Shannon, Patrick

ASSOCIATE PROFESSOR
Social Work
B.A., 1990, M.S.W., State University of New York at Buffalo, 1993
Ph.D., University of Virginia, 2000

Sharkey, Judith A

ASSOCIATE PROFESSOR
Education
B.A., Franklin Pierce College, 1984
M.A.T., School for International Training, 1990
Ph.D., Pennsylvania State University, 2000

Sharp, Dayle B

CLINICAL ASSOCIATE PROFESSOR
Nursing
B.S.N., University of New Hampshire, 1992
M.S.N., Idaho State University, 1999
Ph.D., El Paso Univ of Texas, 2005
M.P.H., Univ of Texas Houston, 2008
DNP, El Paso Univ of Texas, 2014

Sharp, Erin H

ASSOCIATE PROFESSOR
Human Development & Family Studies
B.S., Virginia Commonwealth University, 1999
M.S., 2003, Ph.D., Pennsylvania State University, 2006

Sharpe, Sheree T

ASSISTANT PROFESSOR
Mathematics & Statistics
B.A., Wesleyan College, 2004
M.A., University of Georgia, 2007
Ph.D., University of Miami, 2011

Shea, Christine M

PROFESSOR
Decisions Sciences
B.A., 1980, M.B.A., Wilfrid Laurier University, Canada, 1984
Ph.D., University of Western Ontario, Canada, 1995

Shen, Junhao

PROFESSOR
Mathematics & Statistics
B.S., 1993, M.S., Nanjing University, China, 1996
Ph.D., University of Pennsylvania, 2004

Shepard, Margaret P

CLINICAL ASSOCIATE PROFESSOR
Nursing
B.S.N., 1980, M.S.N., 1983, Ph.D., University of Pennsylvania, 1992

Sherman, Jill M

ASSISTANT PROFESSOR
Human Development & Family Studies
B.S., 2007, M.A., Central Michigan Univ, 2009
Ph.D., Purdue University, 2014

Sherman, Sarah W

PROFESSOR EMERITA
B.A., Marlboro College, 1972
Ph.D., Brown University, 1983

Shetty, Sandhya

ASSOCIATE PROFESSOR
English
B.A., 1977, M.A., University of Poona, India, 1979
M.A., 1982, Ph.D., University of Rochester, 1987

Shiklomanov, Alexander I

RESEARCH ASSISTANT PROFESSOR
Earth Systems Research Center
B.S., 1981, M.S., 1983, Ph.D., Hydrometeorological University, 1996

Shipe, Stephan D

ASSISTANT PROFESSOR
Accounting and Finance
B.B.A., University of North Florida, 2012
Ph.D., Florida State University, 2016

Shippee-Rice, Raelene V

ASSOCIATE PROFESSOR EMERITA
B.S., Fitchburg State College, 1960
Diploma, Cook County Sch Nursing, 1960
B.S.N., Carroll College, 1964
M.S., University of Rochester, 1979
Ph.D., Brandeis University, 1990

Shore, Barry

PROFESSOR EMERITUS
B.S., Tufts University, 1960
M.B.A., University of Massachusetts - Amherst, 1963
Ph.D., University of Wisconsin, 1968

Shore, Samuel D

PROFESSOR EMERITUS
B.S., Juniata College, 1959
M.A., 1961, Ph.D., Pennsylvania State University, 1964

Short, Frederick T

RESEARCH PROFESSOR
Natural Resources & The Environment
B.A., Plymouth State University, 1972
M.S., University of Rhode Island, 1976
Ph.D., University of Alaska, 1981

Short, Kevin M

PROFESSOR
Mathematics & Statistics
B.A., 1985, B.S., University of Rochester, 1985
Ph.D., Imperial College London, United Kingdom, 1988

Shubov, Marianna A

PROFESSOR
Mathematics & Statistics
M.S., 1972, Ph.D., Saint Petersburg State University, Russia, 1985

Sideman, Rebecca G

FULL EXTENSION STATE SPECIALIST/PROFESSOR
Food and Agriculture
B.A., Dartmouth College, 1994
Ph.D., Cornell University, 1999

Sidor, Inga F

CLINICAL ASSOCIATE PROFESSOR
Molecular, Cellular, & Biomedical
B.A., Reed College, 1992
D.V.M., Tufts University, 1999
M.S., University of Connecticut, 2004

Siggelakis, Susan J

ASSOCIATE PROFESSOR
Political Science
B.A., Rutgers University, 1979
M.A., 1983, Ph.D., Johns Hopkins University, 1988

Simos, Evangelos O

PROFESSOR
Economics
B.S., National and Kapodistrian University of Athens, Greece, 1972
M.A., 1974, Ph.D., Northern Illinois University, 1977

Sitkoff, Harvard I

PROFESSOR EMERITUS
A.B., Queens College of the City University of New York, 1961
M.A., 1962, Ph.D., Columbia University School of General Studies, 1975

Sivaprasad, Kondagunta

PROFESSOR EMERITUS
B.S.E.E., University of Madras, India, 1956
M.S., 1958, Ph.D., Harvard University, 1963

Slifer, Karl J

ASSOCIATE PROFESSOR
Physics
B.S., 1995, Ph.D., Temple University, 2004

Smith, Allan B

CLINICAL ASSOCIATE PROFESSOR
Communication Sciences & Disorders
B.S., Florida State University, 1986
M.S., Mass Gen Hosp Sch of Nur, 1996
Ph.D., University of Connecticut, 2002

Smith, Charles W

RESEARCH PROFESSOR
Space Science Center
B.S., University of Maryland, 1977
Ph.D., 1979, M.S., College of William and Mary, 1981

Smith, Cheryl A

FULL EXTENSION STATE SPECIALIST/PROFESSOR
Food and Agriculture
B.A., Plymouth State University, 1978
M.S., University of Rhode Island, 1983
Ph.D., University of New Hampshire, 1992

Smith, Kristin E

RESEARCH ASSOCIATE PROFESSOR
Carsey School
B.A., University of Vermont, 1989
M.P.H., Tulane University, 1993
Ph.D., University of Maryland, 2006

Smith, Nicholas J

PROFESSOR
Philosophy
B.A., Vassar College, 1994
J.D., State University of New York at Buffalo, 1997
Ph.D., Vanderbilt University, 2002

Smith, Richard G

ASSOCIATE PROFESSOR
Natural Resources & The Environment
B.S., University of New Mexico, 1996
Ph.D., Michigan State University, 2005

Smith, Sarah L

ASSISTANT PROFESSOR
Occupational Therapy
B.S., Colorado State University, 1997
D.Sc., University of Oklahoma, 2015

Sohl, Jeffrey E

PROFESSOR
Decisions Sciences
B.A., Villanova University, 1972
M.A., 1974, Ph.D., University of Maryland, 1983

Sokol, Jason C

ASSOCIATE PROFESSOR
History
B.A., Oberlin College, 1999
M.A., 2001, Ph.D., University of California - Berkeley, 2006

Song, Edward

ASSISTANT PROFESSOR
Electrical & Computer Eng Dept
B.S., Queen's University- Ca, 2004
M.S., University of Alberta, Canada, 2007
Ph.D., Louisiana State University, 2014

Sonnenmeier, Rae M

CLINICAL ASSOCIATE PROFESSOR
Communication Sciences & Disorders
B.S.Ed., 1980, M.A., 1984, Ph.D., State University of New York at Buffalo, 1999

Sower, Stacia

PROFESSOR EMERITA
B.A., University of Utah, 1973
M.S., 1978, Ph.D., Oregon State University, 1980

Sowers, Jeannie

ASSOCIATE PROFESSOR
Political Science
B.A., Harvard University, 1989
M.A., 1996, Ph.D., Princeton University, 2003

Sparr, T M

PROFESSOR EMERITUS
B.A., Ohio Wesleyan University, 1963
M.S., 1969, Ph.D., Texas A & M University, 1972

Spence, Harlan

DIRECTOR
EOS Administration
B.A., Boston University, 1983
M.S., 1985, Ph.D., University of California, 1989

Staneva, Viktoriya B

ASSISTANT PROFESSOR
Accounting and Finance
B.S., Ramapo College Nj, 2010
M.Phil., 2014, Ph.D., CUNY Baruch College, 2017

Stibler, Robert J

PROFESSOR EMERITUS
B.S., Susquehanna University, 1970
M.M., 1973, D.F.A., 1979, D.M.A., Catholic University of America, 1979

Stine, William W

ASSOCIATE PROFESSOR
Psychology
B.S., 1977, Ph.D., 1983, M.S., Georgia Institute of Technology, 1983

Sukhu, Anupama

ASSISTANT PROFESSOR
Hospitality Management
B.A., University of Calicut, India, 2008
M.S., Plymouth Business School, Plymouth University, Plymouth England, 2010
Ph.D., Ohio State University, 2015

Sundar, Vidyakshmi

ASSISTANT PROFESSOR
Occupational Therapy
B.S., The Tamil Nada Dr M.G.R Medical University, India, 1979
Ph.D., University at Buffalo, State University of New York, 2007

Sundberg, Donald C

PROFESSOR EMERITUS
B.S., Worcester Polytechnic Institute, 1965
M.S., 1968, Ph.D., University of Delaware, 1970

Swack, Michael E

RESEARCH PROFESSOR
Carsey School
B.S., University of Wisconsin, 1975
M.S., Harvard University, 1979
Ph.D., Columbia University in the City of New York, 1990

Swier, Stanley R

EXTENSION PROFESSOR AND SPECIALIST EMERITUS
B.S., Syracuse University, 1969
M.S., Northern Az University, 1974
Ph.D., Ohio State University, 1976

Swift, M Robinson

PROFESSOR
Mechanical Engineering
B.S., 1971, Ph.D., University of New Hampshire, 1974

T**Tagliaferro, Anthony R**

PROFESSOR EMERITUS
B.A., Boston College, 1968
M.S., Lehigh University, 1972
Ph.D., Cornell University, 1978

Talay, Melike Billur

ASSOCIATE PROFESSOR
Marketing
B.A., 2002, M.B.A., Bogazici University, Turkey, 2004
Ph.D., Michigan State University, 2009

Taylor, James Thomas

PROFESSOR
Natural Resources & The Environment
B.S., 1966, M.S., University of Tennessee, 1968
Ph.D., Oregon State University, 1976

Taylor, Rosemary A

ASSISTANT PROFESSOR
Nursing
B.F.A., New York University, 1988
B.S.N., 1998, Ph.D., Northeastern University, 2013

Tebbetts, Diane R

PROFESSOR EMERITA
B.A., University of New Hampshire, 1965
M.S., Simmons College, 1972
M.L.S., Boston University, 1978
D.L.S., Simmons College, 1985

Teng, Xiaowei

PROFESSOR
Chemical Engineering
B.S., 2001, M.S., East China University of Science and Technology, 2001
Ph.D., University of Rochester, 2006

Thein, May-Win L

ASSOCIATE PROFESSOR
Mechanical Engineering
B.S., 1991, M.S., Lehigh University, 1992
Ph.D., Oklahoma State University, 1999

Thomas, William K

PROFESSOR
Molecular, Cellular, & Biomedical
B.S., University of Redlands, 1981
M.S., 1984, Ph.D., Simon Fraser University, Canada, 1988

Thorson, Jill C

ASSISTANT PROFESSOR
Communication Sciences & Disorders
B.A., 2005, M.A., University of Rochester, 2007
M.S., 2012, Ph.D., Brown University, 2015

Tisa, Louis S

PROFESSOR
Molecular, Cellular, & Biomedical
B.S., 1976, M.S., University of Windsor, Ontario, Canada, 1979
Ph.D., University of Wisconsin, 1987

Tomellini, Sterling A

PROFESSOR
Chemistry
B.S., University of Rhode Island, 1979
Ph.D., Rutgers University, 1985

Torbert, Roy B

PROFESSOR
Physics
B.A., Princeton University, 1971
Ph.D., University of California - Berkeley, 1979

Triplett, Timm A

ASSOCIATE PROFESSOR
Philosophy
B.A., Antioch College, 1972
M.A., 1980, Ph.D., University of Massachusetts - Amherst, 1982

Trubowitz, Rachel J

PROFESSOR
English
B.A., Barnard College, 1976
M.A., 1977, M.Phil., 1980, Ph.D., Columbia University in the City of New York, 1985

Tsang, Paul C

PROFESSOR
Molecular, Cellular, & Biomedical
B.A., Cornell University, 1978
Ph.D., Boston University, 1986

Tsavalas, John G

ASSOCIATE PROFESSOR
Chemistry
B.S., University of Virginia, 1996
M.S., 1998, Ph.D., Georgia Institute of Technology, 2001

Tsukrov, Igor I

PROFESSOR
Mechanical Engineering
B/M, Dnepropetrovsk National University, Ukraine, 1986
M.S., 1993, Ph.D., Tufts University, 1996

Tucker, Anita R

ASSOCIATE PROFESSOR
Social Work
B.A., Dartmouth College, 1992
M.S.W., University of Michigan, 1997
Ph.D., Boston College, 2006

Tucker, Corinna J

PROFESSOR
Human Development & Family Studies
B.A., Clark University, 1992
M.S., 1995, Ph.D., Pennsylvania State University, 1998

Tucker, James E

ASSOCIATE PROFESSOR
Sociology
B.S., 1981, M.A., 1987, Ph.D., University of Virginia, 1992

Turner, Heather A

PROFESSOR
Sociology
B.A., University of Western Ontario, Canada, 1985
Ph.D., University of California - San Francisco, 1990

U**Urquhart, Peter W**

ASSOCIATE PROFESSOR
Music
A.B., Princeton University, 1974
M.M., Rider University, 1978
M.A., Smith College, 1982
Ph.D., Harvard University, 1988

V**Vagts, Peggy A**

PROFESSOR
Music
B.A., Morningside College, 1976
M.M., University of Wisconsin - Madison, 1978

Van Zandt, Cynthia J

ASSOCIATE PROFESSOR
History
B.A., University of Virginia, 1984
M.A., 1991, Ph.D., University of Connecticut, 1998

Vandemark, Douglas C

RESEARCH PROFESSOR
Ocean Process Analysis Lab
B.S., Hope College, 1986
M.S., University of Massachusetts - Amherst, 1988
Ph.D., University of New Hampshire, 2005

Vangundy, Karen T

PROFESSOR
Sociology
B.S., Virginia Polytechnic Institute and State University, 1994
M.A., University of Cincinnati, 1998
Ph.D., University of Miami, 2001

Varga, Krisztina

ASSISTANT PROFESSOR
Molecular, Cellular, & Biomedical
B.S., 1996, M.S., St. John's University - New York, 1998
Ph.D., Columbia University in the City of New York, 2015

Varki, Elizabeth

ASSOCIATE PROFESSOR
Computer Science
B.S., 1985, M.A., University of Delhi, India, 1988
M.S., Villanova University, 1992
Ph.D., Vanderbilt University, 1997

Varner, Ruth K

PROFESSOR
Earth Sciences - Joint Positions
B.A., Hartwick College, 1991
M.S., 1993, Ph.D., University of New Hampshire, 2000

Vashisth, Harish

ASSISTANT PROFESSOR
Chemical Engineering
B.Tech., National Instit of Tech India, 2005
Ph.D., Drexel University, 2010

Vasquez, Bernard J

RESEARCH PROFESSOR
Space Science Center
B.S., Rensselaer Polytechnic Institute, 1987
Ph.D., University of Maryland, 1992

Vasudevan, Palligarnai T

SENIOR VICE PROVOST
Provost Office
B.S.E.T., University of Madras, India, 1974
M.S., State University of New York at Buffalo, 1984
Ph.D., Clarkson University, 1988

Veal, Larry J

ASSOCIATE PROFESSOR EMERITUS
B.S., 1974, M.M., University of Illinois at Urbana-Champaign, 1976

Violette, Catherine A

FULL EXTENSION STATE SPECIALIST/PROFESSOR EMERITA
B.S., 1974, B.S., 1975, M.S., University of Maine, 1977
Ph.D., Pennsylvania State University, 2002

Vroman, Kerryellen G

ASSOCIATE VICE PROVOST FOR INTERNATIONAL PROGRAMS
Education Abroad
B.A., Massey University, New Zealand, 1990
M.S., McMaster University, Canada, 1992
Ph.D., Massey University, New Zealand, 2006

W**Wake, Cameron P**

RESEARCH PROFESSOR
Earth Systems Research Center
B.S., University of Ottawa, Canada, 1984
M.A., 1987, M.A., Wilfrid Laurier University, Canada, 1993
Ph.D., University of New Hampshire, 1993

Walker, Charles W

PROFESSOR EMERITUS
B.A., Miami University, 1969
M.S., 1973, Ph.D., Cornell University, 1976

Wang, Jing

ASSOCIATE PROFESSOR
Decisions Sciences
B.A., Nankai University, China, 1994
M.A., Bowling Green State University, 2001
M.B.A., 2003, Ph.D., Kent State University, 2007

Wansart, William L

ASSOCIATE PROFESSOR EMERITUS
B.S., State University of New York at Buffalo, 1972
M.A., 1975, Ed.D., Colorado State University, 1984

Ward, Larry G

RESEARCH ASSOCIATE PROFESSOR
Center for Coastal & Ocean Mapping
B.A., University of New Hampshire, 1972
M.S., 1974, Ph.D., University of South Carolina, 1978

Ward, Sally K

PROFESSOR EMERITA
B.A., University of Maryland, 1970
M.A., 1974, Ph.D., Brown University, 1977

Ware, Colin

PROFESSOR
PEAEMPL-Casual Salary
B.S., University of Durham, United Kingdom, 1972
M.A., Dalhousie University, Canada, 1973
Ph.D., University of Toronto, Canada, 1980

Warner, Rebecca M

PROFESSOR EMERITA
B.A., Carnegie Mellon University, 1973
Ph.D., Harvard University, 1978

Watson, Winsor H

PROFESSOR
Biological Sciences
B.A., Wesleyan University, 1972
Ph.D., University of Massachusetts - Amherst, 1978

Watters, David H

PROFESSOR EMERITUS
A.B., Dartmouth College, 1972
Ph.D., Brown University, 1978

Watts, Alison W

RESEARCH ASSISTANT PROFESSOR
Civil and Environmental Engineering
B.A., Mount Holyoke College, 1984
M.S., University of Arizona, 1992
Ph.D., University of New Hampshire, 2006

Webb, W Dwight

ASSOCIATE PROFESSOR EMERITUS
B.A., 1955, M.A., University of Redlands, 1956
Ph.D., Stanford University, 1967

Weber, Thomas C

ASSOCIATE PROFESSOR
Mechanical Engineering
B.S., 1997, M.S., University of Rhode Island, 2000
Ph.D., Pennsylvania State University, 2006

Webster, Penelope E

ASSOCIATE PROFESSOR EMERITA
B.S., Northeastern University, 1976
M.A., State University of New York at Geneseo, 1977
Ed.D., Boston University, 1984

Weiner, James L

ASSOCIATE PROFESSOR
Computer Science
B.S., University of Massachusetts - Amherst, 1973
M.S., University of Wisconsin, 1975
Ph.D., University of California - Los Angeles, 1979

Weintraub, Scott E

ASSOCIATE PROFESSOR
 Languages, Literatures, & Cultures
 A.B., Dartmouth College, 2001
 Ph.D., Emory University, 2006

Weisman, Gary R

PROFESSOR EMERITUS
 B.S., University of Kentucky, 1971
 Ph.D., University of Wisconsin, 1976

Wells, Melissa

PROFESSOR
 Social Work
 B.A., University of New Hampshire, 1991
 M.S.W., University of Minnesota, 1995
 Ph.D., University of New Hampshire, 2003

Wells, Roger E

CLINICAL PROFESSOR EMERITUS
 D.V.M., Ohio State University, 1972
 M.S., Michigan State University, 1980

Wharton-McDonald, Ruth M

ASSOCIATE PROFESSOR
 Education
 A.B., Brown University, 1985
 Ed.M., Harvard University, 1989
 Ph.D., University at Albany, 1996

Whistler, Cheryl A

PROFESSOR
 Molecular, Cellular, & Biomedical
 B.A., University of California - San Diego, 1991
 Ph.D., Oregon State University, 2000

White, Barbara Prudhomme

ASSOCIATE PROFESSOR
 Occupational Therapy
 B.S., 1978, Ph.D., University of Minnesota, 1999

White, Christopher M

ASSOCIATE PROFESSOR
 Mechanical Engineering
 B.S., 1994, M.S., State University of New York, 1996
 Ph.D., Yale University, 2001

Wible, James R

PROFESSOR
 Economics
 A.B., Wheaton College, 1973
 Ph.D., Pennsylvania State University, 1980

Wilburn, Reginald A

ASSOCIATE DEAN
 Dean's Office - Liberal Arts
 B.A., University of the District of Columbia, 1999
 M.A., 2001, Ph.D., University of Connecticut, 2009

Wilder, Allison

ASSOCIATE PROFESSOR
 Recreation Management & Policy
 B.S., Ithaca College, 1984
 M.S., State University of New York at Cortland, 1992
 Ph.D., Virginia Commonwealth University, 2008

Williams, Ann J

ASSOCIATE PROFESSOR
 English
 B.A., 1980, M.A., University of New Hampshire, 1990
 M.F.A., University of Iowa, 1997

Williams, Daniel

ASSOCIATE PROFESSOR EMERITUS
 B.A., Northwestern University, 1966
 Ph.D., University of California - Santa Barbara, 1970
 B.A., University of California, 1970

Williams-Barnard, Carol

ASSOCIATE PROFESSOR EMERITA
 A.S., Vermont College of Fine Arts, 1970
 B.S.N., 1972, M.S.N., 1975, D.N.Sc., Catholic University of America, 1979

Willkomm, Therese

CLINICAL ASSOCIATE PROFESSOR
 Occupational Therapy
 B.S., University of Wisconsin, 1982
 M.S., Drake University, 1984
 Ph.D., University of Pittsburgh, 1997

Wilson, Fiona S

CLINICAL ASSOCIATE PROFESSOR
 Management
 M.B.A., Simmons College, 1997
 D.B.A., Boston University, 2009

Wirth, Clifford Joseph

ASSOCIATE PROFESSOR EMERITUS
 B.A., Muhlenberg College, 1969
 M.P.A., San Diego State Univ, 1971
 Ph.D., Southern Illinois University - Carbondale, 1975

Witzling, Mara R

PROFESSOR EMERITA
 B.A., Queens College of the City University of New York, 1967
 M.A., 1970, Ph.D., Cornell University, 1978

Wojchowski, Don M

PROFESSOR
 Molecular, Cellular, & Biomedical
 B.A., Colby College, 1978
 Ph.D., University of Massachusetts - Amherst, 1984

Wollheim, Wilfred M

ASSOCIATE PROFESSOR
 Natural Resources & The Environment
 B.S., Cornell University, 1989
 M.S., University of Wyoming, 1994
 Ph.D., University of New Hampshire, 2005

Wolper, Ethel S

ASSOCIATE PROFESSOR

History

B.A., 1982, M.A., University of Chicago, 1984

Ph.D., University of California - Los Angeles, 1994

Wong, Edward H

PROFESSOR EMERITUS

B.S., University of California - Berkeley, 1968

Ph.D., Harvard University, 1975

Wood, Craig H

ASSOCIATE PROFESSOR EMERITUS

A.B., Stanford University, 1972

M.B.A., University of Chicago, 1974

Ph.D., Ohio State University, 1991

Woodward, Robert S

FD MCKERLEY PROFESSOR EMERITUS

B.S., Haverford College, 1965

Ph.D., Washington University - St Louis, 1972

Woodward, William R

PROFESSOR

Psychology

B.A., Harvard University, 1967

M.A., Princeton University, 1969

M.A., 1973, Ph.D., Yale University, 1975

Wormwood, Jolie B

ASSISTANT PROFESSOR

Psychology

B.A., Ithaca College, 2007

Ph.D., Northeastern University, 2012

Wosnik, Martin M

ASSOCIATE PROFESSOR

Mechanical Engineering

B.S., Technical University of Darmstadt, Germany, 1992

M.S., 1994, Ph.D., State University of New York at Buffalo, 2000

Wraith, Jon M

DEAN

Dean's Office - LS & A

A.A., Butte Community College, 1981

B.S., Humboldt State Univ, 1984

M.S., 1986, Ph.D., Utah State University, 1989

Wright, John J

PROFESSOR EMERITUS

B.S., Worcester Polytechnic Institute, 1965

Ph.D., University of New Hampshire, 1969

Wright, Steven C

PROFESSOR

Kinesiology

B.S., St. Lawrence University, 1979

M.Ed., 1980, Ed.D., Boston University, 1992

Wu, Kang

ASSISTANT PROFESSOR

Chemical Engineering

B.S., Tianjin University, China, 2003

M.S., 2008, Ph.D., University of Illinois at Urbana-Champaign, 2010

Wymore, Adam S

RESEARCH ASSISTANT PROFESSOR

Natural Resources & The Environment

X**Xiao, Jingfeng**

RESEARCH ASSOCIATE PROFESSOR

Earth Systems Research Center

B.S., Lanzhou University, China, 1997

M.S., Beijing University, China, 2000

Ph.D., University of North Carolina at Chapel Hill, 2006

Xie, Wenjuan

ASSOCIATE PROFESSOR

Accounting and Finance

B.B.A., 2000, M.A., Peking University, China, 2002

Ph.D., University of Wisconsin - Madison, 2008

Xu, Dongpeng

ASSISTANT PROFESSOR

Computer Science

B.E., Jilin University in P R China, 2009

Ph.D., Pennsylvania State University, 2018

MENGR, University of Science and Technology,

Xu, Le

ASSOCIATE PROFESSOR

Accounting and Finance

B.S., Beijing University, China, 1999

Ph.D., University of Massachusetts - Amherst, 2003

Y**Yalcinkaya, Goksel**

ASSOCIATE PROFESSOR

Marketing

B.S., Ege University, 1993

M.B.A., Suffolk University, 1998

M.S., Northeastern University, 2003

Ph.D., Michigan State University, 2007

Yi, Nan

ASSISTANT PROFESSOR

Chemical Engineering

B.S., Qingdao University of Science and Technology, 2000

M.S., Fudan University, China, 2005

Ph.D., Tufts University, 2012

Yoon, Se Young

ASSISTANT PROFESSOR

Electrical & Computer Eng Dept

B.S., 2005, M.S., Washington University - St Louis, 2005

Ph.D., University of Virginia, 2011

Yount, Janet A

PROFESSOR EMERITA

B.A., Grinnell College, 1972

M.A., 1973, Ph.D., University of Chicago, 1980

Yu, Qiaoyan

ASSOCIATE PROFESSOR

Electrical & Computer Eng Dept

B.S., Xidian University, China, 2002

M.S., Zhejiang University, China, 2005

M.S., 2007, Ph.D., University of Rochester, 2011

Z

Zang, Jiadong

ASSISTANT PROFESSOR

Physics

B.S., 2007, Ph.D., Fudan University, China, 2012

Zercher, Charles Kent

INTERIM DEAN

Dean's Office - CEPS

B.A., Messiah College, 1981

M.S., State University of New York at Buffalo, 1984

Ph.D., University of Notre Dame, 1989

Ziervogel, Kai

RESEARCH ASSISTANT PROFESSOR

Ocean Process Analysis Lab

Ph.D., 2004, M.S., University of Rostock, Germany, 2005

Zunz, Sharyn J

ASSOCIATE PROFESSOR EMERITA

B.A., University of Wisconsin, 1970

M.S.W., New York University, 1972

Ph.D., Fordham University, 1993

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