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University Calendar

1965–1966

September 15, Wednesday Residence halls open for freshmen
September 16, Thursday Freshman tests
September 17, Friday Orientation period begins
September 17, Friday First Faculty meeting
September 19, Sunday Residence halls open for upperclassmen
September 21, Tuesday Registration for Semester I
September 22, Wednesday First day of classes
September 23, Thursday Convocation, 1:00 p.m.
October 1, Friday Last day to add most courses, 4:30 p.m.
October 19, Tuesday Last day to drop most courses, 4:30 p.m.
November 15, Monday Mid-semester reports due, 9:00 a.m.
November 23, Tuesday Residence halls close for Thanksgiving recess, 7:00 p.m.
November 28, Sunday Residence halls reopen, 2:00 p.m.
November 29, Monday Classes resume
December 4, Saturday Air Force ROTC officer qualification tests
December 11, Saturday Residence halls close for Christmas recess, 7:00 p.m.
December 17, Friday Residence halls reopen, 2:00 p.m.
January 2, Sunday Classes resume
January 3, Monday Semester I final examinations begin
January 24, Monday Final examinations end. Residence halls close, 7:00 p.m.
February 2, Wednesday Residence halls reopen, 2:00 p.m.
February 9, Wednesday Registration for Semester II
February 10, Thursday First day of classes
February 11, Friday Classes hold Tuesday schedule
February 12, Saturday Last day to add most courses, 4:30 p.m.
February 21, Monday Last day to drop most courses, 4:30 p.m.
March 10, Thursday Mid-semester reports due, 9:00 a.m.
March 28, Monday Residence halls close for spring recess, 7:00 p.m.
April 1, Friday Residence halls reopen, 2:00 p.m.
April 10, Sunday Classes resume
April 11, Monday Memorial Day
May 30, Monday Semester II final examinations begin
May 31, Tuesday Senior grades due in Registrar's Office, 9:00 a.m.
June 7, Tuesday Final examinations end. Residence halls close, 7:00 p.m.
June 9, Thursday Commencement
June 12, Sunday

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Officers and Faculty
of the
University of New Hampshire
Trustees

His Excellency, John W. King, A.B., M.A., LL.B., LL.D., ex officio
Governor of New Hampshire
Frank T. Buckley, ex officio
Commissioner of Agriculture
Paul E. Farnum, B.S., M.S., ex officio
Commissioner of Education
John W. McConnell, B.A., Ph.D., D.Sc., ex officio
President of the University
Harold E. Hyde, B.S., M.S., Ed.D., ex officio
President of Plymouth State College
Roman J. Zorn, B.Ed., Ph.D., ex officio
President of Keene State College
Forrest M. Eaton, B.S., Portsmouth (1959-1967)
Chairman of the Board
Dean P. Williamson, B.S., Concord (1960-1968)
Vice Chairman of the Board
Secretary of the Board
Frank W. Randall, B.S., LL.D., Portsmouth (1936-1968)
Maurice F. Devine, A.B., LL.B., LL.D., Manchester (1949-1966)
J. Fred French, Manchester (1961-1965)
Jean A. Wagner, B.A., Hampton Falls (1962-1966)
Norman C. Berube, B.A., M.D., Manchester (1963-1967)
Richard Blalock, Portsmouth (1963-1967)

Years in parenthesis indicate terms of service.
Officers of Administration

John W. McConnell, Ph.D., President
Jere A. Chase, M.Ed., Executive Vice President
Norman W. Myers, B.S., Vice President-Treasurer
Robert N. Faiman, M.S., Ph.D., Dean of the College of Technology and Director of the Engineering Experiment Station
Harry A. Keener, M.S., Ph.D., Dean of the College of Agriculture and Director of the Agricultural Experiment Station
Eugene S. Mills, M.A., Ph.D., Dean of the Graduate School and Coordinator of Research
Robert F. Barlow, Ph.D., Dean of the Whittemore School of Business and Economics
Everett B. Sackett, M.A., Ph.D., Dean of the College of Liberal Arts
James W. Long, M.A., Ph.D., Director of the Division of Physical Education and Athletics
Joseph J. Petroski, M.Ed., Ed.D., Director of University Extension Service and Director of Summer Session
Daniel A. Ferber, M.A., Ph.D., Director of Development and Special Assistant to the President
C. Robert Keesey, B.A., Dean of Students
Elizabeth A. McQuade, A.M., Associate Dean of Students
Richard F. Stevens, B.S., Assistant Dean of Students
Donald E. Vincent, A.M.L.S., A.M., Librarian
Leslie L. LaFond, M.Ed., Acting Director of Admissions
Owen B. Durgin, M.A., Registrar
Samuel W. Hoitt, M.S., Director of the Cooperative Extension Service
Keith J. Nighbert, B.A., Station Manager of WENH-TV, Channel 11
Faculty
As of February 1, 1965

Abell, Max F., Extension Associate Professor Emeritus of Agricultural Economics
B.S., Cornell University, 1914; Ph.D., ibid., 1924. (1926- )

Babcock, Donald C., Professor Emeritus of Philosophy
B.A., University of Minnesota, 1907; M.A., ibid., 1908; S.T.B., Boston University, 1912; D.H.L. (Hon.), University of New Hampshire, 1960. (1918- )

Barraclough, Kenneth E., Professor Emeritus of Forestry
B.A., New York State College of Forestry, Syracuse University, 1921; M.F., Harvard University, 1940. (1926- )

Batchelder, Lyman J., Instructor Emeritus in Mechanical Engineering, Woodshop (1915- )

Bowles, Ella S., Publications Editor Emeritus
Plymouth Normal School, 1905. (1943 )

Brackett, Thelma, University Librarian Emeritus
A.B., University of California, 1919; Certificate, California State Library School, 1920; D.H.L. (Hon.), University of New Hampshire, 1962. (1942- )

Campbell, Willis C., Research Associate Emeritus, Engineering Experiment Station
B.S., New Hampshire College, 1906. (1938- )

Carroll, Herbert A., Professor Emeritus of Psychology
A.B., Bates College, 1923; A.M., Brown University, 1928; Ph.D., Columbia University, 1930. (1941- )

Coulture, Charles W., Professor Emeritus of Sociology
B.A., University of Toronto, 1908; B.D., Victoria College, 1909; M.A., Yale University, 1910; Ph.D., ibid., 1914. (1934- )

Ellis, Elizabeth E., Extension Associate Professor Emeritus of Home Economics
B.S., Teachers College, Columbia University, 1927; M.A., ibid., 1929. (1929- )

Hennessy, William G., Professor Emeritus of English
A.B., Boston University, 1916; A.M., ibid., 1924, (1923- )

Hitchcock, Leon W., Professor Emeritus of Electrical Engineering
B.S., Worcester Polytechnic Institute, 1908. (1910- )

Howes, Horace L., Professor Emeritus of Physics
B.S., Syracuse University, 1905; Ph.D., Cornell University, 1915. (1918- )

* Indicates part time devoted to Cooperative Extension Service.
† Indicates part time devoted to Agricultural Experiment Station.
Huddleston, Eric T., Professor Emeritus of Architecture
B.Arch., Cornell University, 1910. (1914- )

Jackson, C. Floyd, Professor Emeritus of Zoology
B.A., De Pauw University, 1905; M.S., Ohio State University, 1907; D.Sc. (Hon.), University of New Hampshire, 1961. (1908- )

Johnson, Arthur W., Professor Emeritus of Business and Economics
B.B.A., College of Business Administration, Boston University, 1922; M.B.A., ibid., 1929; C.P.A. (1920- )

Johnson, G. Reid, Associate Professor Emeritus of History
A.B., Muskingum College, 1916; M.A., Princeton University, 1920; Ph.D., University of Edinburgh, 1922. (1932- )

Latimer, L. Phelps, Associate Professor Emeritus of Horticulture
B.S., University of California, 1921; M.S., ibid., 1922; Ph.D., ibid., 1926. (1926- )

Manton, Robert W., Professor Emeritus of Music
Harvard University, 1918. (1923- )

Mills, Marian E., Assistant Professor Emeritus of Botany
B.S., Teachers College, Columbia University, 1917; M.A., ibid., 1920. (1927- )

O’Brien, Daniel A., County Agent Leader Emeritus
B.S., Cornell University, 1913. (1920- )

O’Connell, Elias M., Instructor Emeritus in Mechanical Engineering
Graduate, Wentworth Institute, 1923; Graduate, two-year course in pattern making, ibid., 1925. (1925- )

†O’Kane, Walter C., Professor Emeritus of Economic Entomology
B.A., Ohio State University, 1897; M.A., ibid., 1909; D.Sc. (Hon.), ibid., 1932. (1909- )

Parker, Clifford S., Professor Emeritus of Languages
A.B., Harvard University, 1912; A.M., ibid., 1914; Ph.D., Columbia University, 1925. (1931- )

Perry, Errol C., Assistant Professor Emeritus of Farm Management, Thompson School of Agriculture
B.S., Massachusetts State College, 1920. (1929-42, 1946- )

†Phillips, Thomas G., Professor Emeritus of Agricultural and Biological Chemistry
B.S., Ohio State University, 1912; M.S., ibid., 1913; Ph.D., University of Chicago, 1918. (1925- )

†Prince, Ford S., Professor Emeritus of Agronomy and Agronomist Emeritus, Agricultural Experiment Station and Cooperative Extension Service
B.S., University of Illinois, 1913. (1925- )

†Rasmussen, Edwin J., Extension Professor Emeritus of Horticulture
B.S., University of Wisconsin, 1927; M.S., ibid., 1929. (1929-36, 1947- )
Seiberlich, Joseph, Research Professor Emeritus, Engineering Experiment Station
Diploma Ingenieur, Technical University, Karlsruhe, Germany, 1924; Doctor Ingenieur, ibid., 1928. (1941-)

†Smith, Todd O., Research Assistant Professor Emeritus of Agricultural and Biological Chemistry
A.B., Indiana University, 1910; M.S., New Hampshire College, 1917. (1910-)

Solt, Marvin R., Professor Emeritus of Mathematics
B.S., Lehigh University, 1918; M.S., ibid., 1925. (1926-)

Stevens, Clark L., Professor Emeritus of Forestry
B.S., New Hampshire College, 1917; M.F., Yale University, 1926; Ph.D., ibid., 1930. (1919-)

Stevens, Henry B., Director Emeritus of University Extension Service
A.B., Dartmouth College, 1912. (1918-)

Swasey, Henry C., Associate Professor Emeritus of Physical Education and Athletics for Men
B.S., Amherst College, 1915; M.S., Indiana University, 1941. (1921-)

Thames, Sarah, Associate Professor Emeritus of Home Economics
B.S., Simmons College, 1930; M.A., Teachers College, Columbia University, 1942. (1945-)

Walsh, John S., Professor Emeritus of Languages
A.B., Harvard University, 1915; A.M., Boston University, 1928. (1922-)

Weston, Ruth C., Associate State 4-H Leader Emeritus
B.A., New Hampshire College, 1921; M.Ed., University of Maryland, 1953. (1929-)

Yale, William, Professor Emeritus of History
Ph.B., Sheffield Scientific School, Yale University, 1910; M.A., University of New Hampshire, 1928. (1928-)

Abbott, Helen D., Head Cataloger

Abbott, Marcuerite, Associate Professor of Occupational Therapy

Agenbroad, James E., Senior Cataloger
A.B., Miami University, 1956; M.L.S., Rutgers University, 1960. (1960-)

Albert, Harvey, Instructor in Foreign Languages and Literatures

Allen, Bruce D., Instructor in English
B.A., Boston University, 1959. (1964-)

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Allen, Fred E., Professor of Poultry Science and Veterinarian, Agricultural Experiment Station
B.S., University of New Hampshire, 1932; D.V.M., Ohio State University, 1936. (1940-
)

Allison, Richard C., Assistant Professor of Forest Technology, Thompson School of Agriculture
B.S., Pennsylvania State University, 1957; M.F., ibid., 1960. (1962-
)

Allmendinger, E. Eugene, Associate Professor of Mechanical Engineering

Alssen, Nicholas E., Assistant Professor of Foreign Languages and Literatures
A.M., University of Michigan, 1953. (1961-
)

Amell, Alexander R., Professor of Chemistry
B.S., University of Massachusetts, 1947; Ph.D., University of Wisconsin, 1950. (1955-
)

Andersen, Kenneth K., Assistant Professor of Chemistry
B.S., Rutgers University, 1955; Ph.D., University of Minnesota, 1959. (1960-
)

Anderson, Charlotte K., Assistant Librarian and Documents Librarian
B.A., University of Michigan, 1935; A.B.L.S., ibid., 1936; A.M.L.S., ibid., 1951. (1943-
)

†Andrews, Richard A., Associate Professor of Resource Economics
B.S., University of Maine, 1949; M.S., Pennsylvania State University, 1951; Ph.D., University of Minnesota, 1959. (1959-
)

Annis, William H., Assistant Professor of Agricultural Education and Teacher Trainer
B.S., University of Maine, 1951; M.Agric.Ed., University of New Hampshire, 1959; Ed.D., Cornell University, 1961. (1962-
)

Atwood, Janet, Assistant Professor of Physical Education
B.S., Skidmore College, 1950; M.A., State University of Iowa, 1955. (1962-
)

Baier, Lee S., Instructor in English
B.A., Reed College, 1948; M.A., Columbia University, 1952. (1960-
)

Ballard, Horace C., Agricultural Agent, Belknap County
B.S., Cornell University, 1936. (1949-
)

Balomenos, Richard H., Assistant Professor of Mathematics
B.S., United States Merchant Marine Academy, 1952; M.A., New York University, 1956; Ed.D., Harvard University, 1961. (1961-
)

Bardsley, Elizabeth S., Extension Home Economist, Belknap County
B.S., University of Maryland, 1953. (1962-
)

Bardwell, John D., Audio-Visual Coordinator and Lecturer in Education
A.A., Boston University, 1950; B.S., Gorham State Teachers College, 1952; M.Ed., University of New Hampshire, 1955. (1960-
)
Barlow, Robert F., Dean of the Whittemore School of Business and Economics and Professor of Economics
B.A., Colby College, 1950; M.A., Fletcher School of Law and Diplomacy, 1951; Ph.D., ibid., 1960. (1962-)

Barrett, James P., Assistant Professor of Forestry

Bartley, Clara H., Research Associate in Microbiology
B.S., Miami University, 1923; M.A., University of Michigan, 1926; Ph.D., University of Kansas, 1935. (1945-)

Bartley, Irving D., Assistant Professor of Music and University Carillonneur
B.M., Syracuse University, 1935; M.M., ibid., 1938. (1945-)

Barton, Philip S., Professor of Animal Science and Director, Thompson School of Agriculture
B.S., University of New Hampshire, 1928; M.Ed., ibid., 1938. (1939-)

Batchelder, Gerald M., Research Associate Professor, Engineering Experiment Station
B.S., University of New Hampshire, 1950; M.S.C.E., Purdue University, 1952. (1953-)

Batcheller, Joseph D., Associate Professor of Speech and Drama
A.B., Carnegie Institute of Technology, 1936; A.M., University of Minnesota, 1938; Ph.D., ibid., 1942. (1944-)

Batho, Edward H., Associate Professor of Mathematics
B.S., Fordham University, 1950; M.S., University of Wisconsin, 1952; Ph.D., ibid., 1955. (1960-)

Beasley, Wayne M., Research Assistant Professor, Engineering Experiment Station
S.B., Harvard College, 1945. (1957-)

Beckett, John A., Forbes Professor of Management

Beckman, Jere R., Research Associate in Animal Sciences
B.S., University of New Hampshire, 1956; M.S., ibid., 1959; D.V.M., University of California, 1963. (1964-)

Beckwith, Marion C., Chairman and Professor of Physical Education
A.B., Oberlin College, 1935; M.Ed., University of New Hampshire, 1937. (1935-)

Bell, R. Virginia, Assistant Professor of Occupational Therapy
B.S., University of Michigan, 1953; Certificate O.T.R., Boston School of Occupational Therapy, 1955. (1958-)

Bergeron, John A., Assistant Professor of Economics
B.A., Merrimack College, 1954; Ph.D., Massachusetts Institute of Technology, 1959. (1960-)

Bingham, Sylvester H., Professor of English
A.B., Dartmouth College, 1922; A.M., Harvard University, 1929; Ph.D., Yale University, 1937. (1936-)

14
Bjorkman, Ruben E., Instructor in Physical Education and Athletics, and Head Hockey Coach  
B.S., University of Minnesota, 1951. (1964- )

Blanchard, Fletcher A., Jr., Associate Professor of Electrical Engineering  
B.S., Union College, 1948; M.S. in E.E., Lehigh University, 1950. (1950- )

† Blickle, Robert L., Professor of Entomology  
B.S., Ohio State University, 1937; M.S., University of New Hampshire, 1939; Ph.D., Ohio State University, 1942. (1938-41, 1946- )

Blood, Edward J., Assistant Professor of Physical Education and Athletics  
B.S., University of New Hampshire, 1935. (1936- )

*† Blood, Paul T., Associate Professor of Agronomy  
B.S., New Hampshire College, 1921; M.S., University of New Hampshire, 1924. (1921-24, 1928- )

Bick, Melvin T., Associate Professor of Sociology  

Bonnice, William E., Assistant Professor of Mathematics  
B.A.E., Syracuse University, 1951; M.S., University of Washington, 1960; Ph.D. *ibid.*, 1962. (1962- )

Borror, Arthur C., Assistant Professor of Zoology  
B.S., Ohio State University, 1956; M.S., *ibid.*, 1958; Ph.D., Florida State University, 1961. (1961- )

Boston, Clarence E., Associate Professor of Physical Educational and Athletics and Head Football Coach  
A.B., Harvard College, 1939. (1949- )

Bourne, Elizabeth A., County Club Agent, Rockingham County  
Diploma, Framingham Normal School, 1924. (1926- )

† Bowring, James R., Professor of Resource Economics  
B.S.A., University of Manitoba, 1936; M.A., University of Alberta, 1941; Ph.D., Iowa State College, 1944. (1948- )

* Boynton, C. Hilton, Professor of Dairy Science, and Director, Foreign Education Programs  
B.S., Iowa State College, 1934; M.S., *ibid.*, 1940; Ph.D., Rutgers University, 1962. (1945- )

Bratton, Karl H., Professor of Music  
B.M., University of Kansas, 1931; M.A., Teachers College, Columbia University, 1945. (1945- )

Breck, Robert W., County Forester, Hillsborough County  
B.S., University of New Hampshire, 1940; M.F., Yale School of Forestry, 1941. (1947- )

Breeding, Charles H., Instructor in Soils and Plant Science, Thompson School of Agriculture  
B.S., University of New Hampshire, 1949. (1963- )
BRIGGS, JANET C., Instructor in Animal Sciences
B.S., University of Massachusetts, 1962. (1963- )

BRITTON, JOHN F., Colonel, Professor of Air Science
B.A., University of Notre Dame, 1936. (1961- )

BROCKELMAN, PAUL T., Instructor in Philosophy
A.B., Dartmouth College, 1957. (1963- )

BRONZINO, JOSEPH D., Instructor in Electrical Engineering

BROWNE, EVELYN, Professor of Physical Education
A.B., University of California, 1943; M.A., Teachers College, Columbia University, 1943; M.A., University of New Hampshire, 1962. (1943- )

†BRUNS, PAUL E., Professor of Forestry
A.B., New York University, 1937; M.F., Yale University, 1940; Ph.D., University of Washington, 1956. (1958- )

BRYCE, FORBES O., Lecturer in Sociology
B.S., Massachusetts Maritime Academy, 1936; M.A., American University, 1961. (1962- )

BUCK, CHARLES W., County Club Agent, Hillsborough County
B.S., University of Maine, 1951. (1955- )

BULLOCK, WILBUR L., Professor of Zoology
B.S., Queens College, 1942; M.S., University of Illinois, 1947; Ph.D., ibid., 1948. (1948- )

BURTON, DAVID M., Assistant Professor of Mathematics

BUTTERFIELD, MARCIUS R., County Club Agent, Cheshire County
B.S., University of Vermont, 1958. (1962- )

†BYERS, GORDON L., Associate Professor of Soil and Water Science
B.S., McGill University, 1948; M.S.A., Ontario Agricultural College, 1950. (1956- )

CAHILL, LAURENCE J., Jr., Associate Professor of Physics

CALDWELL, S. ANTHONY, Instructor in English

CANNING, WILLIAM B., Lieutenant Colonel, Assistant Professor of Air Science
B.S., Maryland University, 1957. (1963- )

CASAS, R. ALBERTO, Professor of Foreign Languages and Literatures
B.en L., Universidad de Barcelona, 1936; A.M., Columbia University, 1947; Ph.D., ibid., 1954. (1952- )
**Chandler, Priscilla T.** *Instructor in Occupational Therapy*
B.S., Boston University, Sargent College, 1938; M.A., University of Southern California, 1957. (1964- )

**Chapman, Donald H.** *Professor of Geology*
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B.S.E., University of Michigan, 1929; M.S.E., ibid., 1931; Ph.D., ibid., 1934. (1938-)

ZOLLER, J. HAROLD, Professor of Civil Engineering
B.S.C.E., University of Wyoming, 1941; B.S.S.E., University of Illinois, 1945; Ph.D., University of Wisconsin, 1953. (1958-)
Administrative Staff

George W. Bamford, Alumni Fund Director

John D. Bardwell, Audio-Visual Coordinator, University Extension Service

Ronald C. Barrett, Director of Memorial Union

Doris Beane, Assistant for Institutional Studies

Kathleen R. Beckingham, Supervisor of Testing

Richard M. Brayton, Director of Physical Plant Development

Burnell V. Bryant, Director of Alumni Affairs

Robert G. Congdon, Acting Director of Counseling

Henry W. Corrow, Jr., Extension Editor

William D. Crandall, m.d., Assistant Director of University Health Service

Francis H. Gordon, Manager, University Housing

W. Arthur Grant, News Editor

Jane E. Griswold, Director of Dining Services

L. Franklin Heald, Director of Informational Services

Dayton M. Henson, Manager, University Bookstore

Charles H. Howarth, m.d., Director of University Health Service

Nicholas G. Katsiaficas, Association Activities Director and Business Manager of The Alumnus

Herbert E. Kimball, Business Manager

Reginald W. King, Manager, Printing Service
Eugene H. Leaver, Assistant Superintendent of Properties and Supervising Architect

Harold I. Leavitt, Superintendent of Properties

Richard E. LeClair, Director of Placement

William W. Lothrop, Counselor

W. Kent Martling, Assistant Treasurer

Harriet B. Nason, r.n., Supervising Nurse

Mary Lou O'Donnell, Assistant Director of University Extension Service and Conference Coordinator

Ronald W. Olmstead, Controller

Richard C. Plumer, Editor of The Alumnus

Frank W. Poland, Director of Non-Academic Personnel

Craig L. Pritchard, Sports Information Director

Mary Semitros, Alumni Recorder

Russell C. Smith, Purchasing Agent

Jane B. Stearns, Financial Aids Officer

Albert D. Van Allen, Director of University Relations
Admission
to the
University of New Hampshire
Admissions Procedure

University admissions policy is designed to provide for the admission of those students whose personal record, achievement, aptitude, and motivation demonstrate that they have the qualifications for carrying the desired program satisfactorily.

The University admits in-state residents who have a scholastic record which ranks them in the upper two-fifths of their graduating classes from accredited or approved secondary schools, provided they are recommended or certified, and have an appropriate college preparatory background.

All candidates for admission to the University are required to submit the results of the College Entrance Examination Board Scholastic Aptitude Tests and the Writing Sample taken during the senior year. Achievement tests in a language (including the supplementary listening comprehension test, if possible), are required for all students entering the Whittemore School of Business and Economics and the College of Liberal Arts. Other achievement tests, not required but strongly recommended, are the English achievement test, and, for applicants to the College of Agriculture or the College of Technology, an area or areas generally related to the student’s prospective major, i.e., Level I mathematics for engineering.

The number of out-of-state students admitted each year is limited and selection is made primarily on the basis of superior academic achievement in secondary school. Such traits as character, leadership, and initiative are taken into account.

All applicants living in New Hampshire are required to submit a notarized statement to the effect that their parents are legally domiciled in the state. Students admitted from states other than New Hampshire or from foreign countries are considered as non-residents throughout their entire attendance at the University unless their parents have gained bona fide residence in New Hampshire.

Except for early decision candidates, applications should be submitted only after the first term grades are available and for non-resident applicants, before February 15.

No New Hampshire applicant can be considered whose application is not complete at least by July 1. A non-refundable application fee — $5.00 for residents of New Hampshire and $15.00 for non-residents — must accompany the application.
The University recommends the following secondary academic program for students applying to the several undergraduate colleges:

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<th>Agriculture</th>
<th>Liberal Arts</th>
<th>Technology</th>
<th>Business</th>
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<tbody>
<tr>
<td>English</td>
<td>4 units</td>
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<td>4 units</td>
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<tr>
<td>Language</td>
<td>2 units</td>
<td>3 units*</td>
<td>3 units</td>
<td>3 units</td>
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<tr>
<td>Mathematics</td>
<td>3 units†</td>
<td>3 units</td>
<td>4 units†</td>
<td>3 units</td>
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<tr>
<td>Laboratory Science‡</td>
<td>3 units</td>
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<td>3 units</td>
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<tr>
<td>Social Studies</td>
<td>3 units</td>
<td>3 units</td>
<td>2 units</td>
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The University will consider applicants who have taken less than the recommended programs with the following minimums:

<table>
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<tr>
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<th>Agriculture</th>
<th>Liberal Arts</th>
<th>Technology</th>
<th>Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>4 units</td>
<td>4 units</td>
<td>4 units</td>
<td>4 units</td>
</tr>
<tr>
<td>Language</td>
<td>0 units</td>
<td>2 units*</td>
<td>0 units</td>
<td>2 units*</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2 units</td>
<td>2 units</td>
<td>3½ units†</td>
<td>2 units</td>
</tr>
<tr>
<td>Laboratory Science‡</td>
<td>1 unit</td>
<td>1 unit</td>
<td>2 units§</td>
<td>1 unit</td>
</tr>
<tr>
<td>Social Studies</td>
<td>2 units</td>
<td>2 units</td>
<td>2 units</td>
<td>2 units</td>
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</tbody>
</table>

* Of a single foreign language.
† Including algebra I and II, plane geometry, and trigonometry.
‡ Excluding “General Science.”
§ Should include Physics and Chemistry.
Applicants might well include courses or other experiences in music, art, and drama in their secondary school programs, but not at the expense of more formal academic preparation.

Interviews are not required as part of the admission process. They may, however, be requested by the Admissions Office if deemed necessary or desirable to make an equitable decision. Group interviews by appointment are frequently held on Saturday mornings. These group interviews are essentially opportunities for information exchange and are followed by guided tours of the campus. Applicants are encouraged to visit the campus in any event, and regularly scheduled tours leave the Memorial Union at 2:00 p.m. Saturday and Sunday when college is in session.

The University participates in the Regional Cooperation Program of the New England Board of Higher Education in which students from other New England states are given priority in certain curricula, as well as special tuition consideration. Information may be obtained from the New England Board of Higher Education, 31 Church Street, Winchester, Massachusetts, or from the admissions offices of the New England state universities.

**Early Decision**

The University is willing to give applicants an indication of admission, based on scholastic attainment for three years, under an early decision procedure. This plan is specifically appropriate for a well-qualified student who has made the University his first choice and who submits a regular application including junior SAT's with a statement countersigned by the secondary school that UNH is his first choice college and that other applications will be withdrawn if he is admitted under early decision.

**Early Admission**

Secondary school students who show unusual promise may be admitted early to the University. While it does not actively recruit candidates for college entry before graduation from secondary school, the University will, upon recommendation of the school, review the credentials of those whose academic programs have been unusually successful and extensive. Social and emotional maturity also are considered in selecting candidates for early admission.

**Advanced Standing**

The University will recognize unusual secondary school work by means of advanced placement and credit for those who have
taken especially enriched or accelerated courses before entering college. Applicants qualify for such credit by satisfactory achievement on University-approved placement examinations including the College Board Advanced Placement Tests. Further information may be obtained from the Admissions Office.

**Transfer Students**

Qualified candidates for advanced standing from approved institutions may be admitted. Their status is tentatively determined by the quantity and quality of the work completed at the institution from which they come. In transfer, credits are allowable for courses which are appropriate to the curriculum for which the student is admitted and for courses in which grades above the lowest passing grade were received.

While the University is pleased to encourage the competent transfer applicant who has valid and legitimate reasons for desiring the transfer to New Hampshire, it cannot encourage the applicant with a history of academic or personal difficulty. University admissions policy restricts consideration for transfer to those students with satisfactory academic, as well as personal, records. In the event of personal or academic difficulty, a student is usually better advised to return to his former college after an appropriate period and clear his record before attempting to transfer.
Fees and Expenses

The cost for the freshman year at the University averages about $1,600 for a resident of New Hampshire and $2,200 for a non-resident.

Tuition is $480 ($1,125 for non-residents). As part of the regional cooperation program of the New England Board of Higher Education, many non-residents from certain states will be eligible for tuition at the in-state rate in selected curricula. The student must apply to the Registrar for this reduced tuition. Any student registering for eight credits or more per semester pays the full tuition. Any student registering for fewer than eight credits pays $22.50 per credit hour, plus a registration fee of $15 for residents and $50 for non-residents per semester.

All students who are admitted to the University must make an advance tuition deposit of $50 for residents and $100 for non-residents. This deposit will be credited on the student’s tuition bill. In case a student decides not to attend the University after making this deposit, it will automatically be forfeited.

Tuition for each semester is payable in advance. Three-fourths will be refunded to a student withdrawing during the first four days of a semester; one-half after four days and within thirty; and none thereafter.

Refundable deposits may be required to cover locker keys or loss or breakage in certain departments. A charge will be made for individual lessons in music, as noted in the description of Applied Music courses. A charge will be made for riding lessons, as noted in the sections on Physical Education for Women and Animal Science.

Board is $400.00. All freshmen, and sophomores and juniors resident in University housing units (not including fraternities nor sororities), are required to board in University dining halls which include the new Stillings Dining Hall and the renovated Huddleston Dining Hall (formerly the Commons). The purpose of this regulation is to insure that the health of students is safeguarded by offering skilled dietetic supervision in the selection and preparation of well-balanced meals. There are cafeterias in University dining halls and at the Memorial Union for seniors and graduate students.

Books and classroom supplies cost between $75 and $100. These may be purchased at the University Bookstore.

There is a Memorial Union assessment of $12 and an activity tax of $12 which includes a subscription to the undergraduate newspaper and yearbook, and membership in Student...
Union, Student Government, and class activities. An athletic admissions fee of $10 is optional.

Personal expenses average $350. These will vary with the needs of the individual student, and include clothing, laundry, recreation, incidentals, and travel.

The University reserves the right to adjust charges for such items as tuition, board, and room rent from time to time. Such changes will be announced as far in advance as feasible.

A deposit of $15 is required of each student to whom military equipment is issued. Every student participating in the program of Physical Education and Athletics for Men and Physical Education for Women must pay $1 for locker and towel service.

A deferred payment plan allows a student to pay one-third of his college bills before registration and one-third at the end of each of the following two months. A $5 fee is charged for this service, and arrangements are made through the Business Office.

University Housing

Room rents average $280. The University has ten residence halls for women and nine for men. Undergraduate women are required to live in a residence hall or sorority house unless they live at home. Undergraduate men are not required to live in residence halls, but will be accommodated to the extent of the space available. Room rents range from $216 to $380.

Students living in University residence halls are required to sign room contracts covering the entire year beginning in September and ending in June. Housing applications will be sent to the student at the time of official admittance to the University. A ten dollar ($10.00) room deposit must accompany each application for a room. This deposit will be forfeited if the applicant fails to pay room rent by a stipulated date or cancels after that date. Upon occupancy the deposit is held as a damage deposit.

Assignments to University residence halls are made during July and August. A notice of room assignment and bill will be sent when assignment is complete. In the event of a late assignment, the deadline payment date for room rent will be extended as indicated on the Notice of Room Assignment and Bill. Failure to pay rent within the specified time will automatically cancel room reservation. No follow-up notice will be sent.

Room rent is payable in advance. For those attending the first semester, one-half of the year's rent must be paid not later
than July 15. Rent for those attending the second semester must be paid not later than January 15.

A separate check payable to the University of New Hampshire should be forwarded to the Housing Office for room rent. Rooms paid for and not occupied one day after registration day may be declared vacant and three-fourths of the room rent returned, unless the individual having the reservation makes a written request to the Director of University Housing to hold the room until a later date. No room will be held for longer than 10 days after registration date.

An undergraduate woman student under 23 years of age is required to room in one of the women's residence halls or a sorority house, unless she is working for a room in a home approved by the Dean of Students or living with her family.

Financial Aid

A financial aids program assists able and promising students who are unable to meet their educational expenses entirely from their own or their family's resources.

Tuition Grants and Scholarships

A full-time student who is a resident of New Hampshire is eligible for consideration for an in-state Tuition Grant. The amount varies from $100 to full tuition, and the basic consideration is financial need. Non residents are eligible to be considered for non-resident tuition grants; scholastic attainment, financial need, and participation in extra-curricular activities are the principal considerations.

There are other scholarships available for both resident and non-resident students. The basis may be either scholastic attainment, participation in extra-curricular activities, or meeting requirements specified by the donor.

A student may apply for financial aid at any time, but no awards are made until a student has been admitted to the University, has submitted an application for a grant or scholarship, and his parents have filed a parents' confidential statement with the College Scholarship Service at Princeton, N. J. In-state students may obtain these forms from high school principals or guidance counselors. Out-of-state and transfer students may secure the application form from the Financial Aids Office, UNH, and the parents' confidential statement from high school principals or guidance counselors. Applications are due February 15.
Granite State Merit Scholarships are awarded to 20 outstanding graduates of New Hampshire high schools. Recipients are recommended by high school principals, and are usually the highest ranking students planning to attend the University. The award is $100 each year providing a 3.0 (B) average is maintained.

The University sponsors two National Merit Finalists, one in-state and one non-resident, who have indicated UNH as the college of their choice. The awards vary from $250 to $1,500 ($1,700 for a non-resident) depending on the student’s financial need.

Two Achievement Scholarships are awarded, one to an in-state and one to a non-resident student. Awards are based on high achievement plus high aptitude or special talent recognized by appropriate state or regional groups. Awards vary from $500 to $1,200 ($1,700 for a non-resident) depending on financial need.

Loans

Two loan funds are administered by the University: the UNH Loan Fund and the National Defense Student Loan Fund. Financial need must be clearly demonstrated and loans may be used only for expenses incurred in pursuing a college education. Applications may be secured from the Financial Aids Office and should be filed by July 15.

In many communities scholarships and loans are available locally. School principals and guidance counselors have information about these sources of assistance.

Employment

Various types of employment are usually available to students wishing to work part time. The University participates in the College Work-Study Program under Title IC of the Economic Opportunity Act. The purpose of the program is to encourage students from low income families to attend institutions of higher education.

For information on the College Work-Study Program and other financial assistance, contact the Financial Aids Office, Thompson Hall.
The Colleges of the University of New Hampshire
University Academic Requirements

In addition to the particular requirements for specific degrees established by the Colleges, the University requires that every candidate for a bachelor’s degree must successfully complete English 401-402 and History 401, 402; and one year of work (6 semester hours) in each of the following groups:

**Group B** (Natural Sciences) — Biology 401-402; Botany 411; Chemistry 401-402, 403-404; Geology 401-402; Mathematics 407-408; Physical Science 401-402; Physics 401-402; Zoology 412.

**Group C** (Social Sciences) — Economics 401-402; Geography 401, 402; Government 405, 406, 408; Psychology 401-402; Sociology 400, 411, 540.

**Group D** (Humanities) — Arts 475, 476; English 513, 514, 515, 516; Humanities 501-502; Music 403, 404; Language 501, 502; any specific foreign language 503-504, 505-506; German 605-606; Philosophy, any courses; Speech and Drama 431, 436.

All men students must complete Men’s Physical Education 431-432; and all women students, Women’s Physical Education 401, 402; 403, 404.

A student shall be considered as having satisfied the group requirement for any group in which he has received advanced placement standing with credit.

A student who has accumulated 30 or more credits in three or more areas in the field of a given group shall be considered as having satisfied the group requirement.
College of Agriculture

HARRY A. KEENER, Dean
M. C. RICHARDS, Associate Dean

DEPARTMENTS

Animal Sciences  Home Economics
Biochemistry    Plant Science
Botany          Resource Economics
Entomology      Soil and Water Science
Forestry

General Information

Purpose and Programs

The objectives of the College of Agriculture are to give the student a fundamental education in the biological, physical, and social sciences and to introduce him to the arts and humanities. In addition specific technical courses are provided in the student’s interests and in his major.

The College offers three undergraduate degrees: the Bachelor of Science in Agriculture, the Bachelor of Science in Forestry, and the Bachelor of Science in Home Economics.

Advisory System

A member of the faculty closely related to the student’s area of interest is appointed as an adviser to assist the student in planning his academic program.

The student may select his major upon entering the College or he may wait until registration for the sophomore year.

More than One Undergraduate Degree

A student may obtain more than one undergraduate degree at the University by completing all the curriculum, departmental, scholastic, and other requirements for each degree. Students desiring to earn more than one undergraduate degree should make their plans known to their adviser and the College Deans concerned early in their college careers.

Honors Program

The College of Agriculture, through its various departments, offers the superior student the opportunity to participate in an Honors Program which is individually designed to provide added intellectual incentives and opportunities. Participation in the Honors Program is by invitation of a faculty member with the approval of the department concerned and the Dean of the College. It is limited to those students entering the sophomore or junior
year with at least a 3.0 grade point average. The recommending faculty member, his department Chairman, and the Dean will constitute the student’s academic advisory committee. This committee and the student will decide upon a suitable academic program. Departmental and College course requirements may be waived for students in the program. The student will complete the same number of credits to graduate as other students in the department.

Bachelor of Science Degree

Many professional careers are open for our graduates. There are opportunities for people trained in resource development and conservation in rural areas in addition to positions for serving in agricultural industries. Newly created countries throughout the world are asking for assistance in all phases of agriculture, including home economics and forestry.

In all departments students may prepare for further graduate work in their respective fields of interest.

Following are additional examples of employment agencies and industries and the careers which they offer:

‡The agricultural industries, dairy, poultry, and general farming, state and federal governments, feed and fertilizer manufacturers, food processors, cooperatives, banks, and marketing and transportation industries employ graduates as price analysts, farm appraisers and managers, poultry specialists, and in dairy and livestock occupations as farmers, managers, and technologists.

‡State planning and recreation agencies, soil conservation services, the cooperative extension services, and private research firms employ rural and urban planners, hydrologists, conservation experts, resource development economists, nurserymen, and landscape gardeners.

‡The Peace Corps, the Foreign Agricultural Service, the Food and Agricultural Organization of the United Nations, and U. S. export and import firms hire economic growth and farm production experts, soil and water managers, market analysts, international trade economists, agricultural engineers, teachers, plant and animal breeders, and nutrition specialists.

‡The Federal Government and state agencies, universities, health services, and private foundations employ biochemists, geneticists, animal nutrition specialists, plant and animal pathologists and physiologists, veterinarians, foresters, home economists, and entomologists.

Majors and Specializations

Agricultural Education
Animal Sciences
  Animal Science
  Dairy Science
  Poultry Science
  Pre-Veterinary Medicine
Biochemistry
Botany
Entomology
Plant Science
  Field Crops
  Horticulture
Resource Economics
Soil and Water Science
  Soil Science
  Hydrology
  Mechanized Agriculture

Academic Requirements

For the Bachelor of Science degree a total of 128 credits are required. In addition the student must complete the University academic requirements found on page 56 and obtain a written recommendation for graduation from his adviser and department chairman.

Agricultural Education

The Agricultural Education curriculum provides for both a basic and liberal college preparation for those students who plan to teach agriculture or seek employment with the Cooperative Extension Service as agricultural or 4-H club agents. Graduates also find employment in specialized positions with industry or in education where a broad background of technical and professional skills is needed for sales, promotional, administrative, or research activities.

Students in this curriculum satisfy state teacher certification requirements or the Extension Service preparation recommendations by one semester of off-campus experience in a student training center and or in a county Cooperative Extension Service office.

Students desiring to major in this curriculum should consult the professor in charge before the end of the sophomore year.

Students in other majors or areas of specialization who wish to minor in Agricultural or Cooperative Extension Education should consult their advisers and the professor in charge early in their academic careers.

Animal Sciences

The Animal Sciences courses are offered to provide students fundamental scientific training in such specialized areas as genetics, nutrition, animal hygiene, processing, and management. The student also has an opportunity to further concentrate his studies in the fields of Animal, Dairy, or Poultry Science, or Pre-Veterinary Medicine.

Outstanding graduates are qualified to pursue advanced study in preparation for college teaching, research and responsible technical positions in industry and federal and state agencies. Students interested in production and processing can receive training as production managers, for positions in the feed or equipment industries, marketing organizations, breeding associations, sales and service work in allied industries and other areas of the diversified animal agricultural industry.

The department maintains Morgan horses for all phases of class work including riding. Herds of Milking Shorthorn, Hereford and Angus cattle, and Yorkshire swine and a flock of Dorset sheep are maintained.

The nationally recognized dairy herd, consisting of registered Ayrshire, Guernsey, Holstein, and Jersey animals, is housed in a new dairy barn. The Ritzman Animal Nutrition Laboratory includes bomb calorimeters, metabolism stalls for digestion studies, respiration chambers for heat production measurements, and other facilities used in nutrition teaching and research with both farm and laboratory animals.
The University Poultry Farm facilities are available for instruction and for research and include laboratories for both teaching and research in poultry genetics, nutrition, and management.

Laboratory facilities, including such modern equipment as ultra centrifuge, amino acid analyzer, and gas chromatograph, are available in Nesmith Hall to provide the latest scientific training in the field of animal hygiene.

The Department works closely with the New Hampshire animal industry and frequent class trips are made to leading farms, industrial concerns, processing plants, etc., where opportunities are presented for viewing industry in action.

Students who contemplate veterinary medicine as a career should confer early with the adviser to Pre-Veterinary Medicine students. Although two years of pre-veterinary college work will meet the requirements of most schools of veterinary medicine, it should be noted that all veterinary colleges give first preference for admission to applicants from their respective states. Out-of-state students who are admitted must show above average scholastic ability. It is desirable that applicants to colleges of veterinary medicine have farm experience, and, in fact, it is a prerequisite for admission to some.

**Biochemistry**

Biochemistry is the study of the chemistry of living things and of life processes. A student majoring in Biochemistry will receive a fundamental training in chemistry including courses in general, analytical, organic, and physical chemistry. An equally broad program in biological sciences is recommended. In addition to training in Biochemistry, including an opportunity to participate in basic research during the senior year, students may select courses in botany, zoology, microbiology, and genetics.

The curriculum is designed to provide a strong foundation either for technical positions in universities, experiment stations, research institutes, and industrial or government laboratories or for graduate study in the natural sciences. Excellent opportunities for teaching and research in Biochemistry are available to students who earn graduate degrees in this very rapidly growing field of science.

A student who wishes to major in this department should register for Chemistry 403-404 and for Mathematics 421-422 in the freshman year. An early conference with the chairman of the department, preferably prior to registration in the freshman year, is highly desirable for orderly planning of the curriculum.

**Botany**

Students interested in a broad background in the plant sciences should consider majoring in Botany. The principal areas of specialization are: (1) Plant Pathology — the study of plant diseases, their causes and control; (2) Plant Physiology — the study of plant functioning with such practical applications as plant nutrition and requirements for plant growth; (3) Taxonomy — plant classification and plant identification; (4) Ecology — the relationship of the plant to its environment; (5) Morphology and Anatomy — the study of the anatomy, development, and cellular organization of plants, including histological techniques; (6) Cytology — the cell, cytological techniques, and chromosome studies; (7) Preparation for botanical technicians; and (8) Preparation for secondary-school teaching.

The undergraduate courses to be taken in all these fields are nearly the same until the junior and senior years. Some specialization should then be
made. The student who graduates in Botany may take graduate work in Botany or in the related fields of Horticulture, Forestry, and Agronomy which require an extensive background in Botany. Assistantships, research positions, and full-time teaching jobs are more available at present than in previous years. Opportunities for able botanists also occur in government work. Positions as technicians or secondary-school teachers may be obtained with a B.A. or B.S. degree.

Entomology

Entomology offers courses for students who wish to specialize in the study of insect life, insect control, and insects in relation to man. There are many positions open to those qualified in Entomology. There are opportunities for employment in public institutions and with commercial and industrial firms.

Students are given a fundamental training in Entomology and related fields. Those who wish to specialize in the chemical control of insects, and who plan to take graduate work leading to a professional degree, will follow a program outlined as Insect Toxicology. These students will be expected to take advanced courses in mathematics and chemistry.

Students planning a career in Entomology may select elective courses best suited to their needs and interests.

Plant Science

Students with an interest in economically important plants and their use for food, feed, fiber, recreation, or ornamental purposes should consider specialization in Plant Science. Because of the diversity of employment possibilities, the Plant Science curriculum is flexible. Students first obtain a basic knowledge of physical and biological sciences. Selected courses then relate these sciences to the individual's interest. Three options are available as informal guides for curriculum development — science, management, and agribusiness. In addition, the student may wish to concentrate his attention toward either horticultural or agronomic crops.

The science option should be followed by students preparing for advanced study. Additional course work in chemistry, physics, and mathematics will provide an excellent foundation upon which the student can build his research or teaching career.

Management encompasses production and marketing of farm or ornamental crops and establishment and maintenance of turfgrass or nursery stock. Within this area, students will find opportunities in management of farms, greenhouses, golf courses, or nurseries, on state park or highway planning commissions, and with food and feed processing firms. Students specializing in management will select production and applied courses to support the basic core of study.

Agribusiness will expose the student to more courses in marketing, economics, accounting, and business procedures while still retaining the fundamental requirements in Plant Science. Specialization in this area will prepare students for sales and brokerage positions in wholesale or retail marketing or for positions in industry.

Plant Science is a curriculum for city as well as farm men and women. Departmental programs are often conducted in cooperation with New Hampshire plant industries. This cooperation offers the student an opportunity to associate scientific principles with industry practice, thereby extending the scope of his training.
Students interested in a Plant Science major may consult with the Department Chairman, Professor L. C. Peirce.

Resource Economics

This program formerly named Agricultural Economics continues to teach courses on the economic and business aspects of agriculture, farm management, food marketing and consumption, agricultural price policy, and world food supply. The broader aspects of resource development and growth are also covered in the teaching program, including resource economics, public resource policy, conservation economics, and regional economics.

The student in Resource Economics is trained primarily in the science of economics and its use in problem solving by households, firms, and governmental units. In addition the student is encouraged to take courses leading to a broad university education. Students interested in the economic or business aspects of agriculture should also take courses in the Animal and Plant Sciences; those concerned with resource conservation and use should take courses in Forestry and Soil and Water Science. All students will be expected to take courses in the Whittemore School of Economics and Business.

Training for careers in farming, with business firms and banks, or for teaching and research in agricultural colleges or government agencies can be done in Resource Economics.

Soil and Water Science

The subject matter of this program may be classed in both the biological and earth sciences. It includes knowledge of the outermost layer of the earth's crust and that portion of the hydrologic cycle pertaining to the fate of water falling on the earth's surface. Knowledge concerning soil and water is important to persons working in the plant sciences, geology, geography, meteorology, and certain aspects of engineering. Students interested in Soil and Water Science may select one of the three majors described below or develop a program combining elements of the three.

Soil Science — This includes the study of chemical and physical properties of soils in relation to their formation, classification, absorptive capacities for chemical elements and compounds, engineering properties, and ability to support microorganisms and higher forms of plant and animal life. Students obtain a basic knowledge in the physical and biological sciences to prepare for graduate study, for employment by commercial enterprises, or work for various state and federal agencies. Those who continue their education and obtain advanced degrees find professional positions available in teaching and research.

Based upon experiences of alumni employment, opportunities are found in college teaching, research at universities, with chemical companies, the U. S. Department of Agriculture, soil survey and soil conservation, as Extension specialists and in county agent work, land appraisal, forestry, and foreign service, such as technical assistance programs and the Peace Corps.

Hydrology — This is the science underlying development and control of all water resources in the atmosphere and on and beneath the earth's surface. Sciences closely related and basic to the analysis and understanding of water in the hydrologic cycle are meteorology, soils, geology, plant physiology, physics, and chemistry. Because water is a basic requirement of life,
it has social, economic, and political significance throughout the world. As the population of the world grows and as industrial, recreational, agricultural, and residential needs for water increase, greater emphasis will be placed on the study and understanding of problems associated with water resources. Employment opportunities for those broadly trained in hydrology will continue to expand.

Persons trained in hydrology are qualified to seek employment with the United States' Bureau of Reclamation, Geological Survey, Corps of Engineers, and Soil Conservation Service; public utility companies, federal and state forestry services, state highway departments, recreation groups, community resource planning boards, international organizations, scientific or educational institutions, or for self-employment.

**Mechanized Agriculture** — This major is designed to provide instruction and training in the fundamentals of agricultural science with particular emphasis on the technical phases. The program of study prepares graduates for self-employment and for commercial positions in the agricultural industry.

Mechanized Agriculture majors may find employment selling or servicing agricultural building materials, labor-saving mechanical equipment, irrigation systems, tractor, and field machinery. Graduates are qualified for positions as agricultural extension workers, as soil conservationists, or as rural use advisers with electric utility companies. They may also find employment with farm insurance companies or agricultural management organizations.

As farming becomes more intensive and the mechanization of our farms more complete, there will be even greater opportunities for graduates with this type of training.

**Bachelor of Science in Forestry**

The primary objectives of this program are to help the student develop as a person and as a professional forester. His courses in Forestry form the foundation through which he will be professionally prepared.

Bachelor of Science degree graduates are employed in all phases of supply, growth, and utilization of raw materials from the forests. Many graduates eventually become specialists in the wildlife, grazing, watershed, and recreational aspects of land management. One-fifth of the population in New Hampshire engaged in manufacturing is employed in forest based industries. Lumber and paper production are among the top ten industries in the United States.

A comprehensive education emphasizing the biological, physical, and social sciences is provided in the undergraduate curriculum to give a sound base for embarking on a professional career or for entering graduate schools to obtain specialization in specific areas of forestry.

Field work is carried out during the academic year on woodlands adjacent to the campus which are managed by the Department of Forestry. In June each year a two-week field session is held in the northern hardwood forests of New Hampshire for all students who have completed their junior year of studies. There is no additional summer camp. Forestry majors are assisted and encouraged to obtain summer employment during which time the student's performance and progress receive guidance and appraisal.

In addition to the normal University fees and tuition, Forestry students are required to meet transportation and meal charges in connection with regularly planned field trips and the June field session.
The Department of Forestry is accredited by the Society of American Foresters, the national accrediting agency for forestry schools. The curriculum that follows fulfills both the University and College course requirements. A minimum of 128 semester credits are required for the B.S. degree in Forestry.

A major in Wildlife Management is being developed cooperatively by the departments of Animal Sciences, Forestry, and Zoology. Inquiries relative to this proposed new major are invited.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>First</td>
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<tr>
<td></td>
<td>Semester</td>
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<tr>
<td>Chem. 401, 402</td>
<td>General Chemistry</td>
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<tr>
<td>Bot. 411</td>
<td>General Botany</td>
</tr>
<tr>
<td>For. 425, 426</td>
<td>Dendrology; Wood Technology</td>
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<tr>
<td>Engl. 401, 402</td>
<td>Freshman English</td>
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<tr>
<td>Agr. 401</td>
<td>Introduction to College</td>
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<tr>
<td>C. E. 501</td>
<td>Surveying</td>
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<tr>
<td>R.O.T.C.</td>
<td>½</td>
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<tr>
<td>P. E. 431-432</td>
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<td>Hist. 401, 402</td>
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<td>For. 527, 528</td>
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<td>Math. 405 and</td>
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<td>Econ. 401</td>
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<tr>
<td>Biochemistry, Physics, and/or Calculus*</td>
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<td>Business Administration</td>
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<tr>
<td>For. 543, 650</td>
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<tr>
<td>For. 629</td>
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<tr>
<td>Bot. 751</td>
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<tr>
<td>S. and D. 501</td>
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<tr>
<td>Gov. 406</td>
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<tr>
<td>Electives courses</td>
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* A combination totalling 8 credits required.
Bachelor of Science in Home Economics

The purpose of the undergraduate program in Home Economics is twofold:

1. To provide, through the facilities of the Department and the total University, a broad liberal education with study in depth in the social sciences or natural sciences; and

2. To provide specialized instruction based on these disciplines, as preparation for professional careers in which the interests and well-being of the individual, the consumer, and the family are paramount.

The curriculum within the Department of Home Economics relates basic knowledge to an understanding of the needs of people with regard to food, clothing, shelter, management of resources, and interpersonal and family relationships.

Programs of Study

A candidate for the degree of Bachelor of Science in Home Economics completes 128 credit hours of required and elective courses, including the University requirements for graduation as listed on page 56 of this catalogue.

During the freshman year a student selects courses from the various groups listed under the University requirements and takes two or three courses within the Department of Home Economics. In the sophomore year a student selects a concentration in either the social sciences or the natural sciences and by the end of the sophomore year makes a decision regarding the professional major within Home Economics.

The major areas of study in Home Economics are:

Family Life Education, preparing students for teaching in the junior or senior high schools, home economics cooperative extension, and family relations education and/or work with children in community organizations and agencies.

Business and Community Services, preparing students for hospital dietetics and food service management, food and nutrition in business, home
economics, cooperative extension, clothing and textiles in business, and work with families and children in community organizations and agencies.

The Curriculum

UNIVERSITY REQUIREMENTS 34 credits
For all students graduating from the University of New Hampshire, see page 56.

HOME ECONOMICS CORE 15 credits
One course in each of the following areas:
- family relations
- child development
- management and decision making
- food and nutrition
- clothing and textiles

BASIC DISCIPLINES 21 credits
The student selects either the social sciences or physical and biological sciences for study in depth

<table>
<thead>
<tr>
<th>Social Sciences 21 credits</th>
<th>Physical and Biological Sciences 21 credits</th>
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<tbody>
<tr>
<td>psychology</td>
<td>biology</td>
</tr>
<tr>
<td>sociology</td>
<td>botany</td>
</tr>
<tr>
<td>economics</td>
<td>biochemistry</td>
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</tbody>
</table>

Some courses from Group B and Group C of the University requirements may partially fulfill requirements in the social science or natural science sequences above.

PROFESSIONAL SEQUENCES 39 credits
At the end of the sophomore year the student selects one professional sequence

Family Life Education — based on social science concentration
courses to be selected in these areas:
- (a) family relations and child development 9 cr.
- (b) management, consumer problems and housing 9 cr.
- (c) education and home economics education 18 cr.
- (d) one course in speech (recommended) 3 cr.

Workshops for skill development in clothing construction and food preparation will be available when needed for a particular professional competency.

Business and Community Services — based on either social science or natural science sequence depending on student's interest and professional goal.
If this professional sequence is selected, the student also selects one of the 3 options.

**Option 1**  
*Foods and Nutrition*  
(dietetics, food service, business)

18 credits in:  
- foods  
- nutrition

**Option 2**  
*Clothing and Textiles*  
(business, industry)

18 credits in:  
- clothing  
- textiles  
- art

**Option 3**  
*Child Development and Family Life*  
(community agencies)

18 credits in:  
- child development  
- family relations  
- management

An additional 18 credits to be selected from:  
- business administration  
- communications  
- education  
- any other group selected by the student and adviser to strengthen professional objectives  
- (9 credits in at least one of the above groups)

**Electives**  
approximately 25 credits

(to complete a total of 128 credits)

Sufficient flexibility is provided to permit combinations suited to individual needs. Electives may be used to build strong combinations with other fields of interest such as journalism, business, art, etc., or to explore several areas of interest to broaden the general education background.

A junior or senior student in the department may attend The Merrill-Palmer Institute in Detroit, Michigan, for one semester, with full transfer of credit. The Department of Home Economics is affiliated with The Merrill-Palmer Institute which was founded in 1920. This program is designed to give students a theoretical knowledge and understanding of human development and the family and to provide practicum training for students preparing to work professionally in various capacities with individuals, families, and groups.

This curriculum is open to men and women. A program leading to the Master of Science degree in Home Economics is outlined in the Graduate catalogue.
Thompson School of Agriculture

PHILIP S. BARTON, Director

The Thompson School is the two-year division of the College of Agriculture. It offers programs of study on the technician level. High school graduates with satisfactory grades and a real interest in furthering their education are admitted. Two years of academic work on campus, totaling 68 semester credits, plus completion of two summers of supervised placement, lead to the degree of Associate in Applied Science.


Applicants desiring admission in Forest Technology and Soil and Water Conservation Technology must submit two units in College Preparatory Mathematics. Applicants for admission in the other curriculums will find Biology, Chemistry, and Mathematics helpful prerequisites for courses in the Plant and Animal Sciences. It is strongly recommended that each prospective applicant take the College Board Scholastic Aptitude Test during his senior year in high school.

A catalogue may be obtained from the Thompson School of Agriculture, Putnam Hall, University of New Hampshire, Durham, N. H. 03824.
The College of Liberal Arts

EVERETT B. SACKETT, Dean
MELVILLE NIELSON, Associate Dean

DEPARTMENTS

The Arts
Education
English

Music
Nursing
Occupational Therapy

Foreign Languages and Literatures
Geology and Geography
Government
History
Microbiology

Philosophy
Psychology
Sociology
Speech and Drama
Zoology

The departments of Chemistry, Mathematics, and Physics in the College of Technology, the departments of Botany and Entomology in the College of Agriculture, and the Division of Physical Education and Athletics offer programs for students in the College of Liberal Arts.

General Information

Purpose and Objectives

It is the purpose of the College of Liberal Arts, as a center of learning and scholarship, to help all of its members achieve an understanding of the heritage of civilization and to educate them in the tradition of the past and the realities of the present so that they may recognize and act upon their obligations to the future.

The College endeavors to meet the educational needs of each student through the development of interests and skills which, combined with the student's potential, makes possible the living of a richer and more useful life.

Programs of Study

The College of Liberal Arts offers two degrees: Bachelor of Arts, Bachelor of Science.

The Bachelor of Arts Program is intended primarily to provide a broad liberal education along with a major in one of the following fields: The Arts (options in Painting and Graphics, Crafts, and History of Art), Biology, Botany, Chemistry, Elementary Education, English Literature, English Teaching, Entomology, French, General Physical Science, Geography,
Music, providing Mathematics, Education arranged. Requirements technology, Program. Spanish, Speech and Drama (options in General Speech and in Drama), Zoology. Requirements for the Bachelor of Arts degree, and information regarding these majors, are presented in the section entitled Bachelor of Arts Program.

The Bachelor of Science Curricula consist of several programs of study which are intended to provide preparation for professional life. They are arranged in such a manner as to permit considerable specialization while providing a broad cultural education for the students enrolled in them. Bachelor of Science Curricula are offered in: Art Education, Medical Technology, Music Education, Nursing, Occupational Therapy, Physical Education for Men (with an option in Academic Subject Teaching), Physical Education for Women, Pre-Medical, Recreation Education, Social Service. Requirements for the Bachelor of Science degree, and information regarding these curricula, are presented in the section entitled Bachelor of Science Curricula.

Although the University will try to provide sufficient facilities so that a student may pursue any major or curriculum for which he meets the requirements, such a privilege cannot be guaranteed. Rapidly increasing enrollment sometimes results in crowding required specialized courses beyond capacity. On occasion, a student may remain in a crowded curriculum if he is willing to take certain courses during the summer session.

Minor Option

Each student in the College of Liberal Arts may apply during his final term for a minor, to be shown on his transcript. A student should declare his intent to earn a minor as early as possible but no later than the end of his junior year. The minor may be in any discipline in the College of Liberal Arts or any discipline in which a student may earn a Bachelor of Arts degree. A minor is 18 semester hours with C or better in subjects that count for major credit or other courses approved by the minor department. No more than six credits used to satisfy major or curriculum requirements shall be used for a minor.

Special Programs of Study

Although pursuing his studies in the College of Liberal Arts in one of the listed major fields, the student may also prepare himself for some related objectives. Two of these are described below, and there is enough freedom of election to make it possible for the student to arrange others.

Pre-Dental

Students who plan to enter a school of dentistry may follow the Pre-medical curriculum or they may elect to major in almost any field offered under the Bachelor of Arts Program. The student's program should include courses in morphogenesis, physics, and organic chemistry. Students who plan to enter a school of dentistry, either before or after achieving the bachelor's degree, are advised to consult with Professor Paul E. Schaefer, Department of Zoology.
Pre-Law

While the various bar associations and law schools do not prescribe a specific undergraduate curriculum for future lawyers, they recommend that a student who contemplates entering law school should plan a study program which will develop breadth of view and facility of expression. They also urge him to acquire a background of information concerning the society in which he lives and the forces which have shaped modern institutions. They urge him particularly to perfect his use and understanding of the English language in writing and speaking.

The courses considered most helpful are those which develop oral and written expression, deal with man's social, economic, and political institutions, provide an understanding of the human mind, and develop the art of thinking. A course in the elements of accounting may be useful.

Most law schools require the Law School Admission Test of students seeking admission; each law school will advise a student upon request whether or not he will be expected to take the test in partial satisfaction of admission requirements. Particulars of the examination may be obtained at the office of the Department of Government.

Students who plan to enter law school after graduation are advised to consult with the Chairman of the Department of Government as soon as they have made their decision, preferably in the sophomore year.

Preparation For Teaching

The University of New Hampshire offers two types of undergraduate programs for secondary school teacher preparation and one undergraduate program for elementary school teacher preparation.

All of the teacher education programs are selective. For details about the standards of selection, see the prerequisites for the courses in Education.

Secondary School Teacher Education

*University Teacher Preparation Program, Bachelor of Arts Program* students preparing to teach in secondary schools may follow an advisory program of studies called the University Teacher Preparation program. A student in this program will take Education 481 in the sophomore year, Education 757 and 758 in the junior year, Education 759 and the Education 791 course in the major teaching field in the first semester of the senior year. The second semester of the senior year is devoted to student teaching. Variations in this sequence are possible if circumstances make it desirable.

Students following this program do not major in the Department of Education. They major in the subject-matter department and elect the courses in this program. Students interested in this program should consult with the Supervisor of the subject-matter major and with Professor Roland B. Kimball, Chairman of the Department of Education, during the freshman year.

*Bachelor of Science Curricula in Teacher Education.* There are curricula for preparing teachers in the fields of Agriculture, Art, Commercial, Home Economics, Music, and Physical Education. The curricula in Agriculture Education and Home Economics Education are described in the College of Agriculture section; the curriculum in Commercial Education is described in the Whittemore School of Business and Economics section; the curricula in Art Education, Music Education, and Physical Education
are described under *Bachelor of Science Curricula* in the College of Liberal Arts section.

Students interested in one of these programs should consult with the Supervisor of the curriculum during the freshman year.

**Elementary School Teacher Education**

Students planning to teach in elementary schools will declare Elementary Education as their major. Information about this major is presented in the section entitled Bachelor of Arts Program.

**Courses in Supervised Teaching**

The work in Supervised Teaching is under the joint direction of the Coordinators of Student Teaching who are the faculty members for the special methods courses offered by the various subject matter departments, the Director of Student Teaching and other members of the faculty of the Department of Education. Student teaching is done under the immediate supervision of selected teachers in schools approved by the University.

In the Supervised Teaching courses the student participates in the conduct of class exercises and in the control of the classroom, at first chiefly as an observer, but gradually entering into teacher responsibilities until complete charge of the classroom is assumed.

A course in Supervised Teaching is required in the University Teacher Preparation Program. It is open only to students approved by the Department of Education and the Coordinators of Student Teaching for the subject or subjects which the student desires to teach. *Applications for first semester student teaching assignment must be filed in the office of Department of Education during the week prior to April 7 of the preceding academic year.* Those for second semester student teaching must be filed during the week prior to November 7 of the preceding semester.

To be eligible for student teaching the student must have completed the prerequisite sequences of courses in the appropriate Curriculum in Teacher Education or must have completed the sequence of Education courses in the University Teacher Preparation Program and an appropriate sequence of courses in the subject matter department concerned. In addition, the student must have an overall grade point average of 2.2, a grade point average of 2.5 in the subjects or fields he will student teach, and a grade point average of 2.5 for all professional education courses taken.

**Accreditation and Certification**

The teacher preparation programs of the University are accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary teachers, secondary teachers, and school service personnel, with the master’s degree as the highest degree approved.

Completion of the approved teacher preparation programs of the University qualify a student for certification as a teacher in most states. There are a few which have unusual requirements for certification. The Chairman will be glad to advise students regarding these requirements.

**Honors Program**

The College of Liberal Arts offers an Honors Program as a possible means of challenging students of exceptional ability.
This program has three divisions: 1. Honors offerings for each of the freshman and sophomore years. At present this applies only to English 401-402, History 401, 402, and Government 405, 406, 408, and 515. 2. Departmental honors programs, developed and administered by those departments choosing to maintain an honors program. 3. An upper-division, general honors program with two objectives: first, to provide an honors minor program for those students who wish to do honors work but whose major departments do not maintain honors programs; and second, to schedule special lectures, seminars, and other academic activities for all honors students.

To date, the following departments have adopted honors programs: English, Foreign Languages and Literatures, Government, History, Psychology, and Sociology. Students desiring information about a department's program should consult the department chairman.

The upper-division general honors offerings provide continuity with the freshman-sophomore honors curriculum. Should independent study be involved in such a program, a junior may register for a total of 6 credits of independent study and a senior for a total of 12 credits (of which no more than 9 are in his major field of concentration) during the academic year. This work would be done in the 695, 696 course in the relevant department, and in L.A. 695, 696 where the department has no such offering.

The honors minor program gives an honors option to a student majoring in a department not maintaining an honors program, and may be undertaken by such a student with the approval of his departmental supervisor, the Honors Council, the Dean, and a Council member teaching the subject in which the minor would be undertaken. The Council member supervises the student's activities.

It is expected that all honors students will maintain a cumulative average of at least 3.0. Professor Robert C. Gilmore is Director of the Honors Program.

The Ford Foundation Scholarship Program

A limited number of freshmen each year are selected from those who apply for a special five-year program leading to the B.A. and M.A. degrees. The program is limited to superior students who expect that their chosen vocation shall be teaching at the college level. The regular requirements for the B.A. degree and the Graduate School requirements for the M.A. degree are basic requirements. In addition the student is expected to attend special seminars, complete special work in mathematics or philosophy, languages, reading, and writing. During the last three years of the program, he will be assigned to his major department as an intern in teaching.

Prospective freshmen with superior high school records who are interested in this program should consult the principal or counselor in their high schools or write to the Director of Admissions at the University for more information.

Dual Degree Programs

Under certain conditions it is possible for a student to earn two different bachelor degrees. The purpose of the two-degree program is to broaden the education of certain students at the undergraduate level. The program is only for those students who can adequately handle the requirements for two degrees and who can reasonably allocate the additional time and effort needed for the program.

A candidate for two degrees must complete all the curriculum, departmental, scholastic, and other requirements for each degree. It is expected
he will complete five years of academic work. He may not earn a second degree in the same or closely allied major field.

If a student plans to take one of the two degrees in the College of Technology, he should register as a freshman in that College. If he does not plan to include a Technology degree in his program, he may register in any of the other three Colleges. When a student is accepted as a two-degree candidate, supervisors for each major will be appointed. These supervisors will maintain joint control over the student's academic program. Students who wish to be in this program should confer with the appropriate college dean(s), preferably no later than the end of the freshman year.

Bachelor of Arts Program

The Bachelor of Arts Program provides a broad liberal education with a concentration involving at least 24 credits in a major field.

Degree Requirements

Satisfaction of these requirements ensures satisfaction of the University Academic Requirements.

These requirements apply to all students who enter the College of Liberal Arts between July 1, 1965, and June 30, 1966, and are seeking a Bachelor of Arts degree.

1. 128 semester-hour credits.
2. At least a 2.0 grade-point average in all courses completed at the University of New Hampshire.
3. Physical Education: men students — two semesters; women students — four semesters.
4. English 401-402.
5. History 401, 402.
6. Biological Science: Biology 401-402 or Botany 411, Zoology 412.
7. Physical Science: One of the following two-semester sequences, not in student's major department: Chemistry 401-402, 403-404; Geology 401-402; Mathematics 407-408; Physical Science 401-402; Physics 401-402.
8. Social Science: Any three courses selected from the following, not in student's major department: Economics 401-402; Geography 401 or 402 (only one course in Geography may be used in satisfying this requirement); Government 405, 406; Psychology 401-402; Sociology 400, 411, 540.
9. Humanities: One of the following two-semester sequences, not in student's major department: Any two Philosophy courses; Arts 475, 476; English 513, 514 or 515, 516; Humanities 501-502; Languages 501-502; French 503-504 or 505-506; German 605-606; Greek 503-504; Italian 503-504; Latin 503-504 or 505-506; Russian 503-504 or 505-506; Spanish 503-504 or 505-506; Music 403-404; Speech and Drama 431, 436.
10. Special Language Requirement: Proficiency in a foreign language at the level achieved by satisfactory work in a five- or six-hour college
level course is required of all students. This requirement may be fulfilled by achieving a satisfactory score on College Board tests or by completion of beginning courses in language at the University of New Hampshire (French 401, German 401, Greek 401-402, Italian 401, Latin 401-402, Russian 401-402, Spanish 401). Students having studied a foreign language for two or three years in high school should be able to achieve a satisfactory score on the College Board tests. Placement in advanced courses in foreign languages by College Board tests or by any other approved procedure, including transfer, satisfies this language requirement. The Special Language requirement should be satisfied no later than the sophomore year.

11. Major Requirements: A student must complete at least 24 semester credits of major work with grades of C or better. The major department may specify certain required courses and may require a senior paper or project and/or a comprehensive examination. These requirements are given in the listing of majors that follows. (A Major may be selected at the end of the student's freshman year and must be selected prior to the junior year.)

More than 36 semester credits in courses in the major department constitutes excessive concentration and neither the supervisor nor the Dean of the College may approve schedules that reveal over-specialization.

Time Sequence for Requirements

The requirements in the Bachelor of Arts Program are to be satisfied in the appropriate class years as indicated in the following schedule:

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<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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<tr>
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<td>First Semester</td>
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<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
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<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
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<td>Freshman English</td>
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<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
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<td>Biological or Physical Science*</td>
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<td>Major courses and electives</td>
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<tr>
<td>Major courses and electives</td>
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* Students electing a Biological Science during their freshman year must elect a Physical Science during their sophomore year or vice versa.
Majors in the Bachelor of Arts Program

The objectives, opportunities, and department requirements of majors in the Bachelor of Arts Program are described in the paragraphs which follow.

The Arts

It is the belief of the Department of The Arts that art is best taught with a practical center. An experimental arts laboratory (the Student Workshop) and a continuing series of exhibitions of art are therefore basic factors in this department. The courses offered provide an opportunity, within the liberal arts framework, for the serious art student to acquire a thorough knowledge of the basic means of visual expression. In addition, these courses are designed to offer foundation experience for students interested in art but who are majoring in other departments in the University.

The Department of The Arts offers three options leading to the degree of Bachelor of Arts, major in The Arts. (The Department also offers a Curriculum in Art Education leading to the Degree of Bachelor of Science). Students majoring in The Arts must complete the following courses: Arts 431-432, Basic Design and Drawing, and Arts 475-476, Introduction to The Arts. The student majoring in The Arts has the choice of three optional programs: (1) Painting and Graphics, (2) Crafts, (3) History of Art. The optional programs offered in the Department are as follows:

Option I. Painting and Graphics. Introductory courses in design, drawing, graphics, painting and photography, followed by a comprehensive workshop integrating all these disciplines, form the core of this option. Courses to be pursued include art history and electives in the crafts. Students will be prepared for continued professional study in the fields of painting, design, and commercial art. Those students seeking careers in college or secondary school teaching will be qualified to enter programs of graduate study leading to the master of fine arts and master of arts in teaching degrees. The student is required to take the following courses: Arts 541, 542, 536, 451, 650, and one upper level course within the option. Interested students should consult with the supervisor, Professor John W. Hatch.

Option II. Crafts. Introductory courses in ceramics, jewelry, metalsmithing, weaving, and woodworking are offered in this option to acquaint the student with the basic crafts. Within this option the student is required to choose one area for concentration. The areas open are the following: ceramics, metal, and wood. The aim of this option is to provide the student with the opportunity to explore the craft field, and, by developing techniques and familiarity with materials, be adequately prepared for further study at the graduate level. Twenty-four credits in crafts courses are required in this option, with a concentration of 12 credits in one of the available areas (ceramics, metal, or wood). Interested students should consult with the supervisor, Professor Winifred Clark.

Option III. History of Art. The arts of the eastern and western parts of the world amount to a rich legacy. The courses of study in this option are designed to serve a twofold purpose. First they make available for students in the liberal arts programs, and elsewhere in the University, an opportunity for a full historical survey of the subject. Second the courses provide a foundation in fact, theory, and historical problems for a student who desires to continue the study of this subject on the graduate level. The very number of artistic objects and the variety of creative subjects which these objects

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exemplify make the survey of more than one historical period necessary for competence in this subject. A student electing to major in the history of art is required to take a minimum of five survey courses (classical, modern, medieval or Renaissance, northern painting or baroque art, Oriental or American art). In addition, the student is required to take one seminar, preferably in his senior year, Arts 797, Seminar in Art History, which deals with further refinement of problems the student has already discovered, as well as advanced critical and bibliographical tools. The student is expected to take courses in at least one European language, and in related areas in the liberal arts: philosophy, history, and literature. Creative talent in any area of art is not a prerequisite in this option. However, the familiarity with the techniques of the various arts and crafts offered in the department is strongly suggested. This option is designed to prepare a student for further work in three professional areas: teaching, museum work, conservation. Interested students should consult with the supervisor, Professor James A. Fasanelli.

**Biology**

Students who are interested in a broad background in the life sciences are advised to major in Biology. Such students will be required to take courses in botany, entomology, microbiology, and zoology in building up a program. The field, however, is so inclusive that the majority of students will find it desirable to include one or two additional courses in one of the subdivisions, such as Botany, Microbiology, or Zoology. In addition to students who desire to study Biology for general education, it is suggested that those who are interested in *Applied Biology* and Secondary-School Teacher Preparation register as Biology majors.

**Teacher Preparation.** Students who are planning to teach Biology in secondary schools are urged to plan for practice teaching during the senior year. As few positions are available in any year for teaching Biology alone, a student should include courses in his program of study which will qualify him for teaching other sciences.

**Applied Biology.** Students preparing for positions which involve the application of the science of Biology, such as those frequently listed by the federal civil service, the state governments, and industry, should follow the general program of Biology majors and should elect one or two additional courses in fields of Applied Biology. The Division is well fitted to assist in the preparation of students for work in fish and game research, conservation education, and in state departments of conservation. Students preparing for professions in this group should plan to secure advanced degrees, since positions in these fields are difficult to secure without graduate study. Students who are interested in hospital laboratory work should consult the *Medical Technology* curriculum.

Satisfactory completion of the requirements of a Biology major will generally qualify students for admission to graduate schools to specialize in Biology or in one of its major subdivisions. Students planning to major in Biology should elect, as prerequisite, *Botany 411* and *Zoology 412*.

The minimum course requirements for Biology majors will include: Microbiology 503; Botany 503 and one other course selected from Botany 506, 742, or 756; Entomology 402; 7 credits in Zoology (beyond Zoology 412, excluding Zoology 795, 796). Additional courses will be selected from those offered in the Division to total at least 24 semester credits with a grade of C or better. Biology majors are also required to complete (in addition
to the 24 hours of major credit) Chemistry 403-404 and eight hours in physical science (further Chemistry, Geology, Mathematics, Physical Science 401-402, or Physics).

Students interested in majoring in Biology are advised to consult with the supervisor, Professor Paul E. Schaefer.

Botany

Students who are interested in plant life are advised to consider registration as majors in Botany. Botany majors with suitable undergraduate backgrounds may enter the field of secondary education or become research technicians. Botany majors, other than those whose interest is secondary-school teaching, research technique, or a general education, should expect to continue in graduate study here or elsewhere. Government work, institutional research, certain types of industrial positions, and college teaching are open to Botany students with advanced preparation. The principal fields of concentration in Botany are: (1) Pathology, (2) Physiology, (3) Taxonomy, (4) Ecology, (5) Morphology and Anatomy, (6) Cytology, (7) Phycology (Algology).

Students who major in Botany must complete courses offered by the Department to a total of 24 semester credits with grades of C or better. Credits from courses in other departments closely related to the major courses may be included as part of the required credits with the consent of the major supervisor. A broad background in chemistry and other biological sciences is considered essential for most students who major in Botany.

The courses of each major program are selected to meet the needs of the individual student, as determined by the student and his supervisor in personal conference.

Students interested in majoring in Botany are advised to consult with the supervisor, Professor Albion R. Hodgdon.

Chemistry

Students who are interested in the study of Chemistry will find opportunities in such fields as individual work involving the development of processes or production activities or sales work based on a scientific knowledge of the marketable products, the teaching of Chemistry and allied subjects in secondary schools or of Chemistry in colleges, and graduate study for those students who are interested and particularly proficient in their undergraduate work.

The University offers two channels for study of Chemistry: majoring in the subject in the College of Liberal Arts, or enrolling in the Prescribed curriculum in Chemistry in the College of Technology. Students majoring in Chemistry in the College of Liberal Arts may have a wide variety of interests and differing abilities in science. In order to be well prepared for graduate school or a career in chemistry, each student should have the following courses as a minimum: Chemistry 405-406 or 403-404 and 521; 547-548; 661-662; 683-684; and at least one Chemistry course in the senior year; Physics 401-402 (Physics 404, 501-502 desirable for the capable student); Mathematics 421 or 425 (Mathematics 422, 523 or 426 strongly recommended for the capable student); German (at least 5 credits) with French or Russian a possible alternate. According to the student's interests, other supporting subjects may be elected to form a broad program of study and to prepare for one of the opportunities listed above.
The Department is equipped to furnish the preparation necessary for teaching Chemistry in secondary schools. As very few positions are available in any year for teaching Chemistry alone, a student should consider a program of study which may qualify him for teaching Chemistry and other sciences, and should consult with the Chairman of the Department of Chemistry and the Chairman of the Department of Education. Students who are interested in teaching Chemistry in college are advised to plan on graduate study.

Students who plan to major in Chemistry are advised to consult with Professor Alexander R. Amell of the Department of Chemistry as early in their college program as possible.

Education

The University offers undergraduate programs to prepare teachers for both elementary and secondary schools. General information about these programs is given in the section on Preparation for Teaching.

Students planning to teach in secondary schools do not major in the Department of Education. They major either in the subject-matter department in the Bachelor of Arts Program, electing the courses in the University Teacher Preparation Program (see section entitled Preparation for Teaching) or they elect one of the curricula in teaching (see section entitled Bachelor of Science Curricula).

Students planning on teaching in elementary schools do major in the Department of Education as Elementary Education majors. This major is an unusual one combining strong liberal arts preparation with a full year of professional study. For the first three years the student follows the Bachelor of Arts Program. During these years the student must satisfy all of the College requirements, complete 18 semester credits of planned study in a selected liberal arts subject, pass Education 481 or Home Economics 425 with a grade of C or better (no additional Education course may be taken), demonstrate a personality suitable for teaching, gain experience working with groups of children, and have a cumulative grade-point average of at least 2.2. The entire senior year is devoted to professional study and student teaching by enrolling in Education 741-742, a 32-credit course. Students interested in this program should consult with Professor Deborah Stone or Professor Roselmina Indrisano as early as the sophomore year.

Several courses in Education are designed to be of interest to the general student as well as to the prospective teacher. Courses in child growth and development, educational psychology, and principles of education are substantive rather than procedural and thus are appropriate for any student who wishes to gain a better understanding of the American public school system.

English

The Department of English offers two programs of study: the English Literature major and the English Teaching major.

The English Literature major must complete English 513 and must earn grades of C or better in 24 semester credits in literature courses numbered above 750; 6 credits must be in Shakespeare (English 757, 758), 6 credits in American literature (this requirement may be satisfied by English 515, 516, but the 6 credits thus earned cannot be counted toward the 24 major credits), and an additional 12 credits in at least three centuries of English literature prior to the twentieth.
The English Teaching major must meet the state certification requirements for teaching. He must also take the following courses, which must be passed with an average of 2.5 or better:

- English 513, 514
- English 516
- English 706
- English 705
- English 709, 710, 711
- English 757 or 758
- English Education 791
- Speech 504, 658, or English 521
- Speech 508

Students who are interested in majoring in English should consult with the supervisor, Professor Sylvester H. Bingham.

Entomology

The Department of Entomology offers various courses for students who wish to specialize in the study of insect life, insect control, and insects in relation to man. There are many fields open to those qualified in Entomology. There are opportunities for employment in public institutions and organizations, and in addition, there are many opportunities for employment with commercial and industrial firms which frequently employ college graduates who have majored in this field of study. Graduate study is desirable for the student who seeks high achievement in Entomology.

Students who major in Entomology are expected to complete successfully courses offered by the Department, to a total of 24 semester credits, with grades of C or better. Courses in other departments may be counted with the consent of the major supervisor.

Outlines of specific suggested programs of study are available to the student upon request to the supervisor, Professor James G. Conklin.

Foreign Languages and Literatures

The Department of Foreign Languages and Literatures offers majors in four languages and their literatures: French, German, Latin, and Spanish. The supervisor for majors in French is Professor Louis J. Hudon; for majors in German, Professor Hermann W. Reske; for majors in Latin, Professor George Doig; for majors in Spanish, Professor R. Alberto Casás. These programs are designed to be of interest to the following groups of students:

1. Those who have a special interest in foreign languages and literatures and are free to pursue it.

2. Those who intend to enter professions in which a background in foreign languages and literatures is desirable. An example of such a profession is Library Science. Most library schools require training in two foreign languages.

3. Those who plan to teach foreign languages in secondary schools. Since most secondary schools require their teachers to teach more than one subject, students planning to enter teaching at this level must plan their programs carefully. They should combine a major in one of the languages and its literature with a minor or at least a meaningful sequence of courses in another subject. Students interested in teaching a particular language in secondary school should consult the appropriate major supervisor.

4. Those who intend to go on to graduate study in the field of foreign languages and literatures. Such graduate study is requisite to teaching at the college level and to other specialized work in the field.
Students majoring in the Department of Foreign Languages and Literatures must designate French, German, Latin, or Spanish as their particular major. A major must comprise a minimum of 24 major credits in the particular language and its literature.

The following courses cannot be counted for major credit: French 401-402, 503-504, 514; German 401-402; Greek 401-402; Italian 401-402; Latin 401-402; Russian 401-402; Spanish 401-402.

In addition to its regular majors, the Department of Foreign Languages and Literatures offers Honors programs in French, German, Latin, and Spanish. Participation in the Honors program entails:

(1) Satisfaction of the regular major requirements.

(2) Additional work in the junior and senior years to be done in connection with courses numbered 641 and above. The Honors candidate must take at least five three-credit courses at this level and do additional work equivalent to one semester-hour in connection with each.

(3) A senior research project and paper (695, 696 courses) to be the equivalent of six semester-hours.

(4) A comprehensive examination on the major language and its literature.

The candidate’s performance will be evaluated by a committee appointed by the supervisor under whom the student is working. It will include the members of the section in question plus a member of some other department in the Humanities Division. The latter will be chosen on the basis of his direct concern with the field in which the candidate has specialized.

The Department of Foreign Languages and Literatures also participates in the combined History and Literature major which is described below.

General Physical Science
A student having broad interest in physical science, but no professional objective in any one of the recognized sciences in this field, may register as a General Physical Science major. Many students who have majored in General Physical Science have combined this specialization with courses in education leading to secondary school teacher certification.

Students who major in General Physical Science must complete each of the following courses and achieve in them an overall grade point average of 2.3 or better: Mathematics 407-408 and either 421, 422, or 425, 426; Chemistry 403-404 and 521; Geography 473 and 570; Geology 401-402; and Physics 401-402 and 406. Students who are interested in choosing General Physical Science as a major should consult with the supervisor, Professor Jerome M. Pollack.

Geography
Geography satisfies man’s ancient curiosity about distant places and, less exotically, his need for further knowledge of the “home area”. Modern geography is best defined as the discipline that describes and interprets the variable character from place to place of the earth as the home of man. As such, geography is an integrating discipline, studying many types of phenomena that are significant to understanding the character of areas or places. Because its integrating character brings it into contact with many other fields of knowledge, geography forms an excellent core discipline for a
liberal education. Thus, students who have a basic curiosity about areas or the regions of the world, and desire a liberal education can effectively obtain one by majoring in Geography. Those wishing to prepare for careers as professional geographers are advised to concentrate their course work in geography and closely related fields, and should plan to go on to graduate training after completing an undergraduate major in geography.

Today, as in the past, most professional geographers hold positions in educational institutions, and the demand for personnel in this field can only increase. In addition, many geographers now find employment for their skills in various branches of the Federal and state governments, and most recently in market research and plant location services for business and industry.

Students who major in geography are required to take Geography 401 and 402, and additional courses in Geography or related fields approved by their supervisor to a total of 24 semester credits with grades of C or better. The 24 credits should include Geography 481; 471, 472; nine credit hours of intermediate level courses; the seminar in geography; and three credit hours of Geography 795.

Students who are interested in majoring in Geography should consult with the supervisor, Professor William H. Wallace.

Geology

The aim of the geological sciences is to construct the physical and biological history of the earth by the study of the formative processes acting on the earth. This includes knowledge of the constituents that make up the earth, an understanding of the evolution of the earth's structural framework and surface features, and the interpretation of changes in life and the biological environment through time.

Students who are interested in the earth sciences, both those who expect to make some phase of geology their life work, and those who desire to build a program of liberal studies around a core of geological and related subjects, are advised to register as majors in Geology.

The search for new sources of essential mineral resources and the development of new uses for certain minerals have emphasized the need for men trained in the earth sciences. Positions as mining geologists, petroleum geologists, mine operators, federal and state survey geologists, and university and college professors of geology and mineralogy have been successfully filled by graduates of the University who have majored in Geology. Other former major students are teaching in high schools or are in business, some in fields where their geologic preparation is useful.

Students who major in Geology are expected to complete Geology 401-402, and, in addition, courses in Geology or related courses approved by the supervisor to a total of 24 semester credits with grades of C or better. The courses of each major program are selected to meet the needs of the individual student, as determined by the student and his supervisor in personal conference.

At the end of the senior year, a student who majors in Geology must, after consultation with his supervisor, submit either a satisfactory paper or pass a written comprehensive examination.

Students who are interested in majoring in Geology are advised to consult with the supervisor, Professor Jerome M. Pollack. After a student's major interest is determined, the advice, assistance, and counsel of one or more additional members of the Department will be sought where a special area of concentration is contemplated by the student.
Government

The courses offered by the Department of Government are designed to aid the student in gaining a knowledge of the nature, functions, and problems of government, and of the place of government in the modern world. For this general purpose, courses are offered in public affairs — local, state, national, and international. Some courses listed by the Department are chiefly intended to provide information needed for intelligent and responsible citizenship and to provide a part of a liberal education. Others are of a specialized nature and have been planned to provide basic preparation for professional work. A few are intended to stress the historical and philosophical development of the growth of political thought and institutions.

By specializing in one of the several programs in government, a student may prepare himself for further study in graduate school in law, political science and government, or public administration. He may enter an advanced program for more extensive work in some aspect of the foreign service or in regional studies. Social science research, government employment, publications, public relations, and teaching are occupations seeking graduates of government programs. Nearly all leading graduate schools require the prospective student to do the Graduate Record Examination during his senior year. Information may be secured in the Government Department office. Students who are preparing to teach government courses in the secondary schools should check their planned program of study with the Department of Education. Ordinarily, prospective teachers of government courses will find it necessary to teach related courses in the social sciences.

 Majors in Government have an unusual opportunity for mastering research techniques and gaining practical information concerning state and local government in New Hampshire through work as an intern in an approved public or private agency. For this program the student should enroll in Social Science 681 with the prior permission of the Chairman of the Department of Government. Further opportunity for similar research may be gained in Government 771.

 Majors in Government are required to take Government 405 and Government 406 with grades of C or better. Students who expect to major in Government are advised to register for these courses during the freshman or sophomore year. Students majoring in Government are also required to complete a research paper approved by the staff. This project constitutes the chief part of Government 771. A major consists of a minimum of 24 semester credits of work with grades of C or better in Government and in any related courses which may be approved by the supervisor. The 24 semester credits should include not less than 12 in courses above 600. Not more than 9 credits earned as an intern in Social Science 681 may be counted toward the completion of the major requirements. Each student will be counseled individually and his program of study planned for his needs. Opportunity is available for the more able student to share in a program of Independent Study within the Department and in an Honors Program.

 Students interested in electing Government as a major should meet with the class supervisor.

History

History, as a field in which to major, may be of interest to the following groups of students: (1) Those who wish to pursue a career as a college teacher of history. Graduate study is indispensable, but preparation may be made by a certain amount of undergraduate specialization. (2) Those who plan to teach history in secondary schools. For such a position, training in
other social studies is highly desirable, if not absolutely necessary. The student is therefore advised to consult with the Department of Education, as well as with the Department of History, with a view to satisfying teaching certification standards. (3) Those who intend to enter other professional fields in which a considerable amount of historical knowledge is desirable. Such a field, for example, might be that of library training in which an historical preparation would rank with study in literature as a background, or the increasingly important profession of archivist. (4) Any students who feel free to plan the college program without too specific reference to a vocation, and who have a special interest in history.

Students who major in History must earn 24 semester credits in courses in History (exclusive of History 401, 402) with grades of C or better. These 24 credits should include a minimum of six semester credits each from Group I, Group II, and Group III (see the description of courses offered by the Department), and 12 semester credits of the 24 should be in courses numbered above 600. A student who majors in History must prepare a satisfactory paper in his field of concentration or take a comprehensive examination. If the student writes the paper, he must secure approval of the subject chosen from the Chairman of the Department before December 15 of the student's senior year, and the completed paper must be filed with the Chairman before April 15 of the year in which the degree is to be granted. If the student wishes to take the comprehensive examination instead of writing the thesis, he must notify the Chairman of the Department of his decision by December 15; the examination will be given on a pre-arranged day shortly before April 15.

Students planning to major in History should consult with the Chairman of the Department, Professor William R. Jones.

History and Literature

Students who desire a broad education may take a combined major in History and Literature. Students who plan to enter library service may also find it a desirable major. This program offers an opportunity to study the history and literature alike of France, of Germany, or of Spain. A still broader survey of European history and of its literature is also possible. The program involves the completion of 24 semester credits with grades of C or better in one of the following groups of courses, of which 12 credits should be in History and 12 credits in Languages.


Group II — History 535, 536, 719, 720, 739, 740, 743, 747, 749, 756, 774; French 505, 506, 695, 696, 741, 742, 759, 760, 761, 762, 767, 768, 770, 781, 782, 795, 796.


Students' registration cards may be signed by either Professor William R. Jones, Chairman of the Department of History, or by the Supervisor of the Foreign Language major.

Students electing option I, II, or III will be encouraged to read fairly extensively for the History courses in Spanish, French, or German, respectively.
Mathematics

Career opportunities in mathematics include teaching at both secondary and college levels and scientific research and consulting work in business, industry and government. Many positions are open to holders of the B.A. degree with a major in Mathematics. Most such positions require a solid foundation in basic mathematics and provide on-the-job training in any specialties involved. On the other hand, the number of positions in mathematics that require graduate work is steadily increasing. Fortunately, the program required for admission to a graduate school in mathematics is similar to the program required by most industrial employers. The following Mathematics courses are designed to meet these ends: 425-426 or 421-422-523, 527, 528, 531, 761-762, 767-768, and two additional Mathematics courses.

While most secondary school teachers do graduate work, most of them begin their teaching careers on the basis of the B.A. degree. Thus, the undergraduate program of the prospective secondary school mathematics teacher should include adequate preparation for the position. Current trends in secondary mathematics curricula demand a high level of specialized training for the teacher. The following Mathematics courses are designed to meet these demands: 425-426 or 421-422-523, 531, 542, 761-762, 755, 791 and two additional Mathematics courses.

A student who majors in Mathematics must complete one or the other of these sequences.

Prospective Mathematics majors are advised to include calculus in their freshman year programs and to consult as early as possible with the Chairman of the Mathematics Department, Professor M. Evans Munroe.

Microbiology

Students interested in the study of microorganisms, including the bacteria, rickettsiae, and viruses, should register as majors in Microbiology. Such students may prepare themselves for a career in city, state, or federal government service, or a position with universities, research institutes or industrial organizations. Opportunities are available in the areas of general microbiology, medical, public health, or veterinary microbiology, environmental microbiology, and industrial microbiology.

Students who major in Microbiology are expected to complete courses offered by the Department, and by related departments, to a total of 24 semester credits, with grades of C or better. A course in Organic Chemistry is also required by Microbiology majors, but cannot be counted as part of these 24 major credits. It is strongly recommended that students also take a year’s work in mathematics and physics, and a semester of biochemistry. The courses of each major program are selected to meet the needs of the individual student, as determined by the student and his supervisor in personal conference.

Students interested in majoring in Microbiology are advised to consult with the supervisor, Professor Lawrence W. Slanetz.

Music

Studies in the major program in Music, such as history, literature, and appreciation of music, endow the student with cultural values which enrich his entire life. Instruction offered in the Department is designed to develop musicianship, the ability to perform and capacity to teach, supplemented by the general liberal arts program offered by the College. The broad scope of
subjects available within the Department equips the student with a basis for professional competency and at the same time provides the foundation and stimulus for graduate study.

Instrumental and vocal instruction are given in private lessons, while class instruction provides for the pursuit of academic studies. Student recitals, instrumental and vocal ensembles, Men’s and Women’s Glee Clubs, the University Concert Choir, Symphony Orchestra, and Symphonic Band afford both laboratory and concert experience in a variety of performance settings.

The expanding and dynamic force which music is fast becoming in contemporary American society is reflected by increased demands for teachers of music, performers, music librarians, radio, recording, and television musicians, music therapists, and higher standards of quality and performance of music in places of worship.

(The Department also offers a Curriculum in Music Education leading to the Bachelor of Science degree).

A major in Music is offered with three options in concentration. All students must complete the requirements of the basic theory courses: Music 321-322, 423-424, 521-522, and 523-524, and the basic history-literature course, Music 405-406. In addition, the specific requirements of each option are given below;

I. Music History: advanced theory (4 credits); advanced history and literature (12 credits); Music 570 and/or Music 573 (8 credits).

II. Applied Music: qualified students may major in voice, piano, organ, strings, woodwind or brass (a student choosing this option must pass a performance examination before the Department of Music staff); advanced theory or literature (4 credits) and applied music (16 credits — 2 credits per semester). Voice majors must take the following languages to graduate in this program: Italian 401; German 401; French 401. A senior recital also must be presented.

III. Theory: emphasis on musical composition; advanced theory (12 credits), advanced history (4 credits), and Music 570 (8 credits).

Students majoring in Music must earn grades of C or better in all required Music courses.

The Department of Music is a Member of the National Association of Schools of Music.

Prospective majors in Music are advised to consult with the Chairman, Professor Donald E. Steele.

Philosophy

The Greeks understood philosophy as the love of wisdom, that ardent desire to know which Aristotle called the natural aspiration of all men. From this original impulse toward knowledge the sciences and the humanities developed. The goal of the special sciences is the detailed study of limited fields of inquiry. Philosophy aims at a comprehensive knowledge of the whole, a single perspective which will include things as seemingly diverse as matter, space, time, life, spirit, society, beauty, and the divine. And since wisdom is not quite the same thing as knowledge, philosophy also seeks to bring together the discoveries of the special sciences, to assess their significance, and to apply this knowledge to the conduct of life.

Courses in Philosophy, taken early in a student’s program of study, provide an introduction to some of the dominant themes in the history of
ideas and enable the student to get a view of the forest in which he will later examine the trees. Taken near the end of his studies, such courses afford a perspective of where the student has been and how much he has left unexplored. Philosophy 410 at the introductory level, is designed to present such an inclusive view as well as to acquaint the student with the specific nature of philosophic inquiry and with some of the fundamental philosophic problems. Courses in the intermediate group provide for more systematic inquiry in the history of philosophy and in some of the more important branches of the subject in which problems common to philosophy and other disciplines, such as art, literature, religion, and psychology, can be investigated. The advanced courses are for majors and for other students willing to acquire the necessary background for such work. In most cases, such background can be acquired by taking Philosophy 500, 501.

William James once said that, ultimately, the really important question is why there is something rather than nothing. Students who agree with James might consider a major in Philosophy. They should take Philosophy 500-501 as early as possible since this course is the foundation for most of the advanced work in the department.

Students who major in Philosophy must earn a minimum of 24 semester credits in Philosophy or related subjects with grades of C or better, including the following courses in Philosophy: 400, 500-501, 610, 620 and six hours of work in the group 700, 701, 795, 796.

At the end of the senior year students majoring in Philosophy must pass a comprehensive written-oral examination covering the history of philosophy and some field of systematic study (e.g., ethics, aesthetics, metaphysics) selected by the student.

Students interested in majoring in Philosophy should consult with the supervisor, Professor Robert P. Sylvester.

**Physics**

The major in Physics is intended to prepare students for a diversity of interests in the application of this fundamental science. Broad in scope, the program provides electives so that a student may supplement his work in physics by that in other fields, such as mathematics and the allied sciences. The intermediate courses are intended to give the student a thorough grounding in fundamentals in a particular branch of physics. Opportunity is given in the senior year for the major student to do some elementary investigation of his own choosing under guidance. Graduates of this major will find opportunities for employment in the various industrial, government, and armed services laboratories. If particularly proficient in their undergraduate work, they may elect graduate study leading to advanced degrees.

Students are required to complete 24 semester credits, in addition to the introductory courses, with grades of C or better. A student must elect physics 501-02, preferably in the sophomore year, as an introductory course. If Physics 401-402 is elected in the freshman year, a student may be placed in an advanced section of Physics 501-502. If Physics 404 is elected in the freshman year, the regular sequence may be taken in the sophomore year. Since proper preparation in mathematics is essential, the student should elect Mathematics 425-426, in the freshman year if possible, in order to have the prerequisites for the courses that follow. If Mathematics 407 has been passed with a grade of B or higher, students in the College of Liberal Arts may be admitted to Physics 404 with the specific approval of the Department of Physics. Liberal Arts students who wish to register for advanced courses in Physics should discuss the mathematical prerequisites with the
Department of Physics. Seniors are required to participate in a colloquium, Physics 611-612.

The Department is able to furnish the preparation necessary for teaching physics in secondary schools. As very few positions are available for teaching physics only, a student should consider a program of study which will qualify him for teaching physics and another science, such as mathematics, biology, or chemistry. The student interested in such a program should consult with the chairmen of the departments of Education and Physics. Students who wish to major in Physics are advised to consult the Department Chairman early in their college program.

Psychology

A primary function of the Department of Psychology is the provision of an academic major which will contribute to the liberal education of the undergraduate student. It is intended that the experiences which are provided by the major will help to develop the broad viewpoint which is so highly valued as a characteristic of the liberal arts graduate. By majoring in Psychology it is hoped that the student will develop an appreciation of the role of scientific methods in studying behavior, and at the same time, achieve a better understanding of the complex and simple behavior of both humans and non-humans. Some students may wish to major in Psychology in order to prepare themselves for advanced study and a career in one of the following fields: college teaching and research; personnel work in industry or government; supervision and psychological testing in mental hospitals, juvenile courts, city school systems and child guidance clinics; counseling and guidance in secondary schools and colleges; or clinical practice. For non-majors, the study of psychology will be helpful in teaching, nursing, social work, business or industrial management, or in professions such as medicine and law in which human relations are of primary importance.

Students who major in Psychology are required to complete 24 semester credits with grades of C or better in courses in Psychology and in such related courses as may be approved by the supervisor. Each student majoring in Psychology must complete six credits from the following group: Psychology 667, 757, 758, 776, 778, 783; also, he must complete six credits from Psychology 437, 544, 654, 663, 760. Finally, all majors must take Psychology 697 and pass a departmental comprehensive which is offered as a part of this course.

Psychology 695 is an honor’s course which is open to senior students who have a 3.0 grade point average in Psychology and are sponsored by a member of the staff. Psychology 667 and 757 should be taken by all Psychology majors who are planning to enter graduate school.

Students who wish to major in Psychology are advised to consult with the supervisor, Professor Walter R. Duryea.

Sociology

The major in Sociology is for students who desire a liberal education with emphasis on study of the organization and differentiation of society, including study of the research methods developed in recent years for a better understanding of social phenomena; students who intend to do graduate work in sociology; or students who plan to attend a graduate school of social work but prefer a different choice of undergraduate electives than the Social Service curriculum permits.
(The Department also offers a Bachelor of Science Curriculum in Social Service which, with its field experience and its concentration on pre-professional courses, not only prepares students to enter graduate schools of social work but also has been quite successful, for a number of years, in preparing them for junior positions in social work.)

Students who wish to teach sociology in secondary schools are advised that such teachers usually have to teach related social studies. Students with this vocational aim should consult with the Chairman of the Department of Education.

It is recommended that majors in Sociology take Sociology 400 during their freshman or sophomore years. They must complete a minimum of 24 semester credits with grades of C or better in Sociology (or in any related course approved by the supervisor). Sociology 711, 712, 698, 701, 702, and 640, 641, 642, are required. During the second semester of the senior year majors must pass a written comprehensive examination.

The Department offers an Honors Program to give the superior student an unusual opportunity to perform scholarly research in the field of Sociology and Anthropology. Sociology or Social Work majors may be admitted to the program if they have a University grade point average of 3.0 and a similar average in Sociology courses. Honor Program students will take Sociology 695, 696, in their junior year and Sociology 795, 796, in their senior year.

Students who are interested in choosing Sociology as a major should consult with Professor Stuart Palmer.

**Speech and Drama**

The Department of Speech and Drama offers a major with two options: General Speech and Drama. A major in either General Speech or Drama makes an excellent focal point for those students desiring a liberal education combining course work in the humanities, literature, the arts and social sciences. The purpose of this major is to offer a broad program for students interested in: a liberal education stressing the speech arts; a pre-professional background for careers in such fields as public service, teaching, law, ministry, public relations, social administration, and personnel work; basic preparation for the teaching of speech and drama, direction of debate, drama and other speech activities in secondary schools, community theater direction, and professional training for television, theater, and speech correction.

Courses in speech and drama may also be elected for their cultural value by students pursuing other majors.

Those seeking a major in General Speech should acquire a good background in English language and literature, history, government, philosophy, and psychology. They should be able to speak and write well, and they should acquire a reasonable proficiency in public speaking and oral reading.

Those seeking a major in Drama should combine that study with a wide variety of liberal arts courses in such fields as history, dramatic literature, philosophy, the arts, music, and psychology.

The following three-credit courses are required of all Speech and Drama majors: Basic Speech (without major credit), Discussion (without major credit in General Speech), and Introduction to Theater (without major credit in Drama).

For majors in the General Speech option, the following three-credit courses are required: Debate, Theater and Its Drama, Rhetoric in the Western World, Stagecraft, and Speech Correction. Six credits are also re-
required in specific courses in literature in related departments as approved by the major adviser and not also used to satisfy College, or University requirements. Each student's individual program will be considered with regard to breadth and individual needs in assigning courses in related departments. Approval must be secured in advance of registration for credit for courses in this area. Individual students may be allowed to substitute Television and Radio Workshop for Stagecraft with the approval of the major adviser. Stagecraft will contribute considerable background for the course in Television and Radio Workshop.

For majors in the Drama option, the following three-credit courses are required: Theater and Its Drama, Stagecraft, Acting, Directing, and Scenic Design and Lighting. Six credits are also required in specific courses in dramatic literature in related departments with the same provisions as in the General Speech option.

All majors will be required to write a satisfactory paper and/or satisfactorily complete a special project during their senior year. The student must secure approval of the subject of the paper and/or the special report from his major adviser before the Christmas vacation of his senior year and file the completed paper and/or project with the major adviser before the 15th of May of the year in which his degree is to be granted.

To count for major credit the courses required must be completed with a grade of C or better.

Students who wish to major in Speech and Drama should consult with the supervisor, Professor Joseph D. Batcheller.

Zoology

Zoology, the science of animal life, is the study of the structure, functions, development, and classification of the various animal forms. The student may major in Zoology: because of a general educational interest in the subject; because of his avocational interest in nature study; or to prepare for professional work in pure science or in applied zoology. Fish and game research, important in the conservation of our natural resources, is an example of applied zoology. Students who are interested in entering the fields of applied zoology should plan to secure advanced degrees since positions in these fields are difficult to obtain without graduate study. Undergraduate preparation for students who are interested in applied zoology generally should parallel that of any students planning to enter graduate work in zoology.

The University's location on tidewater and near the open ocean provides an unusual opportunity for the study of marine zoology and marine ecology.

Students planning to major in Zoology should elect, as prerequisite, Botany 411 and Zoology 412.

All Zoology majors must earn grades of C or better in 24 semester credits of intermediate and advanced work in Zoology, except that 6-8 hours in related departments may be counted for major credit with the consent of the supervisor. The Zoology major shall include Zoology 507-508, 706, and 729. In addition to the 24-hour major credits, Zoology majors must complete Botany 503 or 506, Chemistry 403-404, a course in organic chemistry (Chemistry 545, 651-652, or Biochemistry 501), and a semester of college physics.

Students who are interested in a Zoology major should consult the supervisor, Professor Philip J. Sawyer.
Bachelor of Science Curricula

The Bachelor of Science Curricula permit considerable specialization in preparation for several professional activities while conserving and developing the breadth and general culture of the students enrolled in them. Curricula are offered in: Art Education, Medical Technology, Music Education, Nursing, Occupational Therapy, Physical Education (men), Physical Education (women), Pre-Medical, Recreation Education, Social Service.

Degree Requirements

These requirements apply to students who enter the College of Liberal Arts between July 1, 1965, and June 30, 1966, and who are seeking a Bachelor of Science degree.

1. 128 semester-hour credits (134 in the Nursing Curriculum).

2. At least a 2.0 grade-point average in all courses completed at the University of New Hampshire.

3. Physical Education: Men students — two semesters; Women students — four semesters.

4. English 401-402.

5. History 401, 402.

(Note that in the following groups specific courses may be required in a particular curriculum.)

6. Group B (Natural Sciences): Two courses selected from Biology 401-402; Botany 411; Chemistry 401-402, 403-404; Geology 401-402; Mathematics 407-408; Physical Science 401-402; Physics 401-402; Zoology 412.

7. Group C (Social Sciences): Two courses selected from Economics 401-402; Geography 401, 402; Government 405, 406, 408; Psychology 401-402; Sociology 400, 411, 540.

8. Group D (Humanities): Two courses selected from Arts 475, 476; English 513, 514, 515, 516; Humanities 501-502; Music 403, 404; Language 501, 502; any specific foreign language 503-504, 505-506 (German 605-606); Philosophy, any courses; Speech and Drama 431, 436.

9. Specific Curricula Requirements: These are presented in the detailed listing of the Curricula. Note that some Curricula have special quality requirements. Courses are to be completed generally in the sequence in which they are arranged.

More than 66 semester hour credits in professional courses in a Bachelor of Science curriculum constitutes excessive concentration and neither the supervisor nor the Dean of the College may approve schedules that reveal over-specialization.
Art Education Curriculum

This curriculum is designed to prepare teachers and supervisors of art in the public schools. It is based upon the demands for teachers who possess developed skills in the arts and a broad general culture in addition to a specialized preparation in Art Education. The satisfactory completion of the curriculum will satisfy the initial certification requirements for teachers of art in the public schools in New Hampshire and in other states.

Freshmen who plan to enter this curriculum should elect Arts 431-432 Basic Design and Drawing and Design, in their first-year program.

A grade of C or better must be achieved in all Arts courses required in the curriculum.

Students seeking to transfer to the University of New Hampshire from other accredited collegiate institutions must arrange an appointment with the supervisor of the curriculum or the Department Chairman prior to admission to the curriculum in order that the applicant may be fully aware of the program to be followed in completing the requirements for the degree.

Interested students should consult with the supervisor, Professor George R. Thomas.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Semester</td>
</tr>
<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
</tr>
<tr>
<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
</tr>
<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
</tr>
<tr>
<td>Group B</td>
<td>Natural Sciences</td>
</tr>
<tr>
<td>Arts 431</td>
<td>Basic Design</td>
</tr>
<tr>
<td>Arts 432</td>
<td>Drawing and Design</td>
</tr>
<tr>
<td>Electives</td>
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## Sophomore Year

<table>
<thead>
<tr>
<th>Course Code(s)</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>P. E. 403, 404</td>
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</tr>
<tr>
<td>Arts 401, 404 or Arts 402, 403</td>
<td>Ceramics</td>
<td>3</td>
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<tr>
<td>Arts 541, 542</td>
<td>Advanced Drawing and Painting</td>
<td>3</td>
</tr>
<tr>
<td>Educ. 481</td>
<td>An Educational Psychology of Development</td>
<td>3</td>
</tr>
<tr>
<td>Group C</td>
<td>Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Group D</td>
<td>Humanities</td>
<td>3</td>
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## Junior Year

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<tbody>
<tr>
<td>Arts 407</td>
<td>Crafts</td>
<td>3</td>
</tr>
<tr>
<td>Arts 536</td>
<td>Graphic Arts</td>
<td>3</td>
</tr>
<tr>
<td>Arts 538</td>
<td>Advertising Design and Illustration</td>
<td>3</td>
</tr>
<tr>
<td>Arts 475, 476</td>
<td>Introduction to The Arts</td>
<td>3</td>
</tr>
<tr>
<td>S. and D. 459</td>
<td>Stagecraft</td>
<td>3</td>
</tr>
<tr>
<td>Educ. 757</td>
<td>Principles of Human Learning</td>
<td>3</td>
</tr>
<tr>
<td>Educ. 758</td>
<td>Principles of Teaching</td>
<td>3</td>
</tr>
<tr>
<td>H. E. 531 or</td>
<td>Interior Design</td>
<td></td>
</tr>
<tr>
<td>Arts 455</td>
<td>Drafting and Space Planning</td>
<td>3</td>
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## Senior Year

<table>
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<tr>
<th>Course Code(s)</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Arts 643 or</td>
<td>Advanced Painting and Composition</td>
<td>3</td>
</tr>
<tr>
<td>Arts 544</td>
<td>Water Media</td>
<td></td>
</tr>
<tr>
<td>Art-Ed. 792</td>
<td>Problems of Teaching Art in Elementary Schools</td>
<td>3</td>
</tr>
<tr>
<td>Art-Ed. 791</td>
<td>Problems of Teaching Art in Secondary Schools</td>
<td>3</td>
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<tr>
<td>Educ. 759</td>
<td>Principles of Education</td>
<td>3</td>
</tr>
<tr>
<td>Ed.-Art 794</td>
<td>Supervised Teaching</td>
<td>14</td>
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<tr>
<td>H. E. 765 or</td>
<td>History of Costume</td>
<td></td>
</tr>
<tr>
<td>Arts 455</td>
<td>Drafting and Space Planning</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
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</tbody>
</table>
Medical Technology Curriculum

There is now a large and increasing demand for medical technologists. Public health and medicine depend more and more upon the laboratory. Professional technicians are needed to perform various laboratory techniques and tests, such as blood typing, blood counts, tissue sections, urinalyses, and bacteriological and serological tests. Positions in this field are available in hospital laboratories, physicians’ and surgeons’ clinics, and in health department laboratories.

Students who are interested in this field should register in the curriculum in Medical Technology. In this program students will take their freshman, sophomore, and junior year’s work at the University and their last year’s work at the Mary Hitchcock Memorial Hospital School of Medical Technology, Hanover, New Hampshire. After satisfactorily completing the courses at the School of Medical Technology (Microbiology 761-762), the student is awarded 32 credits toward the Bachelor of Science degree. This program also qualifies the student for the examination for the Medical Technologist’s certificate administered by the Registry of Medical Technologists of American Society of Clinical Pathologists. Thus a student can obtain the B.S. degree from the University and the M.T. certificate in a four-year period. Students who complete this curriculum are well qualified for work in any hospital or medical laboratory.

At the present time, the fees for the senior year include a University tuition fee of $50 for New Hampshire residents and $120 for non-residents and a maintenance fee of $700 (including room and board) at the Mary Hitchcock Memorial Hospital School of Medical Technology. The latter institution has a stipend program which provides $600 for students meeting the requirements of this program.

Students in the Medical Technology curriculum must obtain grades of C or better in 24 semester credits from the following courses: Zoology 507-508; Microbiology 503, 702, 705; Chemistry 517, 545; and Biochemistry 756.

Students who in their junior year decide not to take the training program at the Mary Hitchcock Memorial Hospital School of Medical Technology will find it possible to transfer to a major in the Bachelor of Arts Program, such as Microbiology or some other biological science. In such case, they would have to satisfy requirements of the Bachelor of Arts Program.

Students interested in the curriculum in Medical Technology are advised to consult with the supervisor, Professor Theodore G. Metcalf.
### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
<td>1/2</td>
<td>1/2</td>
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<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
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<td>1</td>
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<tr>
<td>Biol. 401-402</td>
<td>Man and the Living World*</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Chem. 403-404</td>
<td>General Chemistry</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 407-408</td>
<td>Fundamental Mathematics</td>
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<tr>
<td><strong>Electives</strong></td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>P. E. 403, 404</td>
<td>Physical Education (Women)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Microb. 503</td>
<td>General Microbiology</td>
<td>4</td>
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</tr>
<tr>
<td>Microb. 702</td>
<td>Pathogenic Microbiology</td>
<td>4</td>
<td></td>
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<tr>
<td>Chem. 517</td>
<td>Introductory Quantitative Analysis</td>
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<tr>
<td>Chem. 545</td>
<td>Organic Chemistry</td>
<td>5</td>
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<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary</td>
<td>3</td>
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<tr>
<td>Group D</td>
<td>Humanities</td>
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<tr>
<td><strong>Electives</strong></td>
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### Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Bio. Ch. 756</td>
<td>Physiological Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Microb. 705</td>
<td>Immunology and Serology</td>
<td>4</td>
</tr>
<tr>
<td>Zool. 507-508</td>
<td>Mammalian Anatomy and Systemic Physiology</td>
<td>4</td>
</tr>
<tr>
<td>Group C</td>
<td>Social Sciences</td>
<td>3</td>
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<tr>
<td><strong>Electives</strong></td>
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### Senior Year

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Microb. 761-762</td>
<td>Clinical Laboratory Methods†</td>
<td>16</td>
</tr>
</tbody>
</table>

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* Botany 411 (4 credits) and Zoology 412 (4 credits) may be taken in place of Biology 401-402.

† This course starts about June 20 at the Mary Hitchcock Memorial Hospital School of Medical Technology and includes lecture and laboratory work in microbiology, blood bank and serology, clinical chemistry, hematology, laboratory management and ethics, mycology, parasitology, histology, and clinical microscopy. The credits are awarded in time for graduation in June of the following year after receipt of an official transcript of the grades obtained at the School of Medical Technology and certification by the director of this school and the supervisor of the curriculum that the work has been successfully completed.
Music Education Curriculum

This curriculum is designed to prepare teachers of music for the public schools. It is based on the demands for teachers possessing sound musicianship and a broad general culture in addition to a specialized preparation in music education. This program is fully accredited by the State Department of Education and complies with standards set up for certification of teachers and supervisors of music in most states. Training for teaching in both the elementary and secondary schools is included in the program. The Department is also actively affiliated with the Music Educators National Conference.

To be admitted to this curriculum the student must give evidence of having a sound musical background. Freshmen who plan to enter this curriculum must elect Music 321-322 and four hours of Applied Music in their first year program.

A grade of C or better must be achieved in all music and education courses required in the curriculum.

Public school music teachers must maintain a satisfactory standing musically with other professional musicians in the community and should be able to play or sing acceptably. For this reason, 16 semester credits in Applied Music are required before graduation. Students will be encouraged to accumulate up to eight semester credits in one instrument or in voice. In addition, all candidates are required to meet minimum standards of performance in piano, voice, a woodwind instrument, a brass instrument, a string instrument, and percussion. Candidates are expected to meet the piano and voice requirements by the end of their junior years. The minimum instrumental standards may be met by special examination, or may be demonstrated during the time the candidate is registered for Applied Music in these instruments. Details of minimum standards of performance may be obtained from the Supervisor of the Music Education curriculum.

Students who are interested should consult with the supervisor, Professor John B. Whitlock.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
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</tr>
</thead>
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<tr>
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<td>First Semester</td>
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<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
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<tr>
<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshmen English</td>
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<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
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<tr>
<td>Group B</td>
<td>Natural Sciences</td>
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<tr>
<td></td>
<td>Applied Music*</td>
</tr>
<tr>
<td>Mus. 321-322</td>
<td>Sightsinging, Ear Training, Dictation I</td>
</tr>
<tr>
<td></td>
<td>Music Laboratory</td>
</tr>
<tr>
<td></td>
<td>Recitals‡</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
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</table>

* A minimum of 16 semester credits in Applied Music must be offered by students in this curriculum.
‡ Recitals — Students enrolled in this curriculum must accumulate a minimum of 24 points in the sophomore, junior, and senior years. Attendance at each concert or recital constitutes one point.
### SOPHOMORE YEAR

<table>
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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>P. E. 403, 404</td>
<td>Physical Education (Women)</td>
<td>1</td>
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<tr>
<td></td>
<td>Applied Music*</td>
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<tr>
<td>Educ. 481</td>
<td>An Educational Psychology of Development</td>
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<tr>
<td>Mus. 423-424$</td>
<td>Harmony I</td>
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<tr>
<td>Mus. 521-522</td>
<td>Sightsinging, Ear Training, Dictation II</td>
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<tr>
<td>Mus. 405-406</td>
<td>Music History and Literature</td>
<td>3</td>
</tr>
<tr>
<td>Mus. 525-526</td>
<td>Conducting Methods —</td>
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<tr>
<td></td>
<td>Band and Orchestra</td>
<td>1</td>
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<td></td>
<td>Music Laboratory</td>
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<td>Group C</td>
<td>Social Sciences</td>
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<td>Elective</td>
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### JUNIOR YEAR

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<td>Principles of Human Learning</td>
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<td>Group D</td>
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<tr>
<td>Mus. 523-524</td>
<td>Harmony II</td>
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<tr>
<td>Mus. 725-726</td>
<td>Orchestration and Chorestration</td>
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<td>Music Laboratory</td>
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<tr>
<td>Mu.-Ed. 792</td>
<td>Problems in the Teaching of</td>
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<td>Elementary School Music</td>
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<tr>
<td>Mu.-Ed. 552</td>
<td>Techniques and Methods in Woodwind</td>
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</tr>
<tr>
<td></td>
<td>Instruments†</td>
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<tr>
<td>Mu.-Ed. 553</td>
<td>Techniques and Methods in Brass and</td>
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<td></td>
<td>Percussion Instruments†</td>
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<tr>
<td>Mu.-Ed. 751, 752</td>
<td>Techniques and Methods in Choral</td>
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<td></td>
<td>Music†</td>
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<td></td>
<td>Recitals‡</td>
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### SENIOR YEAR

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<td>Principles of Education</td>
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<tr>
<td>Mu.-Ed. 551</td>
<td>Problems in the Teaching of</td>
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<tr>
<td>Mu.-Ed. 552</td>
<td>Techniques and Methods in String Instruments†</td>
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<td>Music Laboratory</td>
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<td>Ed.-Mu. 793</td>
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<td></td>
<td>Recitals‡</td>
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</table>

† Any combination of three Techniques courses fulfill curriculum requirements.
$ Although Mus. 321-322 is normally a prerequisite to 423-424, they may be taken concurrently in the freshman year with permission of the instructor. Qualified students may be exempted from 321-322.
Nursing Curriculum

Any student interested in nursing as a career is encouraged to consider the revised Nursing Curriculum. The graduate of this program will receive a B.S. degree and will be eligible to take State Board Examinations to become a Registered Nurse. There is a great need for the nurse with a college degree. There are opportunities throughout the world. If the nurse wishes to teach, or supervise, he may readily continue his education to prepare for positions of increasing responsibilities.

The Nursing faculty of the University of New Hampshire will be responsible for the Nursing courses. Learning experiences (Nursing Laboratory) will be arranged in hospitals in the area, a medical center, public health and other health agencies. Starting with the second semester of the junior year, a calendar year will be devoted to nursing courses including nursing experience. For part of this year it will be necessary for the student to live off campus.

The student will purchase uniforms in the sophomore year at a cost of approximately $60.00. Other expenses will be the same as for other students. Special scholarships and loans will be available for the students.

Students in the Nursing Curriculum must obtain a grade-point average of 2.2 or better for the required courses: Zoology 507-508, Psychology 401-402, Nursing 503-504, 602, 610, 621. This Curriculum requires 134 credits for graduation.

Students interested in the program are encouraged to talk with the Chairman of the Department of Nursing.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Freshman Year</th>
<th>Credits</th>
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<tr>
<td></td>
<td><strong>First Semester</strong></td>
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<tr>
<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
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<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
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<td>Engl. 401-402</td>
<td>Freshman English</td>
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<td>Hist. 401, 402</td>
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<td>Bot. 411</td>
<td>General Botany</td>
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<tr>
<td>Zool. 412</td>
<td>Principles of Zoology</td>
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<tr>
<td>Chem. 403-404</td>
<td>General Chemistry</td>
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<tr>
<td>Nurs. 401-402</td>
<td>Introduction to Nursing</td>
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<td>Mammalian Anatomy and Systemic Physiology</td>
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<td>Introductory Sociology</td>
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<td>General Psychology</td>
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<td>H. E. 425</td>
<td>Child Development</td>
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<td>Nurs. 503-504</td>
<td>Fundamentals of Nursing</td>
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<td>Nutrition</td>
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<td>Educ. 757</td>
<td>Principles of Human Learning</td>
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<td>Nurs. 551</td>
<td>Medical and Surgical Nursing</td>
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<td>Nurs. 602</td>
<td>Comprehensive Nursing</td>
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<td>Nurs. 701</td>
<td>Rehabilitation Nursing</td>
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<tr>
<td>Nurs. 702</td>
<td>Senior Seminar in Nursing</td>
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</table>
Occupational Therapy Curriculum

An ally to the medical profession, occupational therapy is any activity, mental or physical, prescribed by a physician and administered by a registered therapist to aid in the recovery or the rehabilitation of the patient.

The successful practice of occupational therapy requires not only thorough academic preparation but also suitable personality combined with judgment, dependability, tact, tolerance, patience, and will to serve. A high degree of mental and physical health is essential. Occupational therapy requires physical vitality and emotional stability.

Both men and women may be admitted if they meet minimum entrance requirements. Minimum requirements include sophomore standing, 2.0 cumulative grade point, Biology 401 and 402 or its equivalent, and an approval interview with the departmental committee*. The student should also take the series of Occupational Therapy Aptitude Tests in the semester preceding selection of the program. Declaration of this major may be made at the end of the freshman year, and no later than the end of the first semester, sophomore year. Students seeking to transfer to the University of New Hampshire from other accredited collegiate institutions must consult with the department chairman, prior to admission to the curriculum, in order that the applicant may be fully aware of the problems involved in completing the requirements for the degree. Due to the highly specialized nature of the Occupational Therapy curriculum, students are advised to enter the program at the beginning of the sophomore year. In most instances transfer students from other universities require an additional semester in order to meet the requirements for the Bachelor of Science degree.

Students who are registered in the curriculum must obtain grades of C or better in the following courses: Zoology 507, 508, 601, 606; Occupational Therapy 411, 522, 524, 526, 702, 681, 682, 683.

The curriculum in Occupational Therapy is designed to satisfy the American Occupational Therapy Association curriculum requirements, and the Council on Education and Hospitals of the American Medical Association, as well as to offer a four-year course leading to the Bachelor of Science degree. This includes the theoretical subjects needed in medical fields, a wide range of skills and crafts used as therapeutic modalities, as well as preclinical observation of patient treatment at the Portsmouth Rehabilitation Center, under University staff supervision in the junior and senior years.

Following completion of the four-year degree program the student will spend a minimum of nine months in student affiliation in approved hospitals or services under the direction of a registered occupational therapist. The occupational therapy student is expected and should plan to take the nine months' clinical affiliation period in a continuous sequence directly after receiving his assignments from the director of the curriculum. When this internship is satisfactorily completed, the student is entitled to a Certificate of Occupational Therapy. The student is then qualified to take examination for registry in the American Occupational Therapy Association. The standard examination is sent out by the Association and administered by the University. A fee of $30.00 is required by the Association for each examination. While the present demand for qualified therapists is far in excess of the supply, there are relatively few opportunities for those who have not completed the requirements for and entered the Registry of the American Occupational Therapy Association.

* Freshmen considering an Occupational Therapy program are advised to follow the freshman program outlined below.
A student affiliation fee of $95 for residents of New England and $200 for non-residents of New England is payable in advance to the University by those students who enter the clinical affiliation program.

The minimum of nine months of student affiliation in approved hospitals is divided as follows:

- O. T. 711 General Medicine, Surgery, and Pediatrics — three months
- O. T. 712 Psychiatry — three months
- O. T. 713 Physical Disabilities — three months

The American Medical Association requires a physical examination including a tuberculin test prior to hospital affiliation.

Expenses vary during the period of student affiliation. Room, board, and laundry are usually provided students by the psychiatric hospitals; meals only in other hospitals. In all cases, the University must approve living arrangements for student affiliates. Students will furnish regulation white uniforms which are required for student affiliation. Students should be prepared to meet all of their living and traveling expenses during the clinical affiliation of nine months.

Students interested in the curriculum are advised to consult the Chairman of the Department, Professor Marguerite Abbott, and to attend the several occupational therapy assemblies which occur during the academic year.

<table>
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<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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<tbody>
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<td>First Semester</td>
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<td>P. E. 431-432</td>
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<td>Biol. 401-402</td>
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<td>Engl. 401-402</td>
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<tr>
<td>Hist. 401, 402</td>
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<tr>
<td>Arts 431, 432</td>
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<td>Psych. (401)</td>
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<td>Soc. (400)</td>
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*Botany 411 and Zoology 412 satisfy this requirement.*
### SOPHOMORE YEAR

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<td>P. E. (403), (404)</td>
<td>Physical Education (Women) (Ele. Games; Rec. Workshop)</td>
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<td>H. E. (425) or Psych. 437</td>
<td>Child Development</td>
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<tr>
<td>O. T. 411</td>
<td>Survey of Occupational Therapy</td>
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</tr>
<tr>
<td>O. T. 412</td>
<td>Therapeutic Crafts</td>
<td>3</td>
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<tr>
<td>Psych. 402</td>
<td>General Psychology</td>
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<tr>
<td>Zool. 507-508</td>
<td>Mammalian Anatomy and Physiology</td>
<td>4 4</td>
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<tr>
<td>Zool. 610</td>
<td>Introduction to Pathology</td>
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<td>Group D</td>
<td>Humanities</td>
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### JUNIOR YEAR

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<tbody>
<tr>
<td>O. T. 515</td>
<td>Therapeutic Crafts, Advanced</td>
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<tr>
<td>O. T. 522</td>
<td>Application of O. T. in General Medicine</td>
<td>2</td>
</tr>
<tr>
<td>O. T. 681</td>
<td>General Medical Lectures</td>
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<tr>
<td>O. T. 682</td>
<td>Orthopedic Medical Lectures</td>
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<tr>
<td>Psych. 654</td>
<td>Psychopathology</td>
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<tr>
<td>Zool. 601</td>
<td>Kinesiology</td>
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<td>Zool. 606</td>
<td>Neurology</td>
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<tr>
<td>O. T. Groups I and II*</td>
<td>Skills and Techniques (select 3)</td>
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### SENIOR YEAR

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<td>O. T. Group I*</td>
<td>Skills and Techniques</td>
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<tr>
<td>O. T. 524</td>
<td>Application of O. T. in Psychiatry</td>
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<tr>
<td>O. T. 526</td>
<td>Application of O. T. in Physical Disabilities</td>
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<tr>
<td>O. T. 683</td>
<td>Medical Lectures, Psychiatry</td>
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<tr>
<td>O. T. 698</td>
<td>Advanced Reading Seminar</td>
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<tr>
<td>O. T. 702</td>
<td>Administration and Organization</td>
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### CLINICAL AFFILIATIONS

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<tr>
<td>O. T. 712</td>
<td>Psychiatry no credit</td>
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<tr>
<td>O. T. 713</td>
<td>Physical Disabilities no credit</td>
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</tbody>
</table>

* OT Group I — required crafts as follows: Arts 425, Woodworking, 3 cr.; Arts 401, Ceramics, 3 cr.; Arts 419, Weaving, 3 cr.; and Home Economics 405, Sewing, 3 cr. OT Group II — skill courses in various departments, selected from an approved list available in the Occupational Therapy office. E.g., The Arts, Home Economics, Business Administration, etc.
Physical Education Curriculum for Men

In addition to the basic Physical Education Curriculum, an Academic Subject Teaching Option is offered under this curriculum.

The Physical Education curriculum is offered for students who are interested in preparing themselves for positions in the fields of health and physical education and as coaches of athletic teams. Freshmen who are interested in this curriculum should register for Physical Education 441-442 in lieu of 431-432 and should elect Physical Education 453. Students also may elect and are encouraged to choose courses to broaden their educational scope. Those planning to enter graduate work in this field should elect additional foundation science courses and a foreign language. A grade of C or better must be achieved in 24 semester credits in the physical education courses required in this curriculum but only six credits of Applied Techniques may be included in this total.

The Academic Subject Teaching Option is offered for students who are planning to teach an academic subject in addition to teaching Physical Education and coaching in secondary schools. In this Option there is greater emphasis upon preparation and directed teaching of the elected academic subject. The same courses listed above are required for freshmen students. Students in this Option must be certain to satisfy all course and quality requirements necessary for admission to practice teaching in the selected academic subject. They must consult with the chairmen of the subject-matter department and the Department of Education as early as possible in their academic careers.

All students interested in these programs should consult with the Chairman, Department of Physical Education for Men, or the Director of the Division of Physical Education and Athletics.

<table>
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<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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<td>Semester</td>
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<td>P. E. 441-442</td>
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<tr>
<td>Biol. 401-402*</td>
<td>Physical Education Activity Courses</td>
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<tr>
<td>Engl. 401-402</td>
<td>Man and the Living World</td>
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<td>Hist. 401, 402</td>
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<td>P. E. 453</td>
<td>Introduction to Contemporary Civilization</td>
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<td>Principles of Physical Education</td>
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<td>P. E. 453</td>
<td>Electives</td>
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* A more intensive introduction would be obtained by electing Bot. 411 and Zool. 412, 4 cr. each.
## SOPHOMORE YEAR

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<td>Physical Education Activity Courses</td>
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<td>P. E. 582</td>
<td>Personal and Community Health</td>
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<td>Physiology of Exercise</td>
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<td>P. E. 652</td>
<td>Kinesiology; Adaptive Physical Education</td>
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<td>P. E. 656</td>
<td>Problems of Health Education</td>
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<td>Administration of Physical Education in Secondary Schools</td>
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<td>P. E. 668</td>
<td>Measurement Procedures in Physical Education</td>
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<tr>
<td>P. E.-Ed. 792</td>
<td>Problems of Teaching Physical Education in the Elementary School</td>
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<tr>
<td>P. E. 622</td>
<td>First Aid-Safety; Athletic Training</td>
<td>2</td>
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<tr>
<td>Ed.P. E. 790</td>
<td>Directed Teaching of Physical Education</td>
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</tr>
<tr>
<td>P. E. 521; 553; 525; 527; 529 (select one)†</td>
<td>2</td>
<td></td>
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<tr>
<td></td>
<td>Electives</td>
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</table>

† Students must complete at least six of these Theory and Applied Technique courses and no more than two of the six may be Problems of Coaching: P. E. 521, Problems of Coaching Basketball; P. E. 522, Problems of Coaching Football P. E. 553, Theory of Teaching Dance; P. E. 524, Problems of Coaching Baseball; P. E. 525, Theory of Teaching Team Sports for Men; P. E. 526, Theory of Teaching Individual Sports for Men; P. E. 527, Theory of Teaching Aquatics; P. E. 528, Problems of Coaching Track and Field; P. E. 529, Theory of Teaching Gymnastics and Tumbling.
### Academic Subject Teaching Option

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td><strong>First Semester</strong></td>
</tr>
<tr>
<td>P. E. 441-442</td>
<td>1</td>
</tr>
<tr>
<td>Biol. 401-402*</td>
<td>3</td>
</tr>
<tr>
<td>Hist. 401, 402</td>
<td>3</td>
</tr>
<tr>
<td>Engl. 401-402</td>
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<td>P. E. 453</td>
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<td></td>
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</tr>
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<td>P. E. 443-444</td>
<td>1</td>
</tr>
<tr>
<td>Zool. 507-508</td>
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<tr>
<td>Educ. 481</td>
<td>4</td>
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<tr>
<td>P. E. 521; 553;</td>
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<tr>
<td>525; 527; 529</td>
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<td>P. E. 522; 524;</td>
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<tr>
<td>526; 528</td>
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<tr>
<td>P. E. 582</td>
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<tr>
<td>P. E. 520</td>
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<td>Group D</td>
<td>3</td>
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<td>Electives†</td>
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<tr>
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<td>P. E. 652</td>
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<td>Group C</td>
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<tr>
<td>P. E. 521; 553;</td>
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<td>525; 527; 529</td>
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<tr>
<td>P. E. 522; 524;</td>
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<td></td>
<td>Electives†</td>
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<tr>
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<td>P. E. 665</td>
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<td>— Ed. 791</td>
<td>3</td>
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<tr>
<td>Ed. 794</td>
<td>6 or 14</td>
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<td>Electives†</td>
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### SOPHOMORE YEAR

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>P. E. 443-444</td>
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<td>Zool. 507-508</td>
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<tr>
<td>Educ. 481</td>
</tr>
<tr>
<td>P. E. 521; 553;</td>
</tr>
<tr>
<td>525; 527; 529</td>
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<tr>
<td>P. E. 522; 524;</td>
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<tr>
<td>526; 528</td>
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<td>P. E. 582</td>
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<tr>
<td>P. E. 520</td>
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<tr>
<td>Group D</td>
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### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>Educ. 757</td>
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<tr>
<td>Educ. 759</td>
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<tr>
<td>P. E. 652</td>
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<td>Group C</td>
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<tr>
<td>P. E. 521; 553;</td>
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<tr>
<td>525; 527; 529</td>
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<tr>
<td>P. E. 522; 524;</td>
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<tr>
<td>526; 528</td>
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### SENIOR YEAR

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<tr>
<td>P. E. 622</td>
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<td>P. E. 665</td>
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<tr>
<td>— Ed. 791</td>
</tr>
<tr>
<td>Ed. 794</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

* A more intensive introduction would be obtained by electing Bot. 411 and Zool. 412, 4 cr. each.
† Electives approved after consultation with the proper Liberal Arts department must qualify students for supervised teaching in another academic subject.
‡ Students must complete at least four of these courses, not including more than two of the Problems of Coaching courses.
Physical Education Curriculum for Women

For women students who plan to prepare themselves for positions as teachers of physical education, the University has organized the Physical Education Curriculum for Women. Furthermore, students have the opportunity, if they so desire, to prepare themselves to teach in a subject-matter field as well as in physical education. The curriculum is open to women who have satisfactorily completed the freshman year and are approved by the Department of Physical Education for Women for admission to that field of concentration. It provides an opportunity for students to teach physical education under supervision, in nearby schools.

Any student in this curriculum who is planning to teach in areas in addition to physical education must complete with an average grade of C or better a second teaching major of 18 semester credits in subjects taught in high schools.

For students in this curriculum, the following courses offered by other departments are suggested as valuable electives: Arts 408, Microbiology 501, Speech 501, Humanities 501-502, Music 403, 404, Psychology 437, Psychology 438, Sociology 400, Sociology 560. Physical Education 454 is also recommended. Students are advised to choose non-professional electives whenever possible. Those planning to enter graduate study should elect a foreign language.

A grade of C or better must be achieved in 24 semester credits in the Physical Education courses required in the curriculum.

Under Physical Education 411, 412, 421, 422 (freshmen); 413, 414, 423, 424 (sophomore); 415, 416 (juniors) and 417 (seniors), Physical Education curriculum students take sections especially reserved for them. During the four years the student will generally have the following: movement fundamentals, soccer, skiing, lacrosse, swimming, basketball, volleyball, tennis (int.), hockey, stunts and tumbling, figure skating, elementary games, folk and square dance, modern dance, badminton, outdoor education, archery, golf, folk and square dancing, modern dance (int.), track and field, apparatus and gymnastics.

For those who are highly skilled in the activities mentioned above, substitutions are made with the approval of the supervisor. Further dance and other activities not listed above are included in courses in the curriculum.

Students interested in majoring in Physical Education should consult one of the Supervisors: Professor Janet Atwood or Professor Marion C. Beckwith.
<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>P. E. 411, 412*</td>
<td>Physical Education</td>
</tr>
<tr>
<td>Biol. 401-402†</td>
<td>Man and the Living World</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
</tr>
<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
</tr>
<tr>
<td>P. E. 453</td>
<td>Principles of Physical Education</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
</tr>
</tbody>
</table>

| SOPHOMORE YEAR | |
| P. E. 413, 414 | Physical Education | First Semester: 1 |
| P. E. 423, 424 | Physical Education | Second Semester: 1 |
| P. E. 455 | Introduction to Community Recreation | |
| Educ. 481 | An Educational Psychology of Development | First Semester: 3 |
| P. E. 520 | Physiology of Exercise | Second Semester: 2 |
| P. E. 582 | Personal and Community Health | |
| Zool. 507-508 | Mammalian Anatomy and Systemic Physiology | First Semester: 4 |
| Group D | Humanities | Second Semester: 3 |
| Elective | |

| JUNIOR YEAR | |
| P. E. 415, 416 | Physical Education | First Semester: 1 |
| Educ. 757 | Principles of Human Learning | Second Semester: 1 |
| Educ. 759 | Principles of Education | |
| P. E. 553, 554 | The Theory of Teaching Dance | First Semester: 2 |
| P. E. 656 | Problems of Health Education | Second Semester: 3 |
| P. E. 563, 564 | The Theory of Teaching Team Sports for Women | First Semester: 2 |
| Zool. 601 | Kinesiology | Second Semester: 3 |
| Group C | Social Sciences | |
| Elective | |

| SENIOR YEAR | |
| Ed.-P. E. 790 | Directed Teaching of Physical Education | |
| P. E. 655 | Remedial Gymnastics | First Semester: 3 |
| P. E. 765 | Administration of Physical Education in Secondary Schools | Second Semester: 3 |
| P. E. 668 | Measurement Procedures in Physical Education | |
| P. E. 573, 574 | The Theory of Teaching Individual Sports for Women | First Semester: 2 |
| P. E.-Ed. 792 | Problems of Teaching Physical Education in the Elementary School | Second Semester: 3 |
| Electives | |

* Freshmen considering this curriculum should also elect P. E. 421, 422.
† A more intensive introduction would be obtained by electing Bot. 411 and Zool. 412, 4 cr. each.
Pre-Medical Curriculum

Young men and women who are interested in careers as physicians or surgeons may select the Pre-Medical curriculum. Students who successfully complete this curriculum will be eligible for admission to Class A medical schools. However, owing to the large number of applicants for admission to medical schools, usually only those students who stand in the upper third of their class can expect to be admitted.

It is highly desirable that a pre-medical student secure a bachelor's degree, although some medical schools do not require it as a condition of admission. The four years of pre-medical work will not only give the student a foundation for his future medical training, but will also give him an opportunity to secure a broad general education.

Students pursuing the Pre-Medical curriculum must obtain a grade point average of 2.5 or better for the required courses in Biology, Chemistry, Physics, and Zoology.

Students who are interested in this curriculum should consult with the supervisor, Professor Paul E. Schaefer.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
<th>First Semester</th>
<th>Second Semester</th>
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<tbody>
<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
<td>1</td>
<td>1</td>
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<tr>
<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>Chem. 403-404</td>
<td>General Chemistry</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 407-408</td>
<td>Fundamental Mathematics (or 405-407 if appropriate)</td>
<td>3</td>
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</table>
### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>P. E. 403, 404</td>
<td>Physical Education (Women)</td>
<td>1</td>
</tr>
<tr>
<td>Bot. 411</td>
<td>General Botany</td>
<td>4</td>
</tr>
<tr>
<td>Zool. 412</td>
<td>Principles of Zoology</td>
<td>4</td>
</tr>
<tr>
<td>Chem. 521</td>
<td>Semimicro Qualitative Analysis</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Foreign Language*</td>
<td>3 or 5</td>
</tr>
<tr>
<td>Phys. 401-402</td>
<td>Introductory Physics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Social Sciences†</td>
<td>3</td>
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### JUNIOR YEAR

<table>
<thead>
<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>Chem. 651-652</td>
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<td>5</td>
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<td></td>
<td>Foreign Language*</td>
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<tr>
<td>Group C</td>
<td>Social Sciences†</td>
<td>3</td>
</tr>
<tr>
<td>Zool. 507-508</td>
<td>Mammalian Anatomy and Systemic</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Physiology</td>
<td></td>
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<td>Elective‡</td>
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### SENIOR YEAR

<table>
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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Group D</td>
<td>Humanities</td>
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</tr>
<tr>
<td></td>
<td>Social Sciences†</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective‡</td>
<td>3</td>
</tr>
</tbody>
</table>

* Either French or German. If the student passes an entrance reading test in either French or German, one year of the same language will fulfill the language requirement. To fulfill this requirement the student must complete either French 402, or 503, or 504; or German 402, or 503, or 504.

† The student must complete 12 semester credits selected from courses in the following departments: Economics, Government, History (other than 401, 402), Psychology, or Sociology. Courses from at least three of the five departments must be presented.

‡ No more than 24 semester credits of Biology (including Botany, Entomology, Microbiology, and Zoology), Chemistry, and Physics in addition to the required courses may be taken as electives.
Recreation Education Curriculum

Men and women students who plan a career in an area of leisure time professional recreation should elect the curriculum in Recreation Education. This curriculum is open to students who have successfully completed their freshman year and have secured permission from the recreation adviser for admission to this field of concentration.

The Recreation Education curriculum includes practical experience under working conditions, requiring each student to accumulate a minimum of eight points for actual leadership in a recreation situation during a summer prior to graduation. This may be in such areas as camps, community recreation centers, playgrounds, hotels or resorts, or organized youth groups or clubs. Written reports of this experience are submitted by the student for evaluation by the faculty supervisor.

Students choosing Recreation Education are advised to acquire special skills in at least two of the following fields: art, drama, music, outdoor education, or physical education. The following courses offered by other departments are suggested as valuable electives for recreation specialists: Arts, Speech 501, Zoology 406, Music 470, Music Education 792, Psychology 663, Sociology 411, Physical Education 656, Physical Education 525 and 526 (Men), and Physical Education 563 and 564 (Women).

The student in Recreation Education must complete, with a grade of C or better, 24 semester credits in the physical education, arts, music, outdoor education, and drama courses required in the curriculum. Prior to graduation, students must hold a certified Standard American Red Cross First Aid and Safety certificate.

For further information concerning this curriculum, consult either Professor Patricia Farrell or Professor Robert E. Wear.

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<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
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<tbody>
<tr>
<td></td>
<td><strong>First Semester</strong></td>
</tr>
<tr>
<td>P. E. 411, 412* or Physical Education Activity Courses for Women</td>
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</tr>
<tr>
<td>P. E. 441, 442</td>
<td>Physical Education Activity Courses for Men</td>
</tr>
<tr>
<td>Biol. 401-402</td>
<td>Man and the Living World</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
</tr>
<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
</tr>
<tr>
<td>P. E. 453</td>
<td>Principles of Physical Education Electives</td>
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</tbody>
</table>

* Women Recreation Education students should also plan to take P. E. 421 and 422.
### SOPHOMORE YEAR

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<td>P. E. 413, 414</td>
<td>Physical Education Activity Courses for Women</td>
<td>1</td>
</tr>
<tr>
<td>P. E. 423, 424, or</td>
<td>Physical Education Activity Courses for Women</td>
<td>1</td>
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<tr>
<td>P. E. 443, 444</td>
<td>Physical Education Activity Courses for Men</td>
<td>1</td>
</tr>
<tr>
<td>P. E. 455</td>
<td>Introduction to Community Recreation</td>
<td>3</td>
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<tr>
<td>Educ. 481</td>
<td>An Educational Psychology of Development</td>
<td>3</td>
</tr>
<tr>
<td>P. E. 582</td>
<td>Personal and Community Health</td>
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<tr>
<td>Zool. 507-508</td>
<td>Mammalian Anatomy and Systemic Physiology</td>
<td>4</td>
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<tr>
<td>Arts 408</td>
<td>Crafts</td>
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<td>Group D</td>
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### JUNIOR YEAR

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<tbody>
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<td>Physical Education Activity Courses for Women</td>
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<tr>
<td>P. E. 525</td>
<td>Theory of Teaching Team Sports for Men</td>
<td>2</td>
</tr>
<tr>
<td>P. E. 521, 524, 527, 529</td>
<td>Problems and Theory of Teaching Sports Courses for Men (Select one)</td>
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<tr>
<td>Speech 459</td>
<td>Stagecraft</td>
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<td>Educ. 757</td>
<td>Principles of Human Learning</td>
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<td>For. 538</td>
<td>Nature Education</td>
<td>3</td>
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<tr>
<td>P. E. 454</td>
<td>Organized Camping</td>
<td>3</td>
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<tr>
<td>P. E. 526 or</td>
<td>Theory of Teaching Individual Sports for Men</td>
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</tr>
<tr>
<td>P. E. 573, 574</td>
<td>Theory of Teaching Individual Sports for Women</td>
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<tr>
<td>P. E. 553, 554†</td>
<td>The Theory of Teaching Dance</td>
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<tr>
<td>Soc. 400, 540</td>
<td>Introductory Sociology; Social Problems</td>
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<td>Humanities</td>
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### SENIOR YEAR

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<tbody>
<tr>
<td>Speech 658</td>
<td>Directing</td>
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<tr>
<td>Music 403‡</td>
<td>Introduction to Music Literature</td>
<td>3</td>
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<td>P. E. 665</td>
<td>Administration of Physical Education in Secondary Schools</td>
<td>3</td>
</tr>
<tr>
<td>P. E. 788</td>
<td>Recreation Field Work</td>
<td>6</td>
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<tr>
<td>P. E.-Ed. 792</td>
<td>Problems of Teaching Physical Education in the Elementary School</td>
<td>3</td>
</tr>
<tr>
<td>Soc. 500</td>
<td>Social Psychology</td>
<td>3</td>
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<td>Group C</td>
<td>Social Sciences</td>
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<tr>
<td></td>
<td>Electives</td>
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</tbody>
</table>

† Second Semester Modern Dance not required for men.
‡ If Music has already been taken, three additional hours in Group D must be taken.
Social Service Curriculum

Social Service includes, among others, the following fields: state public welfare work; child welfare services; school social work; marital and family counseling; medical, psychiatric, and correctional casework; social group work; community organization; social research; social action and administration.

For full recognition in social service, it is important for a man or woman to have completed the two-year professional course in a graduate school of social work. The best preparation for admission to such a graduate school is either a broad liberal arts education with 40 to 60 hours of credit in the social sciences, including a major in Sociology, or the Social Service curriculum. For able students, scholarship aid toward meeting expenses of graduate study is often available.

There is a continuing serious shortage of qualified workers in nearly all the branches of social work. For this reason, a number of students who complete the Social Service curriculum find employment each year, in public welfare, group work, etc. Students registered in it must obtain a grade of C or better in 24 semester hour credits from the following courses: Sociology 520, 500, 703, 621, 622, 701, 702, and 631; and Psychology 402 and 654.

Students interested are advised to consult with the Supervisor, Miss Pauline Soukaris, Department of Sociology.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>First Semester</td>
</tr>
<tr>
<td>P. E. 431-432</td>
<td>Physical Education (Men)</td>
</tr>
<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
</tr>
<tr>
<td>Biol. 401-402</td>
<td>Man and the Living World</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
</tr>
<tr>
<td>Hist. 401, 402</td>
<td>Introduction to Contemporary Civilization</td>
</tr>
<tr>
<td>Soc. 400</td>
<td>Introductory Sociology</td>
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### SOPHOMORE YEAR

<table>
<thead>
<tr>
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<th>Description</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>P. E. 403, 404</td>
<td>Physical Education (Women)</td>
<td>1</td>
</tr>
<tr>
<td>Microb. 501</td>
<td>Public Health and Sanitation</td>
<td>3</td>
</tr>
<tr>
<td>Psych. 401-402</td>
<td>General Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Soc. 520</td>
<td>The Family</td>
<td>3</td>
</tr>
<tr>
<td>Soc. 500 or</td>
<td>Social Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Psych. 544</td>
<td>Psychology of Personality</td>
<td>3</td>
</tr>
<tr>
<td>Group D</td>
<td>Humanities</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
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</tr>
</tbody>
</table>

### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc. 703</td>
<td>Criminology</td>
<td>3</td>
</tr>
<tr>
<td>Soc. 621-622</td>
<td>Introduction to Social Welfare</td>
<td>3</td>
</tr>
<tr>
<td>Group B</td>
<td>Physical Sciences*</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
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### SENIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psych. 654</td>
<td>Psychopathology</td>
<td>3</td>
</tr>
<tr>
<td>Soc. 701-702</td>
<td>Statistics; Social Research</td>
<td>3</td>
</tr>
<tr>
<td>Soc. 631</td>
<td>Social Welfare Field Experience</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td></td>
</tr>
</tbody>
</table>

*Must be satisfied by a Physical Science sequence.*
The College of Technology

ROBERT N. FAIMAN, Dean

JOHN B. HRABA, Associate Dean

Chemical Engineering
civil Engineering
Electrical Engineering
Mechanical Engineering
Chemistry
Mathematics
Physics

General Information

The College of Technology offers its students a vigorous professional education in engineering, the physical sciences, or mathematics. All programs require study in the humanities and social sciences in addition to a thorough grounding in the basic aspects of mathematics, the physical sciences, and specialized studies of the chosen professional area. This pattern of undergraduate work is designed to provide a base either for a successful career in industry or for advanced study at the graduate level.

Since modern technology has drawn engineering applications and their scientific bases more closely together, the engineering curricula are oriented to emphasize the theoretical-scientific aspects of engineering. The importance of the role and responsibility of the engineer or scientist in modern society is emphasized through study in the humanistic-social areas.

Degrees

The College of Technology offers the Bachelor of Science degree in each of its departments.

For information concerning advanced degrees, see the Graduate School catalogue.

Curricula

Each candidate for a degree must satisfy all general University requirements for graduation, complete at least 128 semester credits, including the courses required in one of the four-year curricula and achieve a minimum grade-point average of 2. (Note: Graduation credit requirements as established by departments may range from 128 to 148.)

Curricula of the various departments in the College of Technology are revised and modified as required to reflect the patterns of their professional areas and to provide an effective base for the future professional growth of their graduates. Entering students may anticipate that a curricular program as presented, or as subsequently modified, will permit their graduation in four years, assuming normal loads and progress.

If a break in attendance occurs, or other than normal progress is made, the curricular requirements which must ordinarily be satisfied will be those which are in effect at the time of graduation. Specific programs accomplishing this will be prepared by the student and his adviser for approval by the Executive Committee of the College.

University-wide requirements including Physical Education, History 401-402, and six semester hours each from Groups C and D (see page 56)
are a part of each curriculum. In the freshman and sophomore years, male students may elect Basic Air Force or Army ROTC, or substitute six credits of humanistic-social courses. A total of six hours of ROTC credit may be applied to the total required for graduation in all curricula.

Honors Program

The College of Technology, through its various departments, offers the superior student the opportunity to participate in an Honors Program which is individually designed to provide added intellectual incentives and opportunities beyond those offered in the regular curricula. Admission to Honors status is by invitation of the department concerned and with the approval of the Dean of the College. It is limited to those students entering the junior year with at least a 3.0 average.

The program permits the student, with approval of his departmental adviser and the Dean, to develop an individualized plan of study which, within the framework of his chosen professional area, may include appropriate courses from any of the Colleges in the University in lieu of, and/or in addition to, those courses normally prescribed.

Dual Degree Programs

Students may formally combine studies in a professional curriculum in the College of Technology with studies in other curricula of the University. The College of Liberal Arts offers a broad liberal educational experience in a number of major areas or specific curricula in the Whittemore School or the College of Agriculture may be jointly pursued as the basis of preparation for an interdisciplinary career. Normally these joint programs will involve attendance for five years and two Bachelor's degrees will be awarded upon satisfactory completion of the requirements of both areas.

If a student is approved for a dual degree program, initial registration will be in the College of Technology, but an adviser will be assigned from both areas so that an integrated program of study may be planned from the outset in order to accomplish the student's objectives in the most efficient and academically-sound manner.
Chemical Engineering
O. T. Zimmerman, Chairman

Chemical engineering is that branch of engineering which involves the application of chemistry, physics, mathematics, and fundamental engineering principles to the design, construction, and operation of equipment for carrying out chemical processes on an industrial scale at the lowest possible cost. The Chemical Engineering curriculum therefore, provides the student basic training in the physical sciences, engineering principles, and economics.

Although chemical engineering is a distinct profession, chemical engineers are also considered to be members of the chemical profession and a considerable portion of the Chemical Engineering curriculum is devoted to the science of chemistry. However, emphasis is placed upon the large-scale manufacture of chemical products instead of the laboratory phase of chemistry.

The minimum credits required for graduation in June, 1966, with the degree of Bachelor of Science in Chemical Engineering is 145. The student with the assistance of his adviser should plan a program based on the following suggested distribution of courses which average 18 credit hours per semester.

**FRESHMAN YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E. 431, 432, Basic Physical Education</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 403-404, General Chemistry</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 425-426, Calculus A 1 and A 2†</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 405, Engineering Drawing</td>
<td>0, 3</td>
<td>3, 0</td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Tech. 401, Problems in Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

**SOPHOMORE YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 547-548, Organic Chemistry</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Ch. E. 511-512, Chemical Engineering Principles I and II</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hist. 401-402, Introduction to Contemporary Civilization</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527, 528, Differential Equations and Multidimensional Calculus</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 501-502, General Physics II and III</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science or in 6 credits of approved humanistic-social courses.
† Students whose Mathematics Background Test score indicates a need for a more gradual approach will enroll in Math. 421-422-423 in place of Math. 425-426.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 683-684</td>
<td>Physical Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Ch.E. 613-614</td>
<td>Chemical Engineering Principles III and IV</td>
<td>4</td>
</tr>
<tr>
<td>Ch.E. 622</td>
<td>Chemical Engineering Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 523</td>
<td>Mechanics of Solids</td>
<td>4</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective, Approved Technical Elective</td>
<td>( )</td>
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</table>

**SENIOR YEAR**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch.E. 616</td>
<td>Chemical Engineering Principles V</td>
<td>3</td>
</tr>
<tr>
<td>Ch.E. 617</td>
<td>Chemical Engineering Principles VI</td>
<td>4</td>
</tr>
<tr>
<td>Ch.E. 631</td>
<td>Chemical Engineering Kinetics</td>
<td>4</td>
</tr>
<tr>
<td>Ch.E. 641</td>
<td>Physical Metallurgy</td>
<td>4</td>
</tr>
<tr>
<td>Ch.E. 622</td>
<td>Chemical Engineering Economics and Plant Design</td>
<td>4</td>
</tr>
<tr>
<td>Ch.E. 696</td>
<td>Chemical Engineering Project or Approved Elective</td>
<td>3</td>
</tr>
<tr>
<td>E.E. 533</td>
<td>Fundamentals of Electrical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective, Approved Technical Elective</td>
<td>( )</td>
<td></td>
</tr>
</tbody>
</table>
Technology Curriculum in Chemistry
A. R. Amell, Chairman

This curriculum is intended to prepare the student for the career of a professional chemist in industry and to give a good foundation for graduate study leading to original and independent research.

Instruction is given by lectures, recitations, and carefully supervised laboratory work. The laboratory study is largely individual and the course work of each student is planned to furnish a broad knowledge of chemical science. The student may elect either German or French to enable him to read chemical literature, and he receives a grounding in mathematics and physics necessary for the advanced courses in chemistry. In the senior year, an independent research project is undertaken, permitting the student to use the reference library and chemical periodicals throughout the course of a laboratory investigation.

The minimum credits required for graduation in June, 1966, with the degree of Bachelor of Science in Chemistry is 144. The student with the assistance of his adviser should plan a program based on the following suggested distribution of courses which averages 18 credit hours per semester.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Semester</td>
</tr>
<tr>
<td>P. E. 431-432, Basic Physical Education</td>
<td>½</td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 405-406, General Chemistry and Qualitative Analysis</td>
<td>6</td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
</tr>
<tr>
<td>Math. 425-426, Calculus A 1 and A 2†</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>( )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freshman Semester</td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 547-548, Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>German 401, Elementary German</td>
<td>5</td>
</tr>
<tr>
<td>Hist. 401, 402, Introduction to Contemporary Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527, Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 501-502, General Physics II and III</td>
<td>4</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>( )</td>
</tr>
</tbody>
</table>

* All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science or in 6 credits of approved humanistic-social courses.
† Students whose Mathematics Background Test score indicates a need for a more gradual approach will enroll in Math. 421-422-423 in place of Math. 425-426.
### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 661-662, Analytical Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Chem. 683-684, Physical Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Chem. 685-686, Physical Chemistry Laboratory</td>
<td>2</td>
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<tr>
<td>Chem. 755-756, Organic Chemistry</td>
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</tr>
<tr>
<td>Approved Elective</td>
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</tr>
<tr>
<td>Elective, University Group C or D</td>
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### SENIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem. 785, 786, Organic Chemistry</td>
<td>3</td>
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<tr>
<td>Chem. 697, 698, Chemical Literature and Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Chem. 699, Thesis</td>
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</tr>
<tr>
<td>Approved Elective</td>
<td>( )</td>
</tr>
<tr>
<td>Elective, University Group or D</td>
<td>3</td>
</tr>
</tbody>
</table>
Civil Engineering
J. Harold Zoller, Chairman

The profession of civil engineering, the oldest of the major branches of engineering practice, embraces the functions of planning, design, and construction of buildings, bridges, dams, transportation projects, and public works in general.

The curriculum includes a study of the basic sciences which are essential to the practice of civil engineering, and the application of these principles in the classroom, design room, and laboratory. Additional work is provided in the social-humanistic fields to produce a graduate who is technically competent and well adjusted to his social environment.

The minimum credits required for graduation in June, 1966, with the degree of Bachelor of Science in Civil Engineering is 144. The student with the assistance of his adviser should plan a program based on the following suggested distribution of courses which average 18 credit hours per semester.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
</tr>
<tr>
<td>P.E. 431-432, Basic Physical Education</td>
<td>½</td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 403-404, General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
</tr>
<tr>
<td>Math. 425-426, Calculus†</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 405, Engineering Drawing</td>
<td>3–0</td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td></td>
</tr>
<tr>
<td>Tech. 401, Problems in Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>C.E. 505-506, Surveying I and II</td>
<td>3</td>
</tr>
<tr>
<td>Hist. 401, 402, Introduction to Contemporary Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527-528, Differential Equations and Multidimensional Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 523-524, Mechanics of Solids, Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 501-502, General Physics II and III</td>
<td>4</td>
</tr>
</tbody>
</table>

*All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science or in 6 credits of approved humanistic-social courses.
†Students whose Mathematics Background Test score indicates a need for a more gradual approach will enroll in Math. 421-422-423 in place of Math. 425-426.
### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.E. 517</td>
<td>Engineering Materials</td>
<td>4</td>
</tr>
<tr>
<td>C.E. 620</td>
<td>Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>C.E. 642</td>
<td>Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>C.E. 681-685</td>
<td>Theory of Structures I and II</td>
<td>4</td>
</tr>
<tr>
<td>E.E. 533</td>
<td>Electrical Engineering Fundamentals</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 523</td>
<td>Writing of Technical Reports‡</td>
<td>2</td>
</tr>
<tr>
<td>Geol. 407</td>
<td>General Geology‡</td>
<td>2</td>
</tr>
<tr>
<td>M.E. 533</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### SENIOR YEAR

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.E. 643</td>
<td>Water Supply and Treatment</td>
<td>4</td>
</tr>
<tr>
<td>C.E. 644</td>
<td>Sewerage and Sewage Treatment</td>
<td>4</td>
</tr>
<tr>
<td>C.E. 665</td>
<td>Soil Mechanics and Foundations</td>
<td>4</td>
</tr>
<tr>
<td>C.E. 692</td>
<td>Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>C.E. 693</td>
<td>Reinforced Concrete Theory</td>
<td>3</td>
</tr>
<tr>
<td>Approved C.E. Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved Elective</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

‡ Or approved elective.
Electrical engineers seek to provide solutions to real problems involving man's needs for the processing of information or for the utilization of electrical power. By conversion of information in audible, visual, digital, thermal, or mechanical form into electrical signals we are able to transmit it over large distances, amplify it, store it, recover it rapidly, perform calculations with extreme precision and speed, or to provide automatic devices for controlling complex operations. By the generation, transmission, distribution, and efficient utilization of electrical power, we are able to provide mankind with his most versatile form of energy.

The essence of engineering is design — the art of economically applying theory and judgment to produce devices, components, and engineering systems. Most design tasks make extensive use of mathematics and basic science, which are emphasized in the first two years of the electrical engineering curriculum. In the third year the student concentrates on engineering science courses, whereas in the fourth year laboratory and application courses which develop experience in the practice of measurement, analysis, and design of electrical devices and systems are emphasized.

Because electrical engineering has been applied so widely to other fields of learning; medicine and business, for example; it is particularly well suited to the dual degree programs described on page 115.

The Electrical Engineering curriculum is intended to prepare the student for further and more specialized studies at the formal or informal graduate level and for immediate employment as an engineer-in-training.

The minimum credits required for graduation in June, 1966, with the degree of Bachelor of Science in Electrical Engineering is 144. The student with the assistance of his adviser should plan a program based on the following suggested distribution of courses which average 18 credit hours per semester.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E. 431, 432, Basic Physical Education</td>
<td>½</td>
<td>½</td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 403-404, General Chemistry</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 425-426, Calculus A 1 and A 2†</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 405, Engineering Drawing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Tech. 401, Problems in Engineering</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

* All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science or in 6 credits of approved humanistic-social courses.
† Students whose Mathematics Background Test score indicates a need for a more gradual approach will enroll in Math. 421-422-423 in place of Math. 425-426.
### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>E.E. 501-502, Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Hist. 401, 402, Introduction to Contemporary Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527-528, Differential Equations and Multidimensional Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 523-524, Mechanics of Solids, Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 501, 502, General Physics II and III</td>
<td>4</td>
</tr>
</tbody>
</table>

### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.E. 513-514, Applied Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>E.E. 515, Electric Circuits</td>
<td>3</td>
</tr>
<tr>
<td>E.E. 609-510, Physical Electronics and Linear Active Circuits</td>
<td>3</td>
</tr>
<tr>
<td>E.E. 522, Electronics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>E.E. 555, 556, Student Branch I.E.E.E.</td>
<td>0</td>
</tr>
<tr>
<td>E.E. 523-524, Electrical Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>M.E. 533-536, Thermodynamics, Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 537, Mechanical Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
</tr>
</tbody>
</table>

### SENIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engl. 523, Writing of Technical Reports</td>
<td>2</td>
</tr>
<tr>
<td>E.E. 557, 558, Student Branch I.E.E.E.</td>
<td>0</td>
</tr>
<tr>
<td>E.E. 525, 526, Electrical Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>E.E. 645, 646, Electrical Networks, Fields</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 534, Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 691, Engineering Economy</td>
<td>3</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
</tr>
<tr>
<td>Approved Elective‡</td>
<td>( )</td>
</tr>
</tbody>
</table>

*Electives are selected with the advice and consent of the adviser.*
Technology Curriculum in Mathematics
M. E. Munroe, Chairman

The Technology Curriculum in Mathematics consists of a thorough grounding in calculus, followed by advanced work in algebra, analysis, applied mathematics, and geometry. Such a program meets the requirements currently set by graduate schools for admission to graduate study in mathematics. It also furnishes the basic mathematical training required of mathematicians in industry and government.

Modern science continues to increase its demands on the undergraduate mathematics program and the Technology Mathematics curriculum is subject to continual scrutiny and revision in an effort to keep up with these demands. Every effort is made to give the student of mathematics the most up-to-date possible presentation of the basic subject matter in this field.

The minimum credits required for graduation in June, 1966, with the degree of Bachelor of Science in Mathematics is 138. The student with the assistance of his adviser should plan a program based on the following suggested distribution of courses.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E. 431, 432, Basic Physical Education</td>
<td>1/2</td>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td>Chem. 403-404, General Chemistry</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Hist. 401, Introduction to Contemporary Civilization</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math. 425-426, Calculus A1 and A2</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SOPHOMORE YEAR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>French 401, Elementary French</td>
<td>5</td>
</tr>
<tr>
<td>Hist. 402, Introduction to Contemporary Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527-528, Differential Equations and Multi-dimensional Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Math. 531, Introduction to Set Theory and Number Systems</td>
<td>3</td>
</tr>
<tr>
<td>Math. 542, Probability</td>
<td>3</td>
</tr>
<tr>
<td>Phys. 501, 502, General Physics II and III</td>
<td>4</td>
</tr>
<tr>
<td>Approved Elective</td>
<td></td>
</tr>
</tbody>
</table>

*All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science.
**JUNIOR YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>German 401-402, Elementary German</td>
<td>5</td>
</tr>
<tr>
<td>Math 629, Methods of Applied Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Math 755, Fundamental Concepts of Geometry</td>
<td>3</td>
</tr>
<tr>
<td>Math 761-762, Higher Algebra I and II</td>
<td>3</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
</tr>
<tr>
<td>Approved Elective</td>
<td>( )</td>
</tr>
</tbody>
</table>

**SENIOR YEAR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math. 784, Introduction to Topology</td>
<td>3</td>
</tr>
<tr>
<td>Math. 788, Complex Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Math. 767-768, Real Analysis I and II</td>
<td>3</td>
</tr>
<tr>
<td>Math. 698, Senior Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Elective, University Group C or D</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives</td>
<td>( )</td>
</tr>
</tbody>
</table>
Mechanical engineering is a challenging profession, the concerns of which range from the design of rocket engines and space vehicles to the development of nuclear or conventional power plants, and from the analysis of the behavior of materials to the production of industrial products.

The curriculum in Mechanical Engineering is designed to prepare the graduate either for more advanced studies or for beginning a professional career as a mechanical engineer. To accomplish these objectives, the program of study provides a foundation in basic physical sciences and the classical and more modern concepts in applied mechanics, thermal sciences and materials science. Further, the curriculum is designed to help the student develop his abilities in engineering design and experimentation. A coordinated sequence in the humanities and social sciences is integrated into the curriculum.

This program in mechanical engineering challenges the student to develop his creative potential so that he can meet the increasingly complex needs of industry, government and education, and so that he can recognize and understand the role of technology in our modern society.

The minimum credits required for graduation in June, 1966 with the degree of Bachelor of Science in Mechanical Engineering is 138. The student with the assistance of his adviser should plan a program based on the following suggested distribution of courses which averages 16-18 credit hours per semester.

<table>
<thead>
<tr>
<th>FRESHMAN YEAR</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Semester</td>
</tr>
<tr>
<td>P.E. 431, 432, Basic Physical Education</td>
<td>1/2</td>
</tr>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>Chem. 403-404, General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
</tr>
<tr>
<td>Math. 425-426, Calculus†</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 405, Engineering Drawing</td>
<td>3</td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Tech. 401, Problems in Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

* All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science or in 6 credits of approved humanistic-social courses.
### SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.O.T.C., Air Force or Army, or Elective*</td>
<td>( )</td>
</tr>
<tr>
<td>Hist. 401-402, Introduction to Contemporary Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527-528, Differential Equations and Multidimensional Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 510, Manufacturing Processes and Design</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 522, Materials I</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 523, Mechanics of Solids</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 524, Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 501, 502, General Physics II and III</td>
<td>4</td>
</tr>
</tbody>
</table>

### JUNIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.E. 539, Electrical Engineering Fundamentals</td>
<td>4</td>
</tr>
<tr>
<td>E.E. 640, Circuits, Machinery, and Control</td>
<td>4</td>
</tr>
<tr>
<td>M.E. 533-534, Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 536, Fluid Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 537-538, Mechanical Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>Approved Electives‡</td>
<td>( )</td>
</tr>
</tbody>
</table>

### SENIOR YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.E. 641, Electronic Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 643, Machine Design and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 644, Mechanical Vibrations</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 653, Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 657-658, Heat and Power Systems</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 663, Materials II</td>
<td>3</td>
</tr>
<tr>
<td>M.E. 691, Engineering Economy</td>
<td>3</td>
</tr>
<tr>
<td>Approved Electives‡</td>
<td>( )</td>
</tr>
</tbody>
</table>

*Students whose Mathematics Background Test score indicates a need for a more gradual approach will enroll in Math. 421-422-423 in place of Math. 425-426.

‡Minimum elective requirements are: Group C — 6 credits; Group D — 6 credits; technical elective courses during Junior and Senior years — 12 credits. All elective courses must be approved through the adviser. Technical electives may include up to 6 credits of R.O.T.C.
Technology Curriculum in Physics

J. A. Lockwood, Chairman

The Technology Curriculum in Physics offers basic training in fundamentals, supplemented by laboratory work, in the various branches of physics. Opportunity is given in the senior year for experimental investigation in some of the fields of physics under guidance of staff members. Such a curriculum prepares its graduates for basic research in industry, the various government research organizations, or for continued academic study toward advanced degrees. The diversified opportunities in physics necessitate a flexible curriculum, enabling the student to supplement his studies in physics with other science and engineering courses.

A minimum of 128 semester hours is required for graduation with a Bachelor of Science degree in Physics. Students entering earlier than September, 1963, must satisfy the 144 credit requirement then in effect adjusted for credit changes in required courses. Departmental advisers should be consulted on specific programs accomplishing this.

FRESHMAN YEAR

<table>
<thead>
<tr>
<th>Courses</th>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E. 431, 432, Basic Physical Education</td>
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<td>4</td>
</tr>
<tr>
<td>Engl. 401-402, Freshman English</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 425-426, Calculus A 1 and A 2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 404, General Physics I</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOPHOMORE YEAR

<table>
<thead>
<tr>
<th>Courses</th>
<th>First Semester</th>
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</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Hist. 401, 402, Introduction to Contemporary Civilization</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Math. 527, 528, Differential Equations and Multidimensional Calculus</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Phys. 501-502, General Physics II and III</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Approved Foreign Language</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

JUNIOR AND SENIOR YEARS

To meet the major requirements the student must take Physics 601-602, 503, 703-704, 605-606, 701, 609 or 610, and 607 or 608. (Note that Math. 629-630 is a prerequisite for many of these courses.) For those students intending to pursue graduate study, it is advisable to elect physics and mathematics courses beyond the minimum requirements, and German or Russian as the foreign language. A student interested in applied physics should elect courses in electrical and mechanical engineering and chemistry.

* All freshman and sophomore male students, in these two years, will enroll in either Air Science or Military Science or in 6 credits of approved humanistic-social courses.

† Students whose Mathematics Background Test score indicates a need for a more gradual approach will enroll in Math. 421-422-423 in place of Math. 425-426.
The Whittemore School of Business and Economics

Robert F. Barlow, Dean

Accounting
Business Administration
Hotel Administration
Economics
Secretarial Curriculum

General Information

The Whittemore School of Business and Economics, formerly a department in the College of Liberal Arts, was established as the fourth undergraduate degree-granting college at the University of New Hampshire on July 1, 1962.

The basic purpose of the School is to provide for its students a broad academic background, with professional training in one of the disciplines of accounting, business administration, economics, hotel administration, or the secretarial curriculum. Students will be required to take a substantial part of their course work in the other colleges of the University. In no sense should the basic purpose of the School be interpreted narrowly.

Although upon graduation a student will have a certain degree of professional competence in the area in which he chooses to concentrate, he will shortly discover that from the point of view of his future development substantial familiarity with a myriad of other academic disciplines is necessary. In particular, students will be encouraged to elect courses in the social sciences, mathematics, the natural sciences, and the humanities. The student who pursues study in the relatively broad curricula of business administration and economics will also find that he is prepared for advanced study at the graduate level in these and related disciplines.

Requirements for Degrees

The Whittemore School offers the degrees of Bachelor of Arts and Bachelor of Science. Students concentrating in economics will be candidates for the Bachelor of Arts degree, and students concentrating in the other curricula offered by the School will be candidates for the degree of Bachelor of Science. Each candidate for a degree must satisfy all general University requirements for graduation, earn at least 128 semester credits, including the courses required in one of the four-year curricula described below, and achieve a minimum grade-point average of 2.0.

The several curricula in the Whittemore School are subject to revision and modification from year to year. Students are subject to and responsible for such changes as they may be introduced. However, entering students may anticipate that a curriculum as presented, or as subsequently modified, will permit their graduation in four years, assuming that normal academic loads are carried and normal progress is made.

An undergraduate student entering the School will be required to declare his major not later than the end of his sophomore year. The new cata-
logue becomes effective on July 1 of each year. For information concerning advanced degrees, see the Graduate School catalogue.

Independent Study

A senior in the Whittemore School of Business and Economics may register for 3 to 12 semester credits of independent study, provided: (a) his cumulative academic average is 3.0 or better and (b) he has submitted a plan for independent study that has been approved by his adviser, the instructor involved, and the Executive Committee. The student pursuing an independent-study program must meet all general School requirements. He may petition to submit independent-study credits in whole or in part for required-course credits in the economics curriculum or for elective credits in any one of the prescribed curricula.

Students with superior academic records who pursue independent-study programs for a significant portion of a semester’s work may petition to be designated “Whittemore Scholar.”

The student taking an independent study program will be advised by a member of the faculty of his major area of concentration. It is expected that his program will normally take the form of an independent research paper, although programs calling for another form will be considered. The result of a student’s activity under this plan will be judged by three members of the faculty selected by his adviser and the Dean.

The Ford Foundation Scholarship Program

A limited number of freshmen each year are selected from those who apply for a special five-year program leading to the B.A. and M.A. degrees in economics. The program is limited to superior students who expect that their chosen vocation shall be teaching at the college level. The regular Whittemore School requirements for the Bachelor of Arts degree and the Graduate School requirements for the Master of Arts degree are basic requirements. In addition, the student is expected to attend special seminars, incorporate a minor area of study as well as a major and complete special work in mathematics, languages, reading, and writing. During the last three years of the program he will be assigned to duties as an intern in teaching economics.

Prospective freshmen with superior high school records who are interested in this program should consult the principal or counselor in their high schools or write to the Director of Admissions at the University.

Minor Program

A minor is not required in the Economics, Accounting, Business Administration, and Hotel Administration curricula. A student in any one of these curricula may, however, apply for permission to pursue a minor program of study in any discipline in which sufficient courses are offered at the University. Permission to participate in such a minor program may be granted only by the Executive Committee of the School, which shall consider the student’s major area of concentration and proposed minor before granting such permission. Successful completion of such a program is recorded on a student’s academic transcript.

A minor is 18 semester hours with grades of C or better. No more than 6 credits used to satisfy area of concentration requirements shall be used for a minor.
Joint-Degree Program

A student may obtain more than one undergraduate degree by completing all the curriculum, departmental, College, scholastic, and other requirements. Anyone interested in such a program of study should confer with the deans of the colleges in which he intends to earn degrees as early in his academic career as possible and, if approved for the program, should expect to work closely with faculty advisers from the colleges involved.

Curricula

Accounting

Students electing to concentrate in accounting will follow a program of study which devotes substantial time to the study of accounting principles. This study will include courses in cost accounting, intermediate accounting, advanced accounting, auditing and business systems, and federal taxation, among others. In general, they will be qualified upon graduation for employment as accountants with either private business firms or public accounting firms.

It is also expected that they will have a knowledge of the other aspects of over-all business administration in addition to accounting, as well as a broad background in various related disciplines. A student who elects to concentrate in this program will also find that he is well qualified to do graduate work in either accounting or general business administration.

Students must obtain a cumulative academic average of 2.0 or better in the business administration and economics courses required in this curriculum. Of the required courses in business administration and economics, at least 18 semester credits shall be earned at the University of New Hampshire, and at least 6 of these semester credits shall be in accounting courses.

Business Administration

Students concentrating in business administration will be required to take courses in those areas, such as accounting and statistics, with which a business man should be familiar. In addition, they will be required to obtain a knowledge of the several functional areas of business management, the economy within which the business firm functions and the cultural, social, and political environment within which the business firm exists.

For students interested in marketing and distribution, in finance, or in labor and personnel administration, a list of courses in these areas is offered. Students may choose electives from these groups. In the main, however, students in the general business administration curriculum will obtain a broad knowledge of business management principles as well as of the problems confronting and the solutions available to contemporary business management.

Upon graduation students will be qualified either to continue with advanced study in economics or business or to become members of the business community. They will have not only the requisite skills of business management but also a broad academic background, which is becoming increasingly important for business achievement.

Students in this curriculum must obtain a cumulative academic average of 2.0 or better in the required courses in business and economics as listed in the curriculum. Of the required courses in business administration and
economics, at least 18 semester credits shall be earned at the University of New Hampshire.

Economics

Students concentrating in economics will be expected to fulfill the basic requirements set down for general Liberal Arts students, such as the modern language and science requirements. In addition, within their area of concentration they will be able to take, among others, such advanced courses as national income analysis, intermediate economic theory, money and banking, international economics, business and economic statistics, and comparative economic systems.

It should be borne in mind, however, that undergraduate training in economics by no means qualifies a student as a professional economist. Those students who intend to become professional economists should plan on taking a minimum of three years of graduate work in the discipline after they have obtained their Bachelor's degree. Nevertheless, undergraduate training in economics does provide an excellent background for graduate training not only in that discipline but in other related disciplines such as government and law. If a student plans to receive only the Bachelor's degree, he will find that his work in economics will qualify him for many positions in business and government service.

Students in this curriculum are required to complete 30 semester credits in economics with a cumulative academic average of 2.0 or better. Of these 30 semester credits, a minimum of 18 credits must be in courses in economics numbered 601 or higher. Major credit toward the 18 semester hours required in courses numbered 601 or higher will be approved in the case of transfer students only if such courses have been taken as upper division courses, i.e., in the junior or senior year. In addition, of the required courses in economics at least 18 semester credits shall be earned at the University of New Hampshire.

Hotel Administration

Students concentrating in Hotel Administration will receive basic preparation for careers in professional management and technical specialist positions in the hotel, motel, club, and institutional food service areas. They will be candidates for a Bachelor of Science degree. To insure that graduates know both the basic skills as well as the broad field of hotel administration, each student is required to complete at least two summers of on-the-job experience. Transfer students and others may satisfy part or all of this practical-experience requirement by presenting evidence of having performed similar work.

Additionally, the program of study will include a substantial amount of work in economics and general business management and other courses outside the particular area of hotel administration in order to insure the students' having as broad a professional background as possible.

Secretarial Curriculum

The Secretarial curriculum is designed to prepare the student for the type of secretarial position in which both excellence in secretarial skills and breadth of background are essential. Because such positions are available in a number of different professions and businesses, the requirement of 18 credits in another discipline (the minor) has been established in order to
encourage the student to follow an interest which, in combination with secretarial skills and knowledge, may be expected to lead to satisfying employment in the field of the minor. For example, a student interested in obtaining employment with a government agency would probably select courses in government for the minor. Office experience for a minimum of ten weeks in the summer between the junior and senior years will be required for graduation. The work must be done in a business or professional office approved by the supervisor of the curriculum. It is expected that remuneration for the work will be at the current rate for the kind of work done.

Students in the curriculum must earn grades of C or better in the following secretarial courses: 503-504, 509-510, 511, 513, and 517, a total of 17 credits. In addition, students in this curriculum must earn a C grade or better in 9 credits of work from the following group: Secretarial 622, 523-524, Economics 401-402, Business Administration 401-402, 621, and 633.

Students transferring from collegiate institutions and high school students with previous training in secretarial subjects are required to take the following courses: Secretarial 503-504, 509-510, 511, 513, and 517.

Transfer and high school students who have had one year of Gregg shorthand (or the equivalent of one year) in another institution and have earned a grade of 80 or better (where the passing grade is 70) will not be allowed to enroll in Secretarial 401 for credit: likewise, those students who have had one year of typewriting (or the equivalent) in another institution and have earned a grade of 80 or better (where the passing grade is 70) will not be allowed to enroll in Secretarial 407 for credit (see below).

Students who have had Secretarial 405 at the University of New Hampshire or a similar course in another collegiate institution, or one semester of typewriting in high school or preparatory school, will be required to enter Secretarial 427 instead of Secretarial 407.

The Commercial Teacher Preparation program, an option in the Secretarial curriculum, will prepare the student to teach commercial subjects in secondary schools. The student in this program will not be required to take a minor but will be expected to take Education 481 in the sophomore year, Education 757 and Education 758 in the junior year; Ed.-Cs. 791 in the first semester of the senior year, and Ed.-Cs. 794 (Supervised Teaching of High School Commercial Subjects) in the second semester of the senior year.

Students interested in registering for either the Secretarial curriculum or the Commercial Teacher Preparation option should consult with Professor Doris Tyrrell.
Board of Visitors — Whittemore School

GARDNER ACKLEY
Executive Office of the President
Chairman, Council of Economic Advisors
Washington, D. C.

THOMAS H. BRESLIN
Sub-Area Director
United Steelworkers of America
Concord, New Hampshire

WINTHROP L. CARTER, JR.
Vice President
Nashua Corporation
Nashua, New Hampshire

JOHN J. CORSON
Professor of Public and International Affairs
Princeton University
Princeton, New Jersey

BRADLEY DEWEY
Chairman of the Board
Hampshire Chemistry Corporation
Nashua, New Hampshire

JOHN P. DUNFEY
President, The Dunfey Family Hotels and Motor Inns
Hampton, New Hampshire

LANE DWINNELL
President, Carter & Churchill Co.
President, National Bank of Lebanon
Lebanon, New Hampshire

HARLAND C. FORBES
Chairman of the Board
Consolidated Edison Company of New York
New York City

J. FRED FRENCH
President, Amoskeag Savings Bank
Manchester, New Hampshire

LEONARD C. HARDWICK
President, Spaulding and Frost Company
Fremont, New Hampshire
President, First National Bank
Rochester, New Hampshire

AUSTIN I. HUBBARD
Former Chairman, Board of Trustees, University of New Hampshire
Walpole, New Hampshire

JOHN W. McCONNELL, President
University of New Hampshire
Durham, New Hampshire

CHARLES A. MYERS
Director, Industrial Relations Section
Massachusetts Institute of Technology
Cambridge, Massachusetts

DAVID F. PUTNAM
President, Markem Machine Company
Keene, New Hampshire

JOHN F. ROWE, Commissioner
Department of Resources and Economic Development
Concord, New Hampshire

SINCLAIR WEEKS
Former United States Secretary of Commerce
Lancaster, New Hampshire

WILLIAM C. WHITTEMORE
Treasurer, John Hancock Mutual Life Insurance Company
Boston, Massachusetts

University and School Group Requirements

Students admitted to the University for the first time in the fall of 1964-65 are required to complete six semester hours in each of the following groups. Completion of 30 or more credits in three or more areas in a given group shall satisfy the requirements of that group and advanced placement in any one of these groups satisfies the requirement of that group.
Group A — History 401-402.


Group C — Economics 401-402, Geography 401-402, Government 405, 406, and 408, Psychology 401-402, Sociology 400, 411, and 540.

Group D — Arts 475 and 476, English 513, 514, 515, and 516, Humanities 501-502, Music 403-404, Foreign Languages at the 503-504 or 505-506 level, Philosophy, any two courses, Speech and Drama 431 and 436.

Business Administration-Economics 301 — Digital Computer Programming. 0 credit. Required of all Whittemore School students by the end of the sophomore year.

Some of the courses in the above groups are the same as those required by the School. With the exception of Economics 401-402, those courses shall be considered to fulfill both the School and University requirements. Attention is called to the fact that in order to fulfill the School requirements in Group B, with the exception of the Secretarial curricula, students must take a year’s work (two sequential semesters) in both a biological science and a physical science; in Group C, with the exception of the Secretarial curricula, students must take 6 semester hours of work in psychology and/or sociology and 6 semester hours of work in government and/or geography, with a maximum of 3 semester hours in geography; in Group D, with the exception of the Secretarial curricula, students must take 12 semester hours of work. All students in the Whittemore School are required to take Mathematics 407-408 which will fulfill the Physical Science requirement of Group B.

* Students who do not have the mathematics pre-requisites for Mathematics 407-408 must take Mathematics 302-303 with zero credit to be eligible for Mathematics 407-408. Mathematics 302-303 may be taken concurrently.
### Accountant

#### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
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<tbody>
<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
<td>1</td>
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<tr>
<td>P. E. 431, 432</td>
<td>Physical Education (Men)</td>
<td>1½</td>
</tr>
<tr>
<td>Hist. 401-402</td>
<td>Introduction to Contemporary Civilization</td>
<td>3</td>
</tr>
<tr>
<td>Engl. 401-402</td>
<td>Freshman English</td>
<td>3</td>
</tr>
<tr>
<td>B. A. 401-402</td>
<td>Principles of Accounting</td>
<td>3</td>
</tr>
<tr>
<td>Group B</td>
<td>Mathematics 407-408</td>
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<td>Group C</td>
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**First Semester** | **Second Semester**
--- | ---
16 | 16

#### Sophomore Year

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<tr>
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<td>P. E. 403, 404</td>
<td>Physical Education (Women)</td>
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<td>B. A. 503-504</td>
<td>Intermediate Accounting</td>
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<tr>
<td>Econ. 401-402</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ. 431-432</td>
<td>Business and Economic Statistics</td>
<td>3 or 4</td>
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<td>Group B</td>
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<td>3 or 4</td>
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<td>Group C</td>
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**First Semester** | **Second Semester**
--- | ---
16 | 16

#### Junior Year

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<tr>
<td>B. A. 633</td>
<td>Managerial Organization</td>
<td>3</td>
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<tr>
<td>B. A. 508</td>
<td>Cost Accounting</td>
<td>3</td>
</tr>
<tr>
<td>B. A. 621-622</td>
<td>Commercial Law</td>
<td>3</td>
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<tr>
<td>B. A. 672</td>
<td>Corporation Finance</td>
<td>3</td>
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<tr>
<td></td>
<td>Elective: Business Administration or Economics</td>
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<tr>
<td>Group D</td>
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**First Semester** | **Second Semester**
--- | ---
16 | 16

#### Senior Year

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<thead>
<tr>
<th>Course</th>
<th>Description</th>
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<tbody>
<tr>
<td>B. A. 757</td>
<td>Auditing and Business Systems</td>
<td>3</td>
</tr>
<tr>
<td>B. A. 756</td>
<td>Federal Taxation</td>
<td>3</td>
</tr>
<tr>
<td>B. A. 774</td>
<td>Business Policy</td>
<td>3</td>
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<tr>
<td>Econ. 653</td>
<td>Money and Banking</td>
<td>3</td>
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<tr>
<td></td>
<td>Elective: Business Administration or Economics</td>
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<td>Group D</td>
<td></td>
<td>3</td>
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</tbody>
</table>

**First Semester** | **Second Semester**
--- | ---
16 | 16

Students planning to take the examination for the Certified Public Accountant Certificate are advised to elect B.A. 755 and 760.
### BUSINESS

#### FRESHMAN YEAR

<table>
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<tr>
<th>Course</th>
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<tr>
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<tr>
<td>P. E. 431, 432</td>
<td>1/2</td>
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<tr>
<td>Hist. 401-402</td>
<td>1/2</td>
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<tr>
<td>Engl. 401-402</td>
<td>3</td>
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<td>B. A. 401-402</td>
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<td>Group B</td>
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<td>Group C</td>
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#### Credits

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#### SOPHOMORE YEAR

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<td>Econ. 431-432</td>
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#### Electives

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#### JUNIOR YEAR

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<th>Course</th>
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<tr>
<td>B. A. 633</td>
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<td>B. A. 643</td>
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<td>B. A. 525</td>
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<td>B. A. 675</td>
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<td>B. A. 672</td>
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#### Electives

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<tr>
<th>Credits</th>
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#### SENIOR YEAR

<table>
<thead>
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<th>Course</th>
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<tbody>
<tr>
<td>B. A. 621-622</td>
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<td>Econ. 653</td>
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#### Electives

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137
### ECONOMICS

#### FRESHMAN YEAR

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>First Semester</th>
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<tbody>
<tr>
<td>P. E. 401, 402</td>
<td>Physical Education (Women)</td>
<td>1</td>
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<tr>
<td>P. E. 431, 432</td>
<td>Physical Education (Men)</td>
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<td>Engl. 401-402</td>
<td>Freshman English</td>
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<td>Hist. 401-402</td>
<td>Introduction to Contemporary Civilization</td>
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<tr>
<td>Group B</td>
<td>Mathematics 407-408</td>
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Electives

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#### SOPHOMORE YEAR

<table>
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<td>Physical Education (Women)</td>
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<td>Econ. 401-402</td>
<td>Principles of Economics</td>
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<td>Econ. 431-432</td>
<td>Business and Economic Statistics</td>
<td>3 or 4</td>
<td>3 or 4</td>
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<td>Group B</td>
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Electives

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#### JUNIOR YEAR

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<thead>
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<tr>
<td>Econ. 673</td>
<td>Intermediate Economic Theory</td>
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<td>Econ. 675</td>
<td>National Income Analysis</td>
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Electives

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<tr>
<th>Credits</th>
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#### SENIOR YEAR

<table>
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Electives

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<tbody>
<tr>
<td></td>
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</table>

All students are required to pass a test of general competence in one of the following languages: Classical Greek, French, German, Italian, Latin, Russian, or Spanish. The test is based on the achievement of students after completion of courses in languages at the University of New Hampshire (French 501, Spanish 501, German 501, Russian 501-502, Latin 501-502, Greek 501-502, Italian 501-502). Usually two or three years of high school work are adequate preparation for this test. This examination will consist of an oral-aural test as well as a comprehensive written examination and will
test the student’s ability to comprehend and read texts of moderate difficulty and answer questions based on that text.

A student may also complete his college requirement by passing one of the following courses: French 501, Spanish 501, German 501, Russian 502, Latin 502, Greek 502, Italian 502, or any language course numbered higher.

In the event a student does not pass the competence examination he must make a written application for permission to repeat the examination showing that he has improved his preparation through completion of a course or through tutoring or supervised study. Application forms are available in the office of the Department of Foreign Languages and Literatures.

The competence tests are normally given three times a year; during Orientation week, on the last week of classes in May, and at the end of the Summer Session.

Those graduating in February who have not previously passed the examination may take it at the end of January by petition.

For 6 credits of electives in economics a student may substitute 6 credits in resource economics (courses numbered above 600) or business administration (courses numbered above 600), with the permission of the Dean.
### HOTEL ADMINISTRATION

#### FRESHMAN YEAR

<table>
<thead>
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<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>P. E. 401, 402</td>
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<td>Physical Education (Women)</td>
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<td>P. E. 431, 432</td>
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<td>Engl. 401-402</td>
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<td>Hist. 401-402</td>
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<tr>
<td>Introduction to Contemporary Civilization</td>
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#### SOPHOMORE YEAR

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<tr>
<td>Principles of Economics</td>
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<td>Econ. 431</td>
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<td>Business and Economic Statistics</td>
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<td>Principles of Food Selection and Preparation</td>
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### JUNIOR YEAR

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<tbody>
<tr>
<td>B. A. 509</td>
<td>Hotel and Restaurant Accounting and Control Systems</td>
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<td>Managerial Organization</td>
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<td>Corporation Finance</td>
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<td>Quantity Foods and Purchasing</td>
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<td>Experimental Foods</td>
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<td>Meat and Its Products</td>
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### SENIOR YEAR

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<td>H. Ad. 667</td>
<td>Stewarding and Catering</td>
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<td>Hotel Promotion and Sales</td>
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<td>Lectures on Hotel Management</td>
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<td>Group D</td>
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<td><strong>Total</strong></td>
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**Practical Experience.** To be eligible for graduation a student must have had approved on-the-job allied work for two summers or satisfy the Department Head that equivalent experience has been completed.
SECRETARIAL

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<tr>
<th>FRESHMAN YEAR</th>
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<td>Mathematics 407-408</td>
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<td>Principles of Economics</td>
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<tr>
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<tbody>
<tr>
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<td>Office Machines</td>
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<td>Office Procedures</td>
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*Office Practice. To be eligible for graduation, a student must work during the summer between the junior and senior years in a business office approved by the supervisor of the curriculum.

*A grade of C or better in Secl. 408 will be required of a student electing Secl. 509-510; and a grade of C or better in Secl. 402 will be required of a student electing Secl. 503-504. A student who has had high school courses in typing or shorthand may, when consulting the supervisor of the curriculum, be placed in a more advanced course in typing or shorthand.*
SECRETARIAL
(Commercial Teacher Preparation Option)

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</table>

Office Practice. To be eligible for graduation, a student must work during the summer between the junior and senior years in a business office approved by the supervisor of the curriculum.
The Graduate School

The Graduate School, which has offered instruction since 1903, has for its objective the bringing together of faculty and qualified students in a spirit of scholarship and research. The graduate student is given opportunity to specialize in some field of knowledge, and to develop a maturity of thought and attitude toward his professional field, so that both his professional and his cultural life are enhanced. The work of the Graduate School is under the general direction of the Graduate Faculty. The Dean of the Graduate School is responsible for the administration of the regulations and requirements pertaining to admission, conduct of work, the granting of advanced degrees and other pertinent matters.

Degrees

Graduate programs are offered in the following disciplines: Agricultural Education, Animal Science (Livestock, Dairy, and Poultry), Biochemistry, Botany, Chemical Engineering, Chemistry, Civil Engineering, Electrical Engineering, Entomology, Forestry, Genetics, Home Economics, Mathematics, Mechanical Engineering, Microbiology, Physics, Plant Science (Horticulture), Resource Economics (Agricultural Economics), Soil and Water Science, and Zoology leading to the Master of Science degree; Economics, English, Foreign Languages and Literatures, Government, History, Psychology, and Sociology leading to the Master of Arts degree; and Education leading to the Master of Education degree. Programs also are available leading to the Master of Agricultural Education degree, to the Master of Public Administration degree, and to the Master of Science for Teachers degree. Graduate programs leading to the Doctor of Philosophy degree are offered in the departments of Botany, Chemistry, Genetics, Mathematics, Microbiology, Physics, Plant Science (Horticulture), and Zoology.

Assistantships, Scholarships, and Fellowships

Graduate teaching or research assistantships are available in most departments. These involve part-time work in research and teaching activities or some combination thereof. The University also sponsors tuition scholarships, a UNH Fellowship program available to Ph.D. candidates, and the Alumni Fellowship program available to graduate students in the social sciences and the humanities. There are also a number of fellowship programs sponsored by outside agencies such as National Aeronautics and Space Administration, National Science Foundation, and the National Defense Education Act of 1958.

Information

Detailed information about admission, requirements for degrees, courses, fellowships, scholarships, and assistantships are to be found in the Graduate School catalogue which may be obtained by writing to the Dean of the Graduate School.
Explanation of Arrangement

The title of the course is given in small capital letters; the Arabic numeral designates the particular course. Odd numerals indicate courses normally offered in the first semester; even numerals indicate courses normally offered in the second semester. Arabic numerals enclosed in parentheses indicate that course is repeated in the semester following. Thus course 401 (401) is offered in the first semester and is repeated in the second semester.

Parentheses are also used to designate courses out of semester sequence, e.g., (404) indicates an even-numbered course offered in the first semester.

Following the title is the course description. The next section gives the following information in the order indicated: (1) prerequisites, if any; (2) the number of semester credits the course will count in the total required for graduation. Laboratory periods are usually two and one-half hours in length, recitations either 50 minutes or 80 minutes in length.

Abbreviations have been employed to indicate the number of hours of work required of students in lecture, recitation, and laboratory, and the number of credits given for satisfactory completion of each course. The abbreviations should be interpreted as follows.

Cr. ............................ Semester hour credit
Lab. ................................ Laboratory
Lec. ................................. Lecture
Prereq. ............................. Prerequisites
Rec. ................................. Recitation

NLG following a course description indicates that the course carries no letter grade, being marked "P" for passing or "Cr" for credit.

All courses (unless otherwise marked) are open to students who have passed the prerequisites.

An elective course may be given only when there is a minimum of five students registered.

If the numerals designating a course running through both semesters are connected by a hyphen, the first semester, or its equivalent, is a prerequisite to the second semester. If the numerals are separated by a comma, properly qualified students may take the second semester without having had the first.

Students must register for the number of credits or within the range of credits shown in the catalogue description of a course.

The system of numeric designation of courses is as follows:

200-299 Courses in the Thompson School of Agriculture.
300-399 Non-credit courses, e.g., Mathematics 301.
400-499 Introductory courses not carrying prerequisites and courses generally falling within University-wide and college-wide requirements.
500-599 Intermediate-level courses for undergraduate credit only.
600-699 Advanced-level undergraduate courses. Entrance to courses numbered 600 and above normally requires junior class standing (may under some conditions be taken for graduate credit by non-majors only).
Agricultural Education

700-799 Advanced-level undergraduate courses (may be taken for graduate credit).

800-899 Courses which carry graduate credit only.

Description of courses numbered 800 or above, which are for graduate credit only, will be found in the Graduate School Catalogue.

Accounting
(See Business Administration)

Agriculture (20)
DEAN'S OFFICE, COLLEGE OF AGRICULTURE

401. INTRODUCTION TO COLLEGE
A non-departmental course offering matters not ordinarily reviewed in other courses of instruction. Attention will be given to selected student rules and regulations, scholarships, campus organizations and facilities, opportunities in agriculture as a science, and to programs of study. Also, federal aid as related to land-grant colleges and universities will be discussed. Mr. Richards. For first semester freshmen in Agriculture and Forestry. 1 cr. NLG.

Agricultural Education (22)
WILLIAM H. ANNIS, Assistant Professor and Chairman

650. PRINCIPLES OF AGRICULTURAL AND EXTENSION EDUCATION
The technical and professional qualifications of teachers of agriculture, county agricultural agents, and 4-H club agents. The history, philosophy, and legislation affecting these programs. Special emphasis will be placed on program planning. Mr. Annis. 3 cr.

651, 652. METHODS OF TEACHING FARM MECHANICS IN VOCATIONAL AGRICULTURE
The organization and presentation of farm mechanics subject matter, supervision and direction of farm mechanics projects, and the preparation and presentation of demonstrations. The first semester deals with fundamental farm mechanics skills and the second semester with farm machinery maintenance and operational techniques of instruction. Mr. Gilman. Required of majors in Teacher Education curriculum. 1 lab.; 1 cr.

(792). PLANNING FOR TEACHING
The organization of materials of instruction to meet group and individual needs. Techniques of instruction, planning for teaching, the function of consulting committees, working with youth groups, and program evaluation. This course is scheduled concurrently with Ag. Ed. 794 and 795. Mr. Annis. Prereq.: Ag. Ed. 650 or permission of instructor. 4 cr.

(794). SUPERVISED PRACTICE
Supervised practice in the specific and related problems of agricultural education. Students will be placed in Vocational Agriculture Centers and
Agricultural Education

County Cooperative Extension Service Centers. Mr. Annis. Prereq.: Ag. Ed. 650 or permission of instructor. 11 cr.

795. Preparation for Conducting and Supervising Adult Education Programs

The techniques of adult education in terms of identifying needs, program planning, methods of teaching, supervision, and evaluation. Mr. Annis. Prereq.: Ag. Ed. 650 or permission of instructor. 3 cr.

796. Seminar in Agricultural and Extension Education

Library and reference work and the preparation of papers for various phases of agricultural and extension education. Mr. Annis. Prereq.: Supervised Practice or 6 hours in Agricultural Education. 1 cr.

Agricultural Economics

(See Resource Economics)

Agricultural Engineering

(See Soil and Water Science)

Agronomy

(See Soil and Water Science)

Animal Sciences (25)

(Animal, Dairy, Poultry)

Winthrop C. Skoglund, Professor and Chairman; Fred E. Allen, Professor; C. Hilton Boynton, Professor; Walter M. Collins, Professor; Nicholas F. Colovos, Professor; William R. Dunlop, Professor; Harry A. Keener, Professor; Kenneth S. Morrow, Professor; Richard C. Ringrose, Professor; Loring V. Tirrell, Professor; Alan C. Corbett, Associate Professor; Herbert C. Moore, Associate Professor; Gerald L. Smith, Associate Professor; Richard G. Strout, Associate Professor; James B. Holter, Assistant Professor; Samuel C. Smith, Assistant Professor; Janet C. Briggs, Instructor

401. Fundamentals of Dairying

A general survey of the dairy industry; the selection, feeding, and management of dairy cattle; the composition and properties of milk and other products; dairy manufacturing processes; market milk. Mr. Morrow and Mr. Moore. 2 lec.; 1 lab.; 3 cr.

402. Introduction to the Livestock Industry

Origin, history, development, characteristics, and adaptability of the different types of horses, cattle, sheep and swine, with practice in judging. Mr. Tirrell. 2 lec.; 1 lab.; 3 cr.
403. Poultry Production

The general principles of poultry science and their practical application. Factors of culling, breeding, housing, feeding, marketing, diseases and parasites, incubation, and management. Mr. Skoglund. 2 lec.; 1 lab.; 3 cr.

405, (405). Horsemanship

Instruction in riding using University owned Morgans under supervision of a riding instructor. It may be possible for a limited number of students to stable their horses at the University upon proper authorization. Any student wishing to use this course to satisfy an activity requirement in Physical Education for Women will register for Physical Education 401, 402, 403, or 404. Three hours of riding per week for which a fee of $35.00 per quarter is charged. Mrs. Briggs. 1 cr.

501. Animal Anatomy and Physiology

The general anatomy and physiology of domestic animals and birds. Mr. Allen. 3 cr.

502. Animal Diseases

The prevention, control, and treatment of the bacterial and parasitic diseases of domestic animals. Mr. Allen. Prereq.: An. Sci. 501 or permission of instructor. 3 cr.

503. Fundamentals of Animal Nutrition

Scientific principles of nutrition in both ruminants and non-ruminants. Mr. Ringrose. 3 cr.

504. Meat and Its Products

Slaughtering, meat cutting, curing, and identification of cuts, livestock markets. Trips are taken to packing plants and retail outlets. Mr. Smith. 2 lec.; 1 lab.; 3 cr.

505. Light Horse Science

Origin, history, development, judging, selection, feeding, breeding and management of light horses. Special emphasis will be placed upon saddlehorse selection, the show ring classes, and judging. Horse show management will be discussed. Mr. Tirrell. 2 lec.; 1 lab.; 3 cr.

507, (507). The Scientific Approach to Equine Discipline

The psychological development, control and education stressing bitting, longeing, collection. Mrs. Briggs. Prereq.: An. Sci. 405 or equivalent and permission of instructor. 1-3 credits. May be repeated.

508. Dairy Bacteriology

The application of bacteriology principles to the production and processing of milk and other dairy products. Mr. Moore. 2 lec.; 2 lab.; 4 cr.

509, (510). Principles of Judging

The student can specialize in dairy cattle, dairy products, livestock or poultry. The principles of judging and selection of various animals and products. Mr. Morrow, Mr. Moore, Mr. Smith, Mr. Collins. Elective only after consultation with instructor in charge. 1 cr. May be repeated.
602. Livestock Management
Selection, feeding, breeding, management and preparation for the show ring of beef cattle, swine, and sheep, with special reference to New England conditions. Mr. Tirrell and Mr. Smith. 2 lec.; 1 lab.; 3 cr.

604. Applied Animal Nutrition
Application of scientific principles of nutrition to practical feed formulation and feeding system for poultry and livestock. Mr. G. Smith and other Staff members. 2 lec.; 1 lab.; 3 cr.

605. Physiology of Reproduction
A study of physiology, embryology, endocrinology reproduction and lactation in domestic animals and birds. Staff. Offered in 1965-66. 2 lec.; 1 lab.; 3 cr.

607. Market Milk
The producing, handling and distribution of market milk; dairy farm inspection; control of milk supply. Mr. Moore. 2 lec.; 1 lab.; 3 cr.

608. Ice Cream, Butter, and Cheese
The making, handling, and marketing. Mr. Moore. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

609. Dairy Cattle Breeding Principles
Purebred dairy cattle, breed history, pedigrees; family lines and methods of outstanding breeders; the application of the principle of genetics to the improvement of dairy cattle herd analysis. Mr. Morrow. 2 lec.; 1 lab.; 3 cr.

610. Poultry Management
The application of successful business principles to poultry production; study of surveys and production costs. Visits are made to numerous poultry farms in order to study various types of enterprise. Mr. Skoglund. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)

612. Avian Diseases
A survey of the diseases of domestic fowl. Emphasizes the fundamentals of disease control including bacterial, fungus, helminths and protozoan parasites and avian diseases caused by virus entities. Serological tests; virus isolation and propagation in avian embryos and tissue culture will be conducted in the laboratory. Mr. Corbett, Mr. Dunlop, and Mr. Strout. 3 lec.; 1 lab.; 4 cr. (Alternate years; not offered in 1965-66.)

697-698. Animal Sciences Seminar
A survey of recent literature and research in the Animal Sciences. Staff. 1 cr. May be repeated.

703. Animal Genetics
The principles of Mendelian and quantitative genetics applied to livestock and poultry; selection and breeding systems in genetic improvement and their evaluation. Prereq.: Zool. 706 or permission of instructor. Mr. Collins. 2 lec.; 1 lab.; 3 cr.

708. Advanced Dairy Science
Basic data, fundamental observations, and discussions of research contributing to the present status of the dairy industry. Mr. Moore. Prereq.:
The Arts

Adequate preparation in chemistry and bacteriology. 2 cr. (Alternate years; not offered in 1965-66.)

710. Dairy Cattle Nutrition and Management

Feeding and management of dairy animals, calf feeding, raising young stock, and feeding for economical milk production. Mr. Holter. 2 lec.; 1 lab.; 3 cr.

711-712. Investigations In (Dairy, Livestock, Poultry)

1. Genetics — Mr. Gerald Smith, Mr. Collins, Mr. Morrow. 2. Nutrition — Mr. Gerald Smith, Mr. Ringrose, Mr. Colovos, Mr. Holter. 3. Management — Mr. Tirrell, Mr. Skoglund, Mr. Morrow. 4. Diseases — Mr. Allen, Mr. Corbett, Mr. Dunlop, Mr. Strout, Mr. Samuel Smith. 5. Products — Mr. Gerald Smith, Mr. Moore. 6. Light Horsemanship — Mr. Tirrell, Mrs. Briggs. An opportunity is given for the student to select a special problem in any of the fields listed under the guidance of the instructor. Elective only after consultation with the instructor in charge. Hours to be arranged. 1-3 cr. May be repeated.

The Arts (46)

George R. Thomas, Professor and Chairman; John W. Hatch, Professor; John Laurent, Associate Professor; Winifred Clark, Associate Professor; Richard D. Merritt, Assistant Professor; James A. Fasanelli, Assistant Professor; Alfred R. Potter, Assistant Professor; Daniel L. Valenza, Instructor; David Kibbey, Instructor

The Department of The Arts presents a series of changing exhibitions in the galleries in Paul Creative Arts Center, the Exhibition Corridor in Hewitt Hall, and the Memorial Union. Within a convenient radius of Durham are located a number of the country’s important collections of art which students are encouraged to visit. Among these are: the Addison Gallery of American Art, the Currier Gallery of Art, the DeCordova and Dana Museum, the Lamont Gallery, several excellent museums and galleries in Boston, including the Museum of Fine Arts, the Gardner Museum, the Fogg Museum of Harvard University, and the Institute of Contemporary Art.

An experimental arts laboratory, the Student Workshop, is located in Hewitt Hall and is open to any student in the University, whether or not enrolled in art courses. This laboratory provides an excellent environment in which a student may explore materials, plan and execute projects of his own choice. Excellent facilities, including equipment ranging from small craft tools to industrial type machines, are available.

In those art courses where the student retains the finished work, he pays the cost of materials and supplies used. The University reserves the right to choose to exhibit a student’s work for a period of not more than two years.

Students are responsible for the care of shops, studios, and all equipment therein; damage resulting through negligence or carelessness will be the responsibility of the student. Tools and other equipment will not be used until instruction in their use is given by the member of the staff in charge. Unless specifically authorized by the Chairman of the Department, projects not a part of the instructional program must be excluded from the studios.
The Arts

Courses in the Crafts

401, 402. Ceramics

Exploration of three dimensional forms in clay. A composite course dealing with the basic methods of construction of functional and non-functional forms in clay, with emphasis upon coil-built and slab-built pots, and the introduction to the potter’s wheel. Studio practices in clay preparation, experimentation with glaze materials, formulation of glazes, various methods of decoration, and stacking and firing of the kilns. Mr. Potter. Elective by permission. 2 lab.; 3 cr. Course fee for materials, $8.00.

403, 404. Ceramics

Exploration of three dimensional forms in clay to develop the techniques and the art of throwing clay on the potter’s wheel. Objects to be functional and non-functional with the emphasis upon refinement of form, integration of texture and color to a particular problem. Studio practices in clay preparation, experimentation with glaze materials, formulation of glazes, methods of decoration, and stacking and firing of kilns. Mr. Potter. Elective by permission. 2 lab.; 3 cr. Course fee for materials, $8.00.

407. Crafts

Structural and decorative design for craft projects using paper, wood, fabric, metal, leather, etc., which may be used in elementary and secondary schools. Leather work will be emphasized. Miss Clark. For Art-Education students; also elective by permission. 2 lab.; 3 cr. Course fee for materials, $7.00.

408. Crafts

Structural and decorative design for craft projects using paper, wood, fabric, metal, and natural materials. These craft activities may be used in summer camps, playgrounds, settlement and scout groups. Silk screen printing will be emphasized. Miss Clark. For Recreation Education, Physical Education, and Social Service students; also elective by permission. 2 lab.; 3 cr. Course fee for materials, $7.00.

413, 414. Jewelry and Metalsmithing

Structural and decorative design and construction of jewelry, flatware and hollow ware using sterling silver, copper, brass, pewter. The skills of soldering, polishing, chasing, stone setting, casting, raising, forming are included. A unit in enameling on copper is part of the first semester course. Miss Clark. Limited enrollment. 2 lab.; 3 cr. Course fee for materials, $7.00.

419. Weaving

An introductory course in hand weaving, using the 4-harness loom. Plain and twill weaves, hand pattern techniques, 4-harness patterns for fabric and rug samples and projects using cotton, linen, wool, rayon, etc. Miss Clark. Limited enrollment. 2 lab.; 3 cr. Course fee for materials, $7.00.

425, 426. Woodworking

A basic course in wood, stressing design and techniques in hand and machine work. Projects range from small carvings and turnings to major pieces of furniture. Techniques include veneering and solid wood jointery. Mr. Valenza. Elective by permission. 1 lec.; 2 lab.; 3 cr. Course fee for materials: $7.00 for Arts 425; $15.00 for Arts 426.
600. CRAFTS WORKSHOP

Students in ceramics, jewelry and metalsmithing or woodworking may select one of these areas for advanced studio work. Miss Clark, Mr. Valenza, Mr. Potter. Prereq.: Arts 413-414, or Arts 425-426, or Arts 401, 402, 403, 404 and permission. Labs. as arranged. 6 cr. maximum.

Courses in Painting and Graphics, Sculpture, Architecture

431. BASIC DESIGN

A basic course in the structural and expressive use of the elements of design as a background for crafts, ceramics, sculpture, drawing and painting, advertising design, and illustration. A series of related lectures and demonstrations will be scheduled throughout the semester. Mr. Hatch, Mr. Laurent, and Mr. Kibbey. Elective by permission. 1 lec.; 2 lab.; 2 cr. No credit toward a major.

432. DRAWING AND DESIGN

A continuation of Arts 431 with problems in three dimensional design and drawing from the model and from nature. Mr. Hatch, Mr. Laurent. Prereq.: Arts 431 and permission. 2 lab.; 2 cr. Course fee for materials, $2.50. No credit toward a major.

451. PHOTOGRAPHY

The theory and practice of photography, covering camera operation, developing, printing, and enlarging. Creative solutions are sought to problems which are designed to increase the students' perception. Mr. Merritt. Elective by permission. 1 lec.; 1 lab.; 3 cr. Course fee for materials, $8.50.

455. DRAFTING AND SPACE PLANNING

Basic drafting procedures, including lettering. Study of architectural symbols and interpretation of architectural plans. Problems of architectural design with emphasis on space utilization and space planning. Mr. Thomas. For Hotel Administration students; also elective by permission. 1 lec.; 2 lab.; 3 cr.

457. SCULPTURE

Experimentation with three dimensional forms in clay, wood, stone, and metal as media for sculpture. The use of carving chisels, pneumatic tools and welding torch to either cut down or to build up compositions. The development of form, of volume, and of rhythm in space. Mr. Potter. Elective by permission. 2 lab.; 3 cr.

536. GRAPHIC ARTS

Expression and experimentation in a variety of graphic techniques, i.e., linoleum and wood block printing, etching, lithography, serigraphy, etc., in black and white and color. Mr. Laurent. Elective by permission. 2 lab.; 3 cr. Course fee for materials, $8.00.

538. ADVERTISING DESIGN AND ILLUSTRATION

Creative design problems in various media and techniques in an introduction to the fields of advertising design and illustration. Mr. Kibbey. Elective by permission. 2 lab.; 3 cr.
The Arts

541, 542. Advanced Drawing and Painting

Drawing is concentrated in the fall semester; extensive drawing in studio and from nature, still life and figure drawing in a variety of media, i.e., pencil, pen, ink and wash, pastel, and watercolor. An introduction to oil painting composition, means of form description, and theories of color are presented in studio exercises and outdoor sketching in the spring semester. Mr. Hatch and Mr. Laurent. Elective by permission. 2 lab.; 3 cr.

544. Water Media

A studio course dealing with various water media, transparent and opaque. Projects will stress the handling of watercolor and casein. Inks, temperas, and polyvinal will also be introduced. Mr. Hatch. Prereq.: Arts 431 (or equivalent) and permission. 2 lab.; 3 cr. (Alternate years; offered in 1965-66.)

554. Advanced Photography

The basic theory and practice of color photography. Advanced projects in black and white. Techniques of creative photography including studio and laboratory controls. A portfolio of photographs, representative of the student’s progress during the course, will be required. Mr. Merritt. Elective by permission. 1 lec.; 1 lab.; 3 cr. The course fee for materials will approximate $10.50. (Alternate years; offered in 1965-66.)

643, 644. Advanced Painting and Composition

An extension of Arts 541 and 542 stressing further development in the various media. Figure study and outdoor sketching also will be included. This course may be taken a second time with emphasis on the particular need of the individual. Mr. Laurent. Elective by permission. Labs. as arranged. 3 cr.

650. Studio Workshop

A course in painting, drawing, photography and print-making designed to subject the advanced student to an intensive experience in these four disciplines. This course is required for graduation in the painting and graphics option. Prereq.: Arts 451, 536, 541, 542, and permission. 4 lab.; 6 cr.

789. Problems in the Visual Arts

Advanced students may select a special problem in one of the visual arts in which they have exhibited proficiency, to be developed by means of conferences and studio work. Mr. Thomas and staff. Prereq.: Permission of Department Chairman. Credits to be arranged. This course may be repeated to a total of not more than 6 credits.

Courses in History of Art

475, 476. Introduction to The Arts

A broad historical survey of man’s creative efforts in their relation to contemporary cultural and social movements, presented as a background for interpreting the place of the arts in individual and community life of today. Illustrated lectures with assigned readings. Mr. Thomas and Mr. Fasanelli. 3 cr. Not open to freshmen. No credit toward a major.
581. American Art

A chronological survey of the architecture, painting, sculpture and minor arts of the United States from earliest Colonial times to the mid-20th Century. Emphasis on architecture and the minor arts of the late 19th and 20th Centuries. Architectural field trips and museum visits in New Hampshire and Massachusetts. Mr. Thomas. 3 cr. (Alternate years; offered in 1965-66.)

583. Primitive and Oriental Art

An inquiry into the origins of art in pre-history, an investigation of the art of selected primitive cultures, and a study of Oriental Art concentrating on the pictorial development of China and Japan. This course is primarily concerned with the evolution of pictorial and sculptural images essentially foreign to the classic western tradition. Mr. Hatch. 3 cr. (Alternate years; not offered in 1965-66.)

588. Modern Art

From Louis XVI to Picasso; traces the history of painting through the various revolutions, political and aesthetic, that resulted in the many schools of thought prevalent in 19th and 20th Century art, i.e., classicism, impressionism, cubism, etc. Illustrated lectures with assigned readings. Mr. Fasanelli. 3 cr.

682. Classical Art

A survey of the monuments in Greece and Rome covering the following periods: archaic, classical and Hellenestic in Greece, and the areas influenced by Greek culture; late Republican and Imperial Rome. Significant works from about the mid-8th Century B.C. to the 2nd and 3rd Centuries A.D. are analyzed chronologically. The aim of this course is to give the student a comprehensive picture of the classical achievement, primarily in architecture and sculpture, and to bring to the student's attention more modern debts to the past. Mr. Fasanelli. 3 cr. (Offered in 1965-66.)

684. Medieval Art

A chronological survey of the vast material of the Middle Ages, from the 1st and 2nd Centuries A.D. to the 14th Century. This course covers architecture, sculpture, mosaics, manuscripts, and the minor arts. The transitional character of this vast period will be stressed, as well as its dependence upon the antique past. Architecture and the more minor arts will be accented. Mr. Fasanelli. 3 cr. (Alternate years; not offered in 1965-66.)

685. The Art of the Renaissance

A historic survey of the achievements of Western civilization in sculpture, painting, and architecture from the Gothic cathedral to the 18th Century drawing room. Illustrated lectures with assigned readings. Mr. Fasanelli. 3 cr. (Alternate years; not offered in 1965-66.)

686. Northern Painting

This course is devoted to the study of the development of painting in Flanders, France, and Germany from the late 14th to the early 15th Century. Beginning with a study of French manuscripts, this course will deal largely with Flemish painting in the 15th Century. Following this survey extant French monumental painting will be discussed. Analysis of German painting in the 15th Century will then be discussed and the dependence of this body of material on Flemish developments, as well as Italian, will be dealt
The Arts

with throughout the course. Mr. Fasanelli. 3 cr. (Alternate years; offered in 1965-66.)

687. Baroque Art

This is an advanced course which is a survey of architecture, sculpture and painting, in the countries of western Europe in the 17th and 18th Centuries. The problem of the “Baroque” and the difficulty of defining an international style at a moment when national identities are strong. It is a companion to Arts (685), but is differently oriented. Mr. Fasanelli. 3 cr. (Alternate years; offered in 1965-66.)

(797). Seminar in Art History

This course is a seminar which every student electing to major in the history option must take at least once. The prerequisite for taking the course is the completion of some work in any one of the survey courses offered in the option in the history of art. The seminar’s aims are to direct further work in some area already studied. The students are introduced to advanced problems of a bibliographical, critical, and iconographical nature in a series of preliminary lectures. Every student is required to present the results of his research in a formal presentation of his paper at the end of the term. Mr. Fasanelli. 3 cr.

Courses in Art-Education

Art-Education 791. Problems of Teaching Art in Secondary Schools

The purpose and objectives of teaching art in the secondary schools; selection and organization of teaching materials; teaching techniques which may be advantageously employed in the secondary-school art program. Mr. Thomas. Prereq.: Educ. 758 with a grade of C or better. 2 lec.; 1 lab.; 3 cr.

Art-Education 792. Problems of Teaching Art in Elementary Schools

The purposes and objectives of teaching art in elementary schools; selection and organization of teaching material; teaching techniques which may be advantageously employed in the elementary schools. Mr. Thomas. Prereq.: Educ. 758 with grade of C or better. 2 lec.; 1 lab.; 3 cr.

Education-Art (Ed-Art) 794. Supervised Teaching in Art

Prereq.: Art-Ed. 791, 792. One semester of supervised teaching. 14 cr.

Biochemistry (26)

Edward J. Herbst, Professor and Chairman, Thomas G. Phillips, Professor Emeritus; Arthur E. Teeri, Professor; Stanley R. Shimer, Professor; Miyoshi Ikawa, Professor; Douglas G. Routley, Associate Professor; Samuel C. Smith, Assistant Professor

501. Biological Chemistry

An introduction to organic chemistry and a brief survey of biological chemistry. Mr. Shimer and Mr. Routley. Prereq.: Chem. 402 or 404. 3 lec.; 2 lab.; 5 cr.

504. Animal Nutrition

The chemistry of animal nutrition. Mr. Shimer. Prereq.: Biochem. 501 or equivalent. 2 lec.; 1 lab.; 3 cr.
695, 696. Investigations in Biochemistry
   Introduction to biochemical investigations. Staff. Subject matter and hours to be arranged. 1-3 cr.

699. Senior Thesis
   Participation in research in biochemistry. For seniors majoring in biochemistry who have completed Biochem. 751. Staff. 3 cr.

751. General Biochemistry
   The fundamental principles of biochemistry with emphasis on the chemical properties, principal metabolic pathways, and functions of carbohydrates, lipids, and nitrogenous compounds. Mr. Herbst and Mr. Ikawa. Prereq.: Satisfactory preparation in organic chemistry and quantitative analysis. 3 lec.; 2 lab.; 5 cr.

756. Physiological Chemistry and Nutrition
   An introductory biochemistry course with emphasis on human physiological chemistry and nutrition. The laboratory includes a study of procedures basic to chemical methods used in medical diagnostic work. Mr. Teeri. Prereq.: Satisfactory preparation in organic chemistry. 3 lec.; 2 lab.; 5 cr.

762. Plant Metabolism
   The function, occurrence, synthesis, and degradation of plant constituents. Major emphasis will be placed on respiration and photosynthesis and their relationships to the metabolism of lipids and nitrogen compounds. Mr. Routley. Prereq.: Biochem. 751 or 756 or equivalent. 2 lec.; 1 lab.; 3 cr.

Biology (41)

401-402. Man and the Living World
   A basic course in biology, designed to give the student fundamental facts about himself and an understanding of his relation to the living world, both plant and animal, of which he is a part. 2 lec.; 1 lab.; 3 cr. No credit toward a major.

404. General Biology
   This course is intended as a supplement for those students who wish more advanced courses in biology after completion of Biol. 401-402, by filling in technical details which Biol. 401-402 do not cover. Designed to be taken concurrently with Biol. 402. 1 lec.; 1 lab.; 2 cr. No credit toward a major. Not open to students electing Bot. 411 or Zool. 412.

Biology-Education (Biol.-Ed) 791. Problems in the Teaching of High-School Biology
   Objectives and methods of teaching. The selection and organization of materials; preparation of visual aids; setting up of aquaria and other projects. The use of the field trip as a tool in teaching high school biology. Mr. Schaefer. Prereq.: Two years of biological science and Ed. 758 with a grade of C or better. 2 lec.; 1 lab.; 3 cr.

Education-Biology (Ed.-Biol.) 794. Supervised Teaching of High-School Biology
   See description under Education.
Botany

Botany (27)

ALBION R. HODGDON, Professor and Chairman; M. C. RICHARDS, Professor; AVERY E. RICH, Professor; STUART DUNN, Professor; CHARLOTTE G. NAST, Professor; RICHARD SCHREIBER, Associate Professor; MARION E. MILLS, Assistant Professor Emerita

411. General Botany
   An introduction to plant science. The evolution of structure and function in the plant kingdom. Required as a prerequisite for Zool. 412. Mr. Schreiber. 3 lec.; 1 lab.; 4 cr.

503. The Plant World
   A survey of the plant kingdom from an evolutionary point of view. The structure and function of plant parts. Miss Nast. Prereq.: Biol. 401 or Bot. 411. 2 lec.; 2 lab.; 4 cr.

506. Systematic Botany
   The identification and classification of our native trees, shrubs and wild flowers. Mr. Hodgdon. Prereq.: Biol. 401 or Bot. 411. 1 lec.; 2 lab.; 3 cr.

742. Plant Ecology
   Plant life and its environment, including a consideration of the principal environment factors, such as light, temperature, soil, water, and biotic relations; study of associations, successions, and plant forms; a survey of plant distribution and underlying causes. Mr. Hodgdon. Prereq.: Bot. 411 or Bot. 503. 3 cr.

751. Plant Pathology
   The nature of disease in plants, the etiology, symptomatology, and classification of plant diseases. Mr. Rich. Prereq.: Bot. 411 or Bot. 503. 1 lec.; 2 lab.; 3 cr.

752. Principles of Plant Disease Control
   Exclusion, eradication, protection, and immunization, and the specific, practical methods used to control plant diseases. Mr. Rich. Prereq.: Bot. 751. 1 lec.; 2 lab.; 3 cr. (Alternate years; offered in 1965-66.)

753. Plant Anatomy
   The anatomy of vascular plants with special emphasis upon tissue development and structure. Miss Nast. Prereq.: Bot. 411 or Bot. 503. 1 lec.; 2 lab.; 3 cr.

754. Cytology
   The structure, physiological behavior, and development of cells. The cellular basis of heredity. Mr. Schreiber. Prereq.: a year each in the biological sciences and in chemistry. 3 cr.

755. Advanced Systematic Botany
   The principles and laws of plant classification and nomenclature: study of plant families, field and herbarium work. Mr. Hodgdon. Prereq.: Bot. 506. Hours to be arranged. 3 cr. (Not offered in 1965-66.)
756. **Plant Physiology**

Structure and properties of cells, tissues, and organs; absorption and movement of water; metabolism; growth and irritability. Mr. Dunn. Prereq.: Bot. 411 or Bot. 503, and one year of chemistry. 2 lec.; 2 lab.; 4 cr.

795, 796. **Investigations in Botany**

1. Systematic Botany — Mr. Hodgdon. 2. Plant Physiology — Mr. Dunn. 3. Plant Pathology — Mr. Rich. 4. Plant Anatomy, and Morphology — Miss Nast. 5. Plant Ecology — Mr. Hodgdon. 6. Aquatic Plants — Mr. Hodgdon. 7. Cytology — Mr. Schreiber. Elective only after consultation with the instructor in charge. Hours to be arranged. 2 to 6 cr.

797, 798. **Botany Seminar**

Library and reference work and the preparation of papers and abstracts on special phases of botany. Practice in the preparation of oral and written reports. Botany staff. Prereq.: Six hours of botany or permission of the Chairman of the Department. This course may be repeated for credit. 1 cr.

762. **Morphology of the Vascular Plants**

The life histories and evolution of the extinct and living Pteridophytes, Gymnosperms, and Angiosperms, including comparisons of general structure and sexual organs. Miss Nast. Prereq.: Bot. 411 or Bot. 503. 2 lec.; 2 lab.; 4 cr. (Alternate years; not offered in 1965-1966.)

764. **Microtechnique**

A methods course in embedding, sectioning, and staining plant tissues, and introduction to microscopy. Miss Nast. Prereq.: Bot. 411 or Bot. 503. 3 cr.

766. **Morphology of the Algae**

The study of form, life histories, and classification of the main divisions of the Algae. Identification and recognition of common species will be included. Prereq.: Bot. 411 or Bot. 503. 2 lec.; 2 lab.; 4 cr. (Alternate years; offered in 1965-66.)

768. **Mycology**

Studies of the parasitic and saprophytic fungi, their growth, reproduction, and identification. Mr. Richards. 1 lec.; 2 lab.; 3 cr.

770. **Molecular and Submolecular Biology**

An extensive study of several basic molecular and sub-molecular biological systems, and consideration of the instrumentation employed in the study of these systems. Mr. Nugent and Mr. Chapman. Prereq.: Bot. 754 and permission of instructors. 3 lec.; 3 cr.
301. Digital Computer Programming
The elements of the FORTRAN language; basic instruction in the use of the IBM 1620 computer. 0 cr. (Required of all Whittemore School students by the end of their sophomore year. This course is the same as Econ. 301.)

401-402. Principles of Accounting
A survey of accounting with emphasis on accounting as a tool of management. Designed as an introductory course for accounting and business administration majors. Staff. 3 cr.

405, (405). Managerial Accounting
Concepts and techniques basic to modern accounting method. Description and analysis of selected problems in the measurement of the performance and status of a business enterprise. Needs for data-information, its uses, and its limitations from the manager’s point of view. Not open to business and accounting majors. Staff. 3 cr.

503-504. Intermediate Accounting
A study of accounting theory and principles through cases and problems. The form, content, and uses of financial statements and the valuation of and accounting for inventories, receivables, investments, and fixed assets. Also included are statement analysis and a discussion of capital stock, surplus, and reserves. Prereq.: B.A. 402. 3 cr.

508. Cost Accounting
Analysis of the purposes and limitations of costs for use in the formation of corporate policy. Observation through case materials of the costing practices of a wide variety of companies. Mr. Beckett. Prereq.: B.A. 402. 3 cr.

525 (525). Marketing
A study of the marketing behavior of the firm and its consequences for the economy as a whole. Topics include price and non-price competition, wholesaling, retailing, marketing consumer and industrial goods, consumer behavior, and the influence of technology on market structure. Mr. Marsch- ner. Prereq.: Econ. 402. 3 cr.

621-622. Commercial Law
The law of contracts, agency, sales, negotiable instruments, partnerships, and corporations. Open to juniors and seniors. Mr. Michael. 3 cr.
(627). **TRANSPORTATION**

Economics of transportation. Competitive characteristics of the several modes of transport. National transportation policy. Limited consideration of transportation as a function of business. Mr. Ladd. Prereq.: Econ. 402. 3 cr.

633. **MANAGERIAL ORGANIZATION**

The firm in industry. Structure, organization, and operation of business enterprise. Management tools and techniques. Mr. Beckett. Prereq.: Econ. 402 and junior standing. 3 cr.

643, (643). **PRODUCTION MANAGEMENT**

Principles of production organization, product design, materials acquisition, layout, production engineering, mechanization, production scheduling, and control. Prereq.: Econ. 402. 3 cr.

647. **ADVERTISING**

Advertising as an element of marketing strategy for the firm. Management considerations involved in media selection, campaign planning, effectiveness testing, budget allocation, and consumer behavior studies. Consideration is given to the social and economic characteristics of advertising policy. Mr. Marschner. Prereq.: B.A. 525. 3 cr.

658. **INVESTMENTS**

The problems of investment; investment characteristics of stocks and bonds; public utility, railroad, industrial, and government securities; protection of the investor; investment banking; and related problems. Mr. Degler. Prereq.: Econ. 402. 3 cr.

668. **PERSONNEL ADMINISTRATION**

Methods, techniques, and psychology employed in personnel administration from the standpoint of the manager. The case study method is used. Mr. Gadon. Prereq.: Econ. 402. 3 cr.

671. **CORPORATIONS**

A study of the role of the modern corporation in the economy. Emphasis upon structure of the corporation, the corporate system, combination, and concentration. Mr. Degler. Prereq.: Econ. 402. 3 cr.

672. **CORPORATION FINANCE**

A study of sources and uses of corporate funds; securities and securities market; methods of financing; and financial policy. Mr. Wrightsman. Prereq.: Econ. 402. 3 cr.

675, (675). **MANAGERIAL ECONOMICS**

Concepts and procedures for the analysis and use of cost and revenue data in making business decisions. Make or buy, product policy, pricing and capital expenditure analysis are given special attention. Mr. Ladd. Prereq.: Econ. 402. 3 cr.

695-696. **INDEPENDENT STUDY**

Individual study projects of special interest and benefit to the student. Permission to pursue an independent study project is required from the student's advisor, proposed project instructor, and the Executive Committee. Permission will be granted only to students who have demonstrated
superior scholastic achievement. 3-12 credits per semester. (This course is the same as Econ. 695, 696.)

725. BUSINESS HISTORY
A survey of the development of business enterprise and its institutions in Western Europe and the United States from the late Middle Ages to the era of the giant diversified corporation. Emphasis is placed on the role of the entrepreneur, the impact of public policy on business and the case study of individual firms. Mr. Greenleaf. 3 cr. (This course is the same as Econ. 725 and Hist. 725.)

750. MARKETING MANAGEMENT
A study of the interrelation of marketing, production, and finance. Topics include planning and developing the product, testing, brand management, packaging, sales organization, forecasting, and control. Policy formulation and decision making are emphasized. Mr. Marschner. Prereq.: B.A. 525. 3 cr.

752. MARKETING RESEARCH
The study of marketing research as a basis of formulating marketing policies and strategy. Topics include research design, methods of collecting data, planning the investigation, sampling methods, motivation research, advertising research, and operations research. Mr. Marschner. Prereq.: B.A. 525. 3 cr.

755. ADVANCED ACCOUNTING I
Similar in format to B.A. 503-504, with emphasis on the partnership form of business organization, consignment and installment sales, consolidations and mergers, liquidations, and other topics of an advanced nature. Mr. Moore. Prereq.: B.A. 504. 3 cr.

756. FEDERAL TAXATION
Current federal income, estate, and gift taxes and their impact on corporations, partnerships, and individuals. Mr. Moore. Prereq.: B.A. 504. 3 cr.

757. AUDITING AND BUSINESS SYSTEMS
The work of the independent public accountant and the company-employed auditor with reference to the establishment and use of internal control and data processing systems for managerial and other purposes. Case materials in the conduct of an audit. Introduction to the practice of management consulting and to systems and procedures work. Mr. Moore. Prereq.: B.A. 504 or permission of instructor. 3 cr.

759. CORPORATE ACCOUNTING AND THE PUBLIC
Contemporary corporate accounting as a principal means of communication to interested outsiders about the affairs of the corporation. Consideration of theory and practice through study of corporate annual reports, pronouncements of professional bodies, current literature, and case materials. Mr. Ladd. Prereq.: B.A. 402 or 405. 3 cr.

760. ADVANCED ACCOUNTING II
Chemical Engineering

774. BUSINESS POLICY

Administrative practice of business management; use of business tools; processes of integrating operations, administering business systems, selecting goals and objectives, and formulating policy. Mr. Beckett. Prereq.: senior standing and permission of instructor. 3 cr.

Chemical Engineering (80)

OSWALD T. ZIMMERMAN, Professor and Chairman; IRVIN LAVINE, Professor; STEPHEN S. T. FAN, Assistant Professor; DAVID H. CHITTENDEN, Assistant Professor; HENRY M. GEHRHARDT, Assistant Professor

511. CHEMICAL ENGINEERING PRINCIPLES I

The presentation and interpretation of engineering data; an introduction to systems of units, dimensional analysis, and heat and material balance. Mr. Gehrhardt. 2 cr.

512. CHEMICAL ENGINEERING PRINCIPLES II

A study of chemical equilibrium and heats of reaction needed to describe systems undergoing chemical change; an intensive treatment of heat and material balances on complex systems. Mr. Lavine. 2 cr.

513. CHEMICAL ENGINEERING PRINCIPLES III

Transport phenomenon and stage operations. The equations of change as a basis for the study of molecular and turbulent transport of momentum, energy and mass, with emphasis upon the relation between the transport mechanism and the mathematical expression. Design principles and procedures for stagewise operations in various co-current and counter-current arrangements, based upon the ideal stage concept. Problems in both steady state and non-steady state operations. Mr. Gehrhardt. 3 lec.; 1 lab.; 4 cr.

514. CHEMICAL ENGINEERING PRINCIPLES IV

Analysis of unit operations. Study of chemical engineering systems, with emphasis on the unit operations involved. Extension of previous studies of unit operations, and treatment of operations not previously considered. Mr. Zimmerman. 3 lec.; 1 lab.; 4 cr.

515. CHEMICAL ENGINEERING PRINCIPLES V

Correlated with 613-614 this course presents a unified theoretical treatment of momentum, heat, and mass transfer in steady state. Mr. Chittenden. 3 cr.

517. CHEMICAL ENGINEERING PRINCIPLES VI

Mathematical techniques in chemical engineering applications; problems set-up emphasized; analytical, numerical and statistical methods; digital and analog computations of complex chemical engineering problems. Mr. Fan. 3 lec.; 1 lab.; 4 cr.

622. CHEMICAL ENGINEERING THERMODYNAMICS

The thermal properties of matter; the first law; the second law; useful thermodynamic functions; behavior of ideal and real gases and liquids; volumetric and phase behavior; cycles; steady flow processes; compression of gases; refrigeration and liquefaction of gases. Mr. Fan. 3 lec.; 1 rec.; 4 cr.

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631. **Chemical Engineering Kinetics**

Chemical kinetics, catalysis, and introduction to reactor design. Study of types of kinetic behavior in chemical processes; prediction of reaction rates in batch and flow reactors with and without catalysis; and application to reactor design. Mr. Fan. 3 lec.; 1 lab.; 4 cr.

641. **Physical Metallurgy**

An introductory study of the nature of metals, emphasizing the quantum mechanical description of the solid state and including atomic structure, bonding, historical development of metal theories, elementary zone or band theory, and X-ray diffraction. The microscopic metal system is also considered, and thermodynamics of metallurgical processes, defects and dislocations, phase relations of pure metals and alloys, microstructure, and physical and thermal treatment of metals are discussed. Study of some non-metals is also included. Mr. Zimmerman. 3 lec.; 1 lab.; 4 cr.

662. **Chemical Engineering Economics and Plant Design**

The principles of cost engineering, including estimation of plant investment, working capital, operating costs, labor requirements, payout time, and profitability, value of money, capitalized costs, simple and compound interest, depreciation, taxes and insurance, labor requirements, overhead, financing of chemical enterprises, design of equipment and plants for minimum cost, plant location, transportation, sales cost, equipment cost, and cost indexes. Each class selects one or more problems involving the complete design of a chemical plant. For each problem, the most desirable process must be determined, the site selected, the equipment and plant designed, calculations made for all costs, profitability and payout time, and a complete report prepared, including the drawings of equipment and plant layout. Mr. Lavine. 1 lec.; 3 lab.; 4 cr.

695. **Chemical Engineering Project**

Each student selects a research problem which he carries out independently under faculty supervision. Intensive study in both the library and the laboratory and a satisfactory report upon completion of the work are required. Staff. 3 lab.; 3 cr.

696. **Independent Study**

Individual study projects in various areas of chemical engineering as determined to be of particular interest and value to the student. Permission of the student's advisor and Department Chairman are required; and permission will be granted only to those students who have proved their ability by superior scholastic achievement. 2 to 4 cr.

752. **Process Dynamics**

A basic treatment of process dynamics including a study of first and second order linear processes and their response to step and sinusoidal driving functions. Graphical analysis of the entire control system is included with special emphasis on the optimum design of a stable system. Mr. Gehrhardt. 3 cr.

781. **High Polymers**

Principles and practice of high polymers manufacture, including industrial polymerization methods and equipment design. Laboratory work includes typical polymerization reactions and the physical and chemical testing of various types of plastics and synthetic fibers. Mr. Lavine. 2 lec.; 1 lab.; 3 cr.
Chemistry (81)

Alexander R. Amell, Professor and Chairman; Harold A. Iddles, Professor; Albert F. Daggett, Professor; Helmut M. Haendler, Professor; Robert E. Lyle, Jr., Professor; Charles M. Wheeler, Jr., Associate Professor; Paul R. Jones, Associate Professor; Frank L. Pilar, Associate Professor; Albert K. Sawyer, Associate Professor; Gloria G. Lyle, Associate Professor; Kenneth K. Andersen, Assistant Professor; David W. Ellis, Assistant Professor; Charles W. Owens, Assistant Professor; James H. Weber, Assistant Professor; J. John Uebel, Assistant Professor

401-402. General Chemistry

Elementary chemistry with lecture demonstrations and laboratory practice. Topics of interest to the professional student and of general interest are presented. For Agriculture and Home Economics students and as an elective. 3 lec.; 1 lab.; 4 cr.

403-404. General Chemistry

The fundamental laws and conceptions of chemistry, including a study of the nonmetals and metals and their compounds. The theoretical principles are illustrated by lecture demonstrations, and the applications of chemistry in the professions are explained. For students who plan to take further courses in the Department of Chemistry. 2 lec.; 1 rec.; 1 lab.; 4 cr.

405-406. Inorganic Chemistry

General inorganic chemistry, including qualitative analysis. The preparation of secondary school chemistry will furnish a basis for a thorough course for Chemistry majors and others who may elect the course. Mr. Sawyer and assistants. 3 lec.; 2 lab.; 5 cr.

517. Quantitative Analysis

An elementary course in quantitative analysis designed for those students desiring a brief terminal course in analytical chemistry. Mr. Ellis and assistants. Prereq.: Chem. 404. 2 lec.; 2 lab.; 4 cr.

521. Semimicro Qualitative Analysis

The application of basic solution theory to ionic equilibrium and to the reactions of qualitative analysis. Problem work is required. The laboratory work provides experience in the application of theory to the analysis of simple and complex inorganic substances. Prereq.: Chem. 404. 2 lec.; 2 lab.; 4 cr.

545. Organic Chemistry

An introductory but comprehensive study of the chemistry of carbon compounds with emphasis on the particular phases of the subject needed by students preparing to be technicians, nurses, majors in biological sciences, and others, where a brief course is desired. Prereq.: Chem. 404. (Elective for Medical Technology, Nursing, and Pre-Dental students and majors in Botany.) 3 lec.; 2 lab.; 5 cr.

547-548. Organic Chemistry

The principal classes of organic compounds, aliphatic and aromatic, with emphasis on class reactions and structural theory. Laboratory exercises in the preparation and purification of selected organic compounds; also the use of group reactions for the identification of organic substances in a
systematic scheme of qualitative organic analysis. Mr. Jones, Mr. Andersen, and assistants. 3 lec.; 2 lab.; 5 cr.

582. Introductory Physical Chemistry

Kinetic theory of gases; quantitative laws for behavior of matter in the gas, liquid, and solid phases; valence and the chemical bond; radioactivity; atomic structure and valence; laws of solutions; homogenous and heterogenous equilibrium; colloids; electrochemistry. Designed for Pre-medical and Biology students. Prereq.: Chem. 517, 521, Phys. 402. Elementary Mathematics. 3 lec.; 1 lab.; 4 cr.

651-652. Organic Chemistry

The principal classes of organic compounds, aliphatic and aromatic, with emphasis on class reactions and structural theory. Laboratory exercises in the preparation and purification of selected organic compounds. Mr. Andersen and assistants. Prereq.: One year of General Chemistry. 3 lec.; 2 lab.; 5 cr.

661. Analytical Chemistry

A thorough treatment of the theory and techniques of gravimetric and volumetric analysis followed by special methods of analysis, such as ion exchange and EDTA titrations. Prereq.: Chem. 405-406 or equivalent. 3 lec.; 2 lab.; 5 cr.

663. Introductory Radiochemical Techniques

Radiochemical techniques and laboratory practice in the use of apparatus in many fields of science which utilize radio-chemical operations. Prereq.: General Inorganic Chemistry and General Physics. 3 lec.; 2 lab.; 5 cr.

683-684. Elementary Physical Chemistry

The properties of gases, liquids, and solids; thermochemistry and thermodynamics; solutions, chemical equilibria, reaction rates, conductance, and electromotive force. Mr. Wheeler. Prereq.: Math. 523 or 426 and Physics. Undergraduates must register for Chem. 685-686 concurrently. 3 lec.; 3 cr.

685-686. Physical Chemistry Laboratory

Experimental work illustrating the principles of chemistry. Emphasis is upon the measurement of thermodynamic properties, chemical kinetics and methods of determining the structure of matter. Prereq.: Math. 523 or 426 and Physics. Must be taken concurrently with Chem. 683-684. 2 lab.; 2 cr.

693. Chemical Literature

The use of the Chemical Library as a research tool. Prereq.: Chem. 548 or 652 and 684. 1 cr.

696. Independent Study

With the consent of the adviser and the departmental chairman, an exceptional student may enroll in a course of independent study. This may consist of individual reading, writing, or laboratory work, which will be carried out under the tutelage of a faculty member. The course may be used to replace specific required courses in chemistry, with approval of the adviser and department chairman. Credits to be arranged.

697-698. Seminar

Student reports on topics of interest. Prereq.: Chem. 548 or 652 and 684. 1 cr.
699. **Thesis**

The related background and experimental observation of the year's investigation in some selected subject is required. Members of the staff. For seniors in Chemistry who have completed Chem. 548, 762, 684 and have a good point average. 5 lab.; 6 cr.

755. **Advanced Organic Chemistry**

The preparation of organic compounds is studied with consideration being given to structural and stereochemical control of the reactions from a knowledge of the mechanism of the reaction. Emphasis is on the solution of assigned problems. Prereq.: One year of Organic Chemistry and Physical Chemistry or permission of the instructor. 3 cr.

756. **Characterization of Organic Compounds**

The spectroscopic and chemical properties of organic compounds provide a basis for the systematic characterization of organic structures. Methods for the separation of mixtures of organic compounds are considered. Mr. Lyle and assistants. Prereq.: One year of Organic Chemistry. 1 lec. and 2 labs.; 3 cr.

762. **Instrumental Analysis**

A treatment of the theory, instrumentation and application of methods such as emission spectrography, flame spectrometry, spectrophotometry, gas chromatography, coulometry, potentiometry, conductimetry and polarography to chemical analysis. Prereq.: Chem. 661; Chem. 684, a prereq. or concurrent registration, or, permission of instructor. 3 lec.; 2 lab.; 5 cr.

775. **Inorganic Chemistry**

The relationship between chemical reactions and modern concepts of inorganic chemistry on a moderate level. The applicability and limitations of the newer ideas. Mr. Haendler or Mr. Weber. Prereq.: Chem. 683-684 or permission. 3 lec.; 3 cr.

776. **Advanced Physical Chemistry**

A review of selected topics in elementary physical chemistry. Prereq.: One year of Physical Chemistry. 3 lec.; 3 cr.

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**Civil Engineering (82)**

J. Harold Zoller, **Professor and Chairman**; Russell R. Skelton, Professor; Charles O. Dawson, Professor; Harold E. Langley, Jr., Associate Professor; Tung Ming Wang, Associate Professor; John L. Sanborn, Assistant Professor

501, (501). **Elementary Surveying**

A course for non-civil engineering students in the theory and use of tape, level, transit, plane table, and stadia in making plane and topographic surveys. Computations and drafting exercises necessary for making surveys and maps for all purposes. Mr. Dawson. 2 lec.; 1 lab.; 3 cr.

505. **Surveying I**

Engineering measurements, using tape, transit, level, and stadia, and the computation, adjustment, and plotting of such measurements. Prereq.: Math. 425. 1 lec.; 2 lab.; 3 cr.
Civil Engineering

506. Surveying II
Applications of engineering measurement theory; orientation by solar and Polaris observations; theory and use of the plane table; introduction to photogrammetry, simple curves, and earthwork computations. Prereq.: C.E. 505. 1 lec.; 2 lab.; 3 cr.

517. Engineering Materials
Methods of manufacture, physical properties and the application of the various materials used in civil engineering works, including timber, steel, stone, brick, cement, concrete, and bituminous materials. Laboratory tests and reports on the testing of cements, aggregates, concrete specimens, cast iron, structural steel, wood, and other engineering materials. Prereq.: M.E. 523 concurrently or as a prerequisite. 3 lec.; 1 lab.; 4 cr.

620. Transportation Engineering
The development, organization, administration, and inter-relation of transportation systems and facilities, including railroads, highways, airports, waterways, and pipe lines. Major emphasis will be given to the economics of location, geometric and structural design, construction materials, methods and costs, as applied to modern transportation engineering. Mr. Skelton. Prereq.: C.E. 506. 3 cr.

642. Fluid Mechanics
Properties of fluids; fluid statics; flow of incompressible and compressible ideal fluids; flow of real fluids; and measurement of fluid properties. Mr. Dawson and Mr. Zoller. Prereq.: M.E. 523. 3 lec.; 1 lab.; 4 cr.

643 Water Supply and Treatment
The sources, quantity, quality, and sanitary aspects of public water supplies. Methods of purification and distribution systems. Mr. Langley. Prereq.: C.E. 642. 3 lec.; 1 lab.; 4 cr.

644. Sewerage and Sewage Treatment
The theory and problems of sewerage, the principles governing the disposal of sewage, and the various methods of sewage treatment. Mr. Langley. Prereq.: C.E. 643. 3 lec.; 1 lab.; 4 cr.

665. Soil Mechanics
Soil classification, physical properties including permeability, compressibility, bearing capacity, settlement and shear resistance are related to the principles underlying the behavior of soils subjected to various loading conditions. Underground exploration and typical foundation problems are included. Mr. Skelton. Prereq.: C.E. 620 or permission of the instructor. 3 lec.; 1 lab.; 4 cr.

681. Theory of Structures I
The stress analysis of structures under fixed and moving loads. Roof trusses, highway and railroad bridges; use of influence lines, lateral bracing, and portals. Mr. Wang and Mr. Zoller. Prereq.: M.E. 523 as a prerequisite or concurrently. 3 lec.; 1 design period; 4 cr.

685. Theory of Structures II
Beam and truss deflections. The analysis of continuous beams and rigid frames by classical and modern methods; indeterminate trusses. Mr. Wang. Prereq.: C.E. 681. 2 lec.; 1 design period; 4 cr.
692. **Steel Design**

The design of members and connections; tension and compression members, beams, plate girders; riveted, bolted, and welded joints. Mr. Wang. Prereq.: C.E. 517 and 681. 2 lec.; 1 design period; 3 cr.

693. **Reinforced Concrete Design**

The principles of reinforced concrete, including rectangular beams, slabs, T-beams, columns, footings, retaining walls. Mr. Wang. Prereq.: C.E. 685 as a prerequisite or concurrently. 2 lec.; 1 design period; 3 cr.

696. **Independent Study**

A limited number of qualified senior students will be permitted to pursue independent studies under faculty guidance and may write terminal theses reporting the results of their investigations. Prereq.: Permission of the instructor and senior standing. 2 to 4 cr.

711. **Community Planning**

An introduction to community planning. Social, economic, and physical factors affecting community planning; content and extent of desirable community planning programs, including purpose and scope, the preliminary survey, elements of community land planning, the master plan, transportation systems, street patterns and traffic, motor vehicle parking, airport sites, public building sites, parks and recreational facilities, zoning, control of land subdivision, neighborhood centers, housing, legal, financial and economic problems, and redevelopment of blighted areas. Mr. Dawson. Prereq.: Permission of the instructor. 3 cr.

714. **Contracts, Specifications, and Professional Relations**

The essential elements required in engineering contracts; the purposes and content of specifications; professional conduct, relations, and ethics; and estimating by means of quantity surveys and unit cost methods. Mr. Dawson. Prereq.: Permission of the instructor. 3 cr.

721. **Highway Engineering I**

Highway organization, administration, finance, planning, programming, traffic surveys, traffic methods; highway laws, contracts, specifications; highway capacity, geometric design, access control, safety, accident studies; pavement selection, performance, and maintenance. Mr. Skelton. Prereq.: C.E. 620. 3 cr.

722. **Highway Engineering II**

Design of flexible and rigid pavements and bases for highways, airports, and city streets; pavement selection, construction methods, materials, specifications, and engineering cost estimates. Mr. Skelton. Prereq.: C.E. 620. 3 cr.

741. **Hydraulic Engineering**

Application of fluid mechanics to hydraulics problems, such as reservoirs, dams, control works, open-channel flow, hydroelectric power irrigation, drainage, and multipurpose projects. Prereq.: C.E. 642. 2 lec.; 1 lab.; 3 cr.

742. **Hydrology**

The occurrence and physical effects of water on the earth, including meteorology, groundwater, runoff, and streamflow routing. Prereq.: C.E. 642 concurrently or as a prerequisite. 2 lec.; 1 lab.; 3 cr.
Civil Engineering

782. Timber Design
Properties and characteristics of structural woods, mechanics of wood, connection methods, design of timber members and connections in beams, columns, and trusses, and glued laminates of wood. Mr. Wang. Prereq.: C.E. 692 and permission of the instructor. 1 lec.; 1 design period. 2 cr.

784. Structural Components
Selected problems in the analysis and design of structural components; such as beams on elastic foundations, curved beams, beam columns, buckling, torsion. Mr. Wang. Prereq.: C.E. 685 and permission of the instructor. 3 cr.

790. Structural Engineering
The planning and design of determinate and indeterminate structures. Introduction to modern design theories; pre-stressed concrete, plastic theory of steel and reinforced concrete. Mr. Wang. Prereq.: C.E. 685 and C.E. 693. 2 lec.; 1 design period; 3 cr.

Dairy Science
(See Animal Sciences)

Drama
(See Speech and Drama)

Economics (72)

Carroll M. Degler, Professor; John A. Hogan, Professor; Ruth J. Woodruff, Professor; Robert F. Barlow, Professor; Sam Rosen, Professor; Kenneth J. Rothwell, Associate Professor; John A. Bergeron, Assistant Professor; Manley R. Irwin, Assistant Professor; Dwayne E. Wrightsman, Assistant Professor

301. Digital Computer Programming
The elements of the FORTRAN language; basic instruction in the use of the IBM 1620 computer. Staff. 0 cr. (Required of all Whittemore School students by the end of their sophomore year. This course is the same as B.A. 301.)

401-402. Principles of Economics
A study of the principles underlying the organization and operation of the economy. Staff. 3 cr.

403, (403). Economic History of the United States
Historical survey of the development of American business and industry with consideration of credit and trade institutions and of the role of government in the economy. Miss Woodruff. 3 cr.

431-432. Business and Economic Statistics
Statistical techniques as an aid in decision-making. Includes methods of collection, analysis and presentation of statistical data, introduction to
probability theory, statistical inference, regression analysis, index numbers, quality control, and time series analysis. Mr. Singhvi. 3 cr.

(652.) Public Finance

Problems and policies of expenditure, revenue, and debt of federal, state, and local governments. Economic analysis and evaluation of individual types of taxes as well as entire governmental fiscal programs. Critical appraisal of recommended changes in tax systems. Tax problems in the State of New Hampshire. Prereq.: Econ. 402. 3 cr.

653. Money and Banking

The monetary and banking system with reference to monetary standards, value of money, commercial and noncommercial banking, and the structure and policy of the Federal Reserve System. Mr. Wrightsman. Prereq.: Econ. 402. 3 cr.

657. Government Regulation of Business

A study of the role of government in economic affairs, with emphasis upon the regulation of competition and monopoly. Mr. Irwin. Prereq.: Econ. 402. 3 cr.

663. International Trade and Finance

Theory of international trade, foreign exchange, balance of payments, tariffs, and protection. The economic aspects of international relations, with particular reference to recent policies. Miss Woodruff. Prereq.: Econ. 402. 3 cr.

(664). Comparative Study of Economic Systems

An examination of socialism, communism, capitalism, and modifications of these economic systems, particularly as exemplified by the Soviet Union, China, Yugoslavia, India, the United Kingdom, and the United States. Mr. Barlow. Prereq.: Econ. 402. 3 cr.

666. Economic Development

An analysis of the problems and available solutions confronting the underdeveloped areas of the world. Mr. Rothwell. Prereq.: Econ. 402. 3 cr.

671. Trade Unions and Industrial Management

Trade union history, philosophy, and policies. Historical development of management attitudes and the attitudes of law and legislation toward unions. Collective bargaining: its nature, purpose, and public policy considerations. Mr. Gadon. Prereq.: Econ. 402. 3 cr. Not open to students who have taken Econ. 51.

672. Labor Economics

Application of the tools of economic analysis to the market for labor. Wage determination and wage policy under union and non-union conditions. The determination of factor shares of the national income with particular emphasis on labor's share. Mr. Hogan. Prereq.: Econ. 402. 3 cr. Not open to students who have taken Econ. 51.

673. Intermediate Economic Analysis

Analysis of supply and demand. The determination of prices, production, and the distribution of income in non-competitive situations as well as in the purely competitive model. General equilibrium. Mr. Bergeron. Prereq.: Econ. 402. 3 cr.
675. **National Income Analysis**

Macro-economic measurement, theory, and public policy determination. Mr. Rosen. Prereq.: Econ. 402. 3 cr.

679-680. **History of Economic Thought**

The evolution of economic thought, including the work of contemporary economists. Examination and critical appraisal of the work of major economists and major schools of economists particularly with reference to the applicability of their theories to current economic problems. Prereq.: Econ. 402. Econ. 679 not open to students who have had Econ. 78.

695-696. **Independent Study**

Individual study projects of special interest and benefit to the student. Permission to pursue an independent study project is required from the student's advisor, proposed project instructor, and the Executive Committee. Permission will be granted only to students who have demonstrated superior or scholastic achievement. 3-12 credits per semester. (This course is the same as B.A. 695-696.)

The courses listed below are primarily for graduate students, although seniors who have the prerequisites will be admitted.

704. **Economic History**

An analysis of the development of the American and European economies. Miss Woodruff. Prereq.: 12 semester hours of courses in economics and permission of the instructor. 3 cr.

725. **Business History**

A survey of the development of business enterprise and its institutions in Western Europe and the United States from the late Middle Ages to the era of the giant diversified corporation. Emphasis is placed on the role of the entrepreneur, the impact of public policy on business and the case study of individual firms. Mr. Greenleaf. 3 cr. (This course is the same as B.A. 725 and Hist. 725.)

727. **Public Policy in Social and Labor Legislation**

This course will cover American social and labor legislation of the recent decades and provide an opportunity to study the way in which American economic and human values have been implemented and modified by law. Attention will be given to legislation and private industry programs in social security, reemployment, unemployment insurance, health services, training and retraining and fair employment practice. The course will include lectures, discussion, assigned reading and individual student projects. Prereq.: One year's work in economics or sociology. Mr. McConnell. 3 cr.

754. **Advanced Money and Banking**

Emphasis on central banking, monetary policy and monetary theory. Study of current problems and developments in banking. Mr. Degler. Prereq.: Econ. 653 and permission of the instructor. 3 cr.
758. **Government Regulation of Business**

Analysis of government policy with reference to such problems as conspiracy, monopoly, mergers, unfair practices, and discrimination. This analysis includes a legal and economic appraisal of government policy alternatives. Mr. Irwin. Prereq.: Econ. 657 and permission of the instructor. 3 cr.

(761). **Comparative Economic Systems**

Analysis of the functioning of various types of national economic systems. Emphasis on economic planning and development. Mr. Barlow. Prereq.: Econ. 664 and permission of the instructor. 3 cr.

763. **International Economics**

A survey of contemporary issues in international economic theory and policy. Analysis of trade theory, balance of payments problems, international liquidity, and the adjustment processes. Mr. Rothwell. Prereq.: Econ. 663 and permission of the instructor. 3 cr.

773. **Macroeconomic Theory**

Advanced analysis of such aggregates as national income, total output, employment and the general price level. Examination of the major aggregate models. Mr. Rosen. Prereq.: Econ. 675 and permission of the instructor. 3 cr.

774. **Mathematical Economics**

Application of mathematical techniques to selected problems in economic analysis. Mr. Bergeron. Prereq.: permission of the instructor. 3 cr.

776. **Economic Fluctuations**

The study of recurrent movements of prosperity and depression, with emphasis upon causes and public policy implications. Mr. Rosen. Prereq.: Econ. 675 or permission of the instructor.

778. **Advanced Economic Analysis**

An examination of advanced topics in microeconomics with emphasis on recent developments in such areas as general equilibrium analysis, welfare economics, demand theory, and capital theory. Mr. Bergeron. Prereq.: Econ. 673 and permission of the instructor. 3 cr.

797. **Seminar in Economic Development**

Survey of theories of economic development; detailed case studies in problems of economic development. Mr. Rothwell. Prereq.: Econ. 666 and permission of the instructor. 3 cr.
Education (48)

Roland B. Kimball, Professor and Chairman; Thomas O. Marshall, Professor (on leave Semester I, 1965-66); Wayne S. Koch, Professor; Everett B. Sackett, Professor; Carleton P. Menge, Associate Professor; David D. DRAVES, Associate Professor; Walter N. Durost, Associate Professor; Joseph J. Petroski, Associate Professor; Roselmina Indrisano, Assistant Professor; Deborah E. Stone, Assistant Professor; John D. Bardwell, Lecturer

William H. Annis, Assistant Professor (Agricultural-Education); George R. Thomas, Professor (Art-Education); Paul E. Schaefer, Associate Professor (Biology-Education); Lewis C. Goffe, Associate Professor (English-Education); William R. Jones, Assistant Professor (History-Education); Marjory A. Wybourn, Professor (Home Economics-Education); Charles H. Leighton, Assistant Professor (Language-Education); Richard H. Baloménos, Assistant Professor (Mathematics-Education); John B. Whitlock, Associate Professor (Music-Education); James W. Long, Professor (Physical Education); Marion C. Beckwith, Professor (Physical Education); Doris E. Tyrrell, Associate Professor (Secretarial Studies-Education)

Consultants in Teacher-Education

Thomas P. Ahearn, R. Philip Hugny, Edmund M. Keefe, Elizabeth McClain, Benjamin Mooney, Paul L. O'Neil, C. Paul Quimby, Edith Whittum

Staff at Crotched Mountain School for the Deaf

Frank J. Calidonna, Adjunct Lecturer; Helen G. Crathern, Adjunct Lecturer; Anne Hennessy, Adjunct Instructor; B. Cairbre McCann, Adjunct Lecturer; Robert E. Kelly, Adjunct Assistant Professor; Kathleen E. Philion, Adjunct Lecturer; Isabelle Vezina, Adjunct Lecturer; Barbara Wilson, Adjunct Lecturer

Cooperating Teachers

Courses in Education

481, (481). An Educational Psychology of Development
This course considers the philosophical and psychological principles underlying the process of education. Through a critical examination of human behavior, the student gains self-knowledge and an understanding of principles that affect all men. An analysis of popular novels, autobiographical reports, and technical studies constitutes the basis for group thinking and discussion. Not open to freshmen. 3 cr.

757, (757). Psychology of Human Learning
Psychology of learning as it operates within the classroom. Prereq* Mr. Koch. 3 cr.

(758), 758. Principles of Teaching
Application of the theories of learning studied in Education 757, with emphasis upon the following: organization of content, specific planning, and a study of procedures essential to the evaluation of the learning processes. Prereq.* Mr. Marshall. Two 2-hour lec.-labs.; 3 cr.

759, (759). Principles of Education
American schools have developed, and are still developing, in unique forms quite unlike their European counterparts. Among Americans, however, there are basic disagreements concerning the direction our schools should take. This course deals with these conflicts of philosophy, the problems of American education and research pertinent to these problems. Prereq.* Mr. Marshall and Mr. Kimball. 3 cr.

(763). Instructional Media
To help improve ability to communicate ideas through materials and equipment commonly available in a school audio-visual center. Educational films, bulletin board design, the role of language labs, educational television, programmed learning, and media research. A laboratory period of one hour each week is required in addition to the regular class period. Mr. Bardwell. Prereq.: Educ. 757 or permission of instructor. 3 cr.

785. Utilization of Testing in Public Education
Strategies for discovering and employing predictive validities of standardized tests in public school work. 3 cr.

741-742. Elementary School Teacher Preparation
A block program including observation; psychology of learning; principles of teaching reading, language arts, social studies, mathematics, science,
Education

and other elementary school subjects; student teaching; and a synthesizing seminar. Prereq.:* Miss Indrisano and Miss Stone. 16 cr. per sem.

Courses in Problems in the Teaching of School Subjects

The following courses are devoted to a study of problems, objectives, selection and organization of subject matter, teaching and testing techniques, and classroom management in the teaching of the respective subjects.

For details concerning prerequisites and nature of these courses, see descriptions given under respective subject matter departments.

Agricultural Education (Ag. Ed) 650. Principles of Agricultural Education
Mr. Annis. 3 cr.

Agricultural Education (Ag. Ed) 651, 652. Methods of Teaching Agricultural Mechanics
Mr. Gilman. 1 lab.; 1 cr.

Agricultural Education (Ag. Ed.) (792). Planning for Teaching
Mr. Annis. 4 cr.

Art-Education (Art-Ed) 792. Problems of Teaching Art in Elementary Schools
Mr. Thomas. 3 cr.

Art-Education (Art-Ed) 791. Problems of Teaching Art in Secondary Schools
Mr. Thomas. 3 cr.

Biology-Education (Biol-Ed) 791. Problems in the Teaching of High-School Biology
Mr. Schaefer. 3 cr.

English-Education (Engl-Ed) 791. Problems in the Teaching of High-School English
Mr. Goffe. 3 cr.

History-Education (Hist-Ed) 791. Problems in the Teaching of High-School History and Other Social Studies
Mr. Draves. 3 cr.

Home Economics-Education (HE-Ed) 791. Problems in the Teaching of High-School Home Economics
Miss Wybourn. 3 cr.

* The prerequisite for courses in education is permission of the Department, based upon the following:

Ed. 481: Open to any student, sophomore or above.
Ed. 757: Ed. 481 with grade of C or better, cumulative average of 2.2, average of 2.5 in major.
Ed. 758: Same as for Ed. 757 plus a C or better in Ed. 757, a personality suitable for teaching, and a speech test.
Ed. 759: Ed. 757 with C or better and permission of department.
Ed. 741-742: Senior standing, completion of all General Liberal Arts requirements, 18 semester hours in a Liberal Arts major subject, personality suitable for teaching, experience working with groups of children, Ed. 481 or Home Ec. 425 with grade of C or better, cumulative average of 2.2.
LANGUAGES-EDUCATION (LANG-ED) 791. PROBLEMS IN THE TEACHING OF MODERN LANGUAGES IN THE HIGH-SCHOOL
3 cr.

LATIN-EDUCATION (LAT-ED) 791. PROBLEMS IN TEACHING HIGH SCHOOL LATIN
3 cr.

MATHEMATICS-EDUCATION (MATHE-ED) 791. PROBLEMS IN THE TEACHING OF HIGH-SCHOOL MATHEMATICS
Mr. Balomenos, 3 cr.

MUSIC-EDUCATION (MU-ED) 792. PROBLEMS IN THE TEACHING OF ELEMENTARY SCHOOL MUSIC
Mr. Whitlock, 3 cr.

MUSIC-EDUCATION (MU-ED) 791. PROBLEMS IN THE TEACHING OF SECONDARY SCHOOL MUSIC
Mr. Whitlock, 3 cr.

PHYSICAL EDUCATION-EDUCATION (PE-ED) 792. PROBLEMS OF TEACHING PHYSICAL EDUCATION IN THE ELEMENTARY SCHOOL
3 cr.

Courses in Supervised Teaching

Student teaching is required in the Teacher Preparation program. It is open only to students whose applications are approved by the Department of Education and the department(s) of the subject(s) which the applicant desires to teach. Approval will be based upon the following: a cumulative university average of 2.2; a grade point average of 2.5 in the subjects of the field(s) in which supervised teaching is to be done, a C grade or better in each education course; at least 18 semester hours of work completed in the subject(s) to be taught; personal qualities and attitudes appropriate for classroom teaching. Application should be made through the Department of Education during the week preceding November 10 or April 10 of the semester immediately preceding the semester in which supervised teaching is to be done.

Students may enroll for 9 or for 14 credits* in supervised teaching. Approval to receive 9 credits for secondary supervised teaching must be granted by the Director of Secondary Student Teaching and the applicant's subject department.

EDUCATION-AGRICULTURE (ED-AG) (794). SUPERVISED TEACHING IN AGRICULTURE
Prereq.: Senior standing in Agricultural Education curriculum.

EDUCATION-ART (ED-ART) 794. SUPERVISED TEACHING IN ART

EDUCATION-BIOLOGY (ED-BIOL) 794. SUPERVISED TEACHING IN HIGH SCHOOL BIOLOGY

* Except Ed-Agr. 794 wherein the credits are 11, Ed-HE 794 wherein they are 7, Ed-PE 790 wherein they are 6.
Education

Education-Commerce (Ed-Cs) 794. Supervised Teaching in High School Commercial Subjects

Education-Elementary (Ed-El) 793. Supervised Teaching in the Elementary School

Education-English (Ed-Engl) 794. Supervised Teaching in High-School English

Education-History (Ed-Hist) 794. Supervised Teaching in High-School History and Other Social Studies

Education-Home Economics (Ed-HE) 794. Supervised Teaching in High-School Home Economics

Education-Language (Ed-Lang) 794. Supervised Teaching in High-School Modern Foreign Language

Education-Latin (Ed-Lat) 794. Supervised Teaching in High-School Latin

Education-Mathematics (Ed-Math) 794. Supervised Teaching in High-School Mathematics


Education-Physical Education (Ed-PE) 790. Directed Teaching of Physical Education
Prereq.: PE-Ed. 792 or concurrently.

Electrical Engineering (83)

Alden L. Winn, Professor and Chairman; Leon W. Hitchcock, Professor Emeritus; William B. Nulsen, Professor; Robert N. Faiman, Professor; John B. Hraba, Professor; Albert D. Frost, Professor; Fletcher A. Blanchard, Associate Professor; Joseph B. Murdoch, Associate Professor; Kerwin C. Stotz, Associate Professor; Donald W. Melvin, Assistant Professor; Ronald R. Clark, Assistant Professor; Robert W. Goodrich, Assistant Professor; Chester W. Stanhope, Instructor

501-502. Electrical Engineering
The fundamental physical laws and concepts of electrical engineering and their application to circuits, electric and magnetic fields, instrumentation, and direct-current machinery. Prereq.: Math. 523 or 426 taken concurrently and Phys. 404. E.E. 501: 1 lec.; 1 rec.; 1 lab. or conf.; 3 cr. E.E. 502: 1 lec.; 2 rec.; 1 lab.; 4 cr.

504. Electrical Engineering and Circuits (Honors).
By combined independent study and conferences and laboratories, students cover in depth the material listed for E.E. 502 and 515. Prereq.: E.E. 501 and Math. 523 or 426. Requires permission of instructor. 1 lab. and 2-3 conf.; 5 cr.

510. Electronic Circuits
Theory of operation, analysis, and design of active circuits containing electron devices. Prereq.: E.E. 609. Required of juniors in Electrical Engineering. 3 cr.
513-514. APPLIED ELECTROMAGNETS

Electric and magnetic circuits, vector diagrams, and equivalent circuits as applied to transformers, synchronous, and asynchronous machines and machine dynamics. Prereq.: E.E. 502, Math. 527. Required of juniors in Electrical Engineering. 3 cr.

515. CIRCUIT THEORY


522. ELECTRONICS LABORATORY

Experimental investigations in the principles of electrical engineering as applied to electronic devices, circuits, and instrumentation. Prereq.: E.E. 510 taken concurrently. Required of juniors in Electrical Engineering. 1 lab.; 1 cr.

555, 556, 557, 558. STUDENT BRANCH IEEE

A student-conducted organization, operated under the by-laws of the Institute, designed to introduce the student to professional society activities. Approximately 10 to 12 meetings are scheduled during the year, usually in the evenings. These meetings provide lectures by industrial representatives, inspection trips, and attendance at state and regional meetings. Each student is urged to become a student member of IEEE. Required of juniors and seniors in Electrical Engineering. No cr. NLG.

523, 524. ELECTRICAL LABORATORY

Experimental investigations in the principles of electrical engineering as applied to electrical engineering systems, devices and components. Laboratory procedures and presentation of engineering reports. Prereq.: E.E. 513, 514 taken concurrently with E.E. 523, 524 respectively. Required of juniors in Electrical Engineering. 1 lab.; 2 cr.

525, 526. ELECTRICAL LABORATORY

Experimental investigations in the principles of electrical engineering as applied to electrical engineering systems, devices and components. Formal reports are required. Prereq.: E.E. 514, E.E. 510. Required of seniors in Electrical Engineering. 1 lab.; 2 cr.

533. FUNDAMENTALS OF ELECTRICAL ENGINEERING

Direct- and alternating-current circuits, instruments and machines, and rectifiers and transformers. Prereq.: Phys. 501. Required of juniors in Chemical and Civil Engineering. 3 lec.; 1 lab.; 4 cr.

539. ELECTRICAL ENGINEERING FUNDAMENTALS

Electric and magnetic fields and circuits. Prereq.: Phys. 501. Required of juniors in Mechanical Engineering. 3 lec.; 1 lab.; 4 cr.

605. ELECTRICAL ENGINEERING NETWORKS AND LINES (Honors)

By combined independent study and conferences students cover in depth the material described in E.E. 645. Prereq.: E.E. 504. Permission of the instructor. 2-3 conf.; 5 cr.

609. PHYSICAL ELECTRONICS

Electron ballistics, conduction in gases, vacuum, metals, and semi-conductors; theory of emission; theory of operation, characteristic curves, and
Electrical Engineering

equivalent circuits for electron devices such as vacuum and gas tubes, solid state rectifiers, and transistors. Prereq.: E.E. 515 or E.E. 504 taken concurrently. Required of juniors in Electrical Engineering. 3 cr.

640. CIRCUITS, MACHINERY, AND CONTROL
Continuation of electric circuits. Applications of electrical engineering to machines and systems. Prereq.: E.E. 539. Required of juniors in Mechanical Engineering. 3 lec.; 1 lab.; 4 cr.

641. ELECTRONIC FUNDAMENTALS
Physical electronics, electronic circuits with emphasis on instrumentation. Prereq.: E.E. 533 or 539. Required of seniors in Mechanical Engineering. 2 lec.; 1 lab.; 3 cr.

645. ELECTRICAL NETWORKS
Generalized network analysis, equivalent networks, filter properties, elementary synthesis, transient and steady-state analysis of transmission lines. Prereq.: E.E. 515 or E.E. 504. 3 cr.

646. ELECTRIC FIELDS
Static electric and magnetic fields, electromagnetic fields, Maxwell's equations, wave equations, plane waves. Prereq.: E.E. 502, Math. 527. Required of seniors in Electrical Engineering. 3 cr.

652. INDUSTRIAL ELECTRONICS FUNDAMENTALS
Application of electronics to industrial processes. Prereq.: E.E. 641. Normally limited to students not registered in the Electrical Engineering curriculum. 2 lec.; 1 lab.; 3 cr.

695. ELECTRICAL ENGINEERING PROJECTS
A laboratory or advanced study course. Each student will either join one of the department research projects or engage in a project which is in one of the areas of current staff interest. Admission to the course will be limited to those accepted by a staff member. 1-4 conf. or 1-2 lab.; 1-4 cr.

706. ADVANCED CIRCUIT THEORY
Steady state and transient analysis, derivation of fundamental formulas and constants; application of LaPlace transforms. Prereq.: Permission of instructor. 3 lec.; 1 conf.; 4 cr.; when offered without conference period. 3 cr.

757. ELECTRONIC SYSTEMS ANALYSIS AND DESIGN
Techniques in coding, storage, and transfer of information. Analysis and design of electronic systems. Prereq.: Permission of instructor. 3 cr.

762. ILLUMINATION
Radiation, fundamental processes in gases, atomic spectra, sources of visible and near visible energy, lamp circuitry, lighting and wiring design, control of light, photometry, and color. Prereq.: Permission of the instructor. 2 cr.

781. INSTRUMENTATION
Analysis and design of equipment for measurement, instrumentation, and control. 3 rec.; 1 lab.; 4 cr.
780. (780). **ENGINEERING ANALYSIS**

The basic principles and analytical methods employed in the solution of complex problems in the various branches of engineering. Prereq.: Permission of the instructor. 2-3 cr.

782. **CONTROL SYSTEMS**

Fundamental principles involved in the design and analysis of feedback control systems. Prereq.: Permission of the instructor. 3 lec.; 3 cr.; or 3 lec. and 1 lab.; 4 cr.

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**English (49)**

Sylvester H. Bingham, Professor and Chairman; William G. Hennessy, Professor Emeritus; Robert G. Webster, Professor; J. Howard Schultz, Professor; Dale S. Underwood, Professor; G. Harris Daggett, Associate Professor; Max S. Maynard, Associate Professor; John C. Richardson, Associate Professor; Lewis C. Goffe, Associate Professor; Edmund G. Miller, Associate Professor; Philip L. Nicoloff, Associate Professor; Thomas A. Williams, Associate Professor; Robert J. Kispert, Associate Professor; Eugene N. Yarrington, Assistant Professor; Donald M. Murray, Assistant Professor; S. Anthony Caldwell, Instructor; Lee S. Baier, Instructor; Diane Fortuna, Instructor; Lawson Inada, Instructor; Gordon A. LaMeyer, Instructor; Hugh M. Potter, Instructor; Bruce D. Allen, Instructor; Diane S. Janeau, Instructor; David S. Reid, Instructor

301. **IMPROVEMENT IN WRITING**

Required of all students whose attainments in the fundamentals of English are found to be unsatisfactory. 3 rec.; no cr. NLG.

302. **IMPROVEMENT IN READING**

Intensive drill in reading skills for six weeks. 3 rec.; no cr. NLG.

401-402. **FRESHMAN ENGLISH**

Training to write more correctly and with more force and to read with more appreciation and discernment the chief types of literature. The staff of the department under the chairmanship of Mr. Baier. 3 cr. No credit toward a major.

513, 514. **AN INTRODUCTION TO ENGLISH LITERATURE**

The development of English literature from its beginning to the 20th century by means of selected readings. Mr. Richardson, Mr. Miller, Mr. LaMeyer. Prereq.: Engl. 401-402. 3 cr. No credit toward a literature major.

515, 516. **A SURVEY OF AMERICAN LITERATURE**

Mr. Webster, Mr. Daggett, Mr. Goffe, Mr. Nicoloff, Mrs. Fortuna, and Mr. Potter. Prereq.: Engl. 401-402. 3 cr. No credit toward a literature major.

518. **THE BIBLE AS LITERATURE**

The various literary types found in the Bible and a survey of the influence of the Bible on English literature. Mr. Schultz. Prereq.: Engl. 401-402. (Alternate years; offered in 1965-66.)

*Any student may be recalled and reassigned to an instruction group at any time in his four years at college upon report of any member of the Faculty that his work in composition or in reading is deficient.
English

521-522. News Writing
   Mr. Murray. Prereq.: Engl. 401-402. 3 cr. No credit toward a literature major.

523. Writing of Technical Reports
   Required of seniors in Agriculture and in Mechanical, Electrical, and Civil Engineering. Mr. Webster. 2 cr.

625-626. Advanced Composition
   Practice in the techniques of narration and description. Class discussions and individual conferences. Mr. Williams. Prereq.: Engl. 401-402. 3 cr. No credit toward a literature major.

628. Article Writing
   Mr. Murray. Prereq.: Engl. 401-402 and Engl. 521-522. 3 cr. No credit toward a literature major.

695, 696. Senior Honors
   Open to senior English literature majors who, in the opinion of the department, have demonstrated the capacity to do superior work in English. In the first semester the student will examine a series of special literary problems and write a number of short papers. In the second semester, he will investigate independently one or two larger topics and write one or two long papers. Of the nine credits awarded (3 the first semester, 3 or 6 the second semester), 6 may be counted toward the 24 which constitute a major in English literature. 3 cr.; 6 cr. Open to seniors by departmental invitation only.

701-702. Writing As An Art
   Class workshop, discussions and readings of the students' fiction, poetry, or plays. Individual conferences. Mr. Williams. Prereq.: Engl. 625 or its equivalent. 3 cr. No credit toward a literature major.

705. English Grammar
   Mr. Goffe. Required of students in the teacher preparation program and open to other students with the permission of the instructor. 3 cr. No credit toward a literature major.

706. Expository Writing
   Mr. Murray. Required of students in the teacher preparation program and open to other students with the permission of the instructor. 3 cr. No credit toward a literature major.

709, 710, 711. Critical Analysis
   Analysis of three forms of writing: 709, exposition; 710, fiction; 711, poetry. Mr. Bingham and Mr. Richardson. Required of students in the teacher preparation program and open to other students with the permission of the instructor. 3 cr. No credit toward a literature major.

751. History of the English Language
   Mr. Kispert. 3 cr.

753. Anglo-Saxon
   Mr. Kispert. 3 cr.
754. **Beowulf**  
Mr. Kispert. 3 cr.

755, 756. **Chaucer**  
Mr. Underwood. 3 cr.

757, 758. **Shakespeare's Plays**  
The major histories, comedies, and tragedies. Mr. Schultz. 3 cr.

759. **Milton**  
Mr. Schultz. 3 cr. (Alternate years; offered in 1965-66.)

760. **Boswell's Johnson**  
Mr. Maynard. 3 cr. (Not offered in 1965-66.)

761. **Wordsworth**  
Mr. Miller. 3 cr. (Alternate years; not offered in 1965-66.)

762. **Browning**  
Mr. Daggett. 3 cr. (Alternate years; offered in 1965-66.)

763, 764. **English Literature in the Sixteenth Century**  
Mr. Schultz. 3 cr. (Alternate years; not offered in 1965-66.)

765, 766. **English Literature in the Seventeenth Century**  
Mr. Lameyer and Mr. Underwood. 3 cr. (Alternate years; offered in 1965-66.)

767, 768. **English Literature in the Eighteenth Century**  
Mr. Maynard. 3 cr. (Alternate years; offered in 1965-66.)

769, 770. **The English Romantic Period**  
Wordsworth, Coleridge, Lamb, Hazlitt, Byron, Shelly, Keats, DeQuincey. Mr. Miller. 3 cr. (Alternate years; offered in 1965-66.)

771, 772. **Victorian Prose and Poetry**  
Major non-fictional prose from Carlyle to Stevenson and major poetry from Tennyson to Hardy. Mr. Miller. 3 cr. (Alternate years; not offered in 1965-66.)

773, 774. **British Literature of the Twentieth Century**  
Mr. Richardson. 3 cr. (Alternate years; not offered in 1965-66.)

775. **New England Renaissance**  
Emerson, Thoreau, and other transcendentalists. Mr. Daggett. 3 cr. (Alternate years; not offered in 1965-66.)

776. **American Novel in the Nineteenth Century**  
Mr. Webster. 3 cr. (Alternate years; not offered in 1965-66.)

777. **American Poetry of the Nineteenth Century**  
Mr. Daggett. 3 cr. (Alternate years; offered in 1965-66.)

779, 780. **American Literature of the Twentieth Century**  
Mr. Nicoloff. 3 cr. (Alternate years; offered in 1965-66.)
English

781, 782. Introduction to English Drama
   The development of English drama, exclusive of Shakespeare, from the Middle Ages to the present. 3 cr. (Alternate years; offered in 1965-66.)

783, 784. The English Novel of the Eighteenth and Nineteenth Centuries
   Mr. Bingham and Mr. Miller. 3 cr. (784 offered in 1965-66.)

English Education (Engl-Ed) 791. Problems in the Teaching of High-School English
   Principles and methods of teaching literature and composition in secondary schools. For all students who plan to teach English in secondary schools and for all students majoring in Language, History, or Education. Mr. Goffe. Prereq.: a grade of C or better in Ed. 758. Literature majors in English by permission of the instructor; all other students by fulfillment of the following: Engl. 513, 514, 516, 706, 709, 710, 711; one semester of Engl. 757, 758; a demonstration of skill in the use of English grammar, either by the satisfactory completion of Engl. 705 or by examination. 3 cr. No credit toward a literature major.

Entomology (29)

James G. Conklin, Professor and Chairman; Robert L. Blickle, Professor; Walter C. O'Kane, Professor Emeritus; R. Marcel Reeves, Assistant Professor

402, 403. Introductory Entomology
   An introduction to entomology in its broad aspects. The structure, biology, and classification of insects. This course should be particularly useful to students contemplating a major in entomology or in the general field of biology-education. Each student is required to make an insect collection. Open to any student. Mr. Conklin. 2 lec.; 1 lab.; 3 cr.

506. Forest Entomology
   Structure and development of insects. Orders and families of insects of importance to foresters. Principles of insect control. Biology and control of representative forest insects. Each student is required to make an insect collection. Adapted especially for Forestry majors. Open to any student. Mr. Conklin. 2 lec.; 1 lab.; 3 cr.

704. Medical Entomology
   Insects and arachnids in relation to public health. The more important disease carriers, their biologies, and means of control. Adapted especially for students interested in public health or medicine. Mr. Blickle. Elective for juniors and seniors. 2 lec.; 1 lab.; 3 cr.

707, 708. Advanced Entomology
   The anatomy and physiology of insects. Systematic entomology. Mr. Conklin, Mr. Blickle. Required of Entomology majors. Open to others than Entomology majors by permission of the Department Chairman. 2 lec.; 2 lab.; 4 cr.

709, 710. Advanced Economic Entomology
   Problems in applied entomology; the literature of economic entomology; investigational methods; studies of the specialized phases of entomology.
Mr. Conklin, Mr. Blickle. Required of Entomology majors. Open to others than Entomology majors by permission of the Department Chairman. 1 to 3 cr.

Foreign Languages and Literatures

Charles H. Leighton, Assistant Professor and Chairman; Clifford S. Parker, Professor Emeritus; John S. Walsh, Professor Emeritus; R. Alberto Casas, Professor; Louis J. Hudon, Professor; Hermann W. Reske, Associate Professor; Samuel E. Stokes, Jr., Associate Professor; Alexander P. Danoff, Assistant Professor; Nicholas E. Alssen, Assistant Professor; George Doig, Assistant Professor; Christiane Musinsky, Instructor; Harvey Albert, Instructor; Orlirio Fuentes, Instructor; Ursula D. Lawson, Instructor; Osmonde S. Limousin, Instructor; Vlasta J. Polich, Instructor; Edna S. Hudon, Lecturer; Hildegard S. Reske, Lecturer; Isabel Z. Fuentes, Lecturer; Pilar H. Mack, Lecturer

General Language and Literature (55)

Register for the following courses as Lang. 501, etc.

501, 502. Survey of Greek and Roman Literature

The masterpieces of Greek and Roman literature in translation. Through the study of literature, the students will learn about the ancient civilization from which much of our contemporary culture has come. A cultural course for the student unprepared to read the original languages but desiring acquaintance with the subject matter. A background course for majors in such subjects as English, History, Latin, or the modern languages and literatures. Not open to freshmen. 3 cr. No credit toward a major.

751, 752. Survey of Modern European Literature

The Renaissance, classicism, romanticism and realism studied as international movements. Stress is not upon the details of each national literature, but upon the interdependence of the literatures of the various countries. Conducted in English. 3 cr.

772. Applied Linguistics

Designed to acquaint teachers and others with the techniques and practical application of modern structural linguistics. Prereq.: Permission of the instructor. 3 cr. (Not offered in 1965-66.)

773. Introduction to Romance Philology

The historical development of French and Spanish from Vulgar Latin. Phonology, morphology, syntax, semantics, etymology. Frequent reference is made to the spoken languages of today as well as to comparative semantics. Prereq.: One year of Latin and familiarity with two Romance languages. 3 cr. (Not offered in 1965-66.)

Language-Education (Lang-Ed.) 791. Problems in the Teaching of Modern Languages in the High School

The special objectives, methods, and devices of modern language teaching in high school. For prospective teachers of French, German and Spanish. Prereq.: Education 758 with grade of C or better (or one year of teaching experience) and one of the following courses: French 506, German 606, Spanish 506. 3 cr.
Foreign Languages and Literatures

French (56)

Register for the following courses as Fr. 401, etc.
New students will be assigned to French 401, French 503 or French 505 on the basis of their performance in the French placement examination.

401-402. ELEMENTARY FRENCH*
For students without previous knowledge of French. Aural-oral practice, and the study of fundamental speech patterns, reading and writing to achieve a firm basis for an active command of the language. No credit toward a major. 5 rec.; 2 lab.; 5 cr. (Students who offer two or more entrance units of high school work in French, and who do not qualify for French 503, will not be permitted to register for credit for French 401. They may, however, audit the course with proper authorization and register for credit for the second half of the course. French 402.)

503-504. INTERMEDIATE FRENCH*
Intensive and extensive reading of complete texts of intrinsic literary and intellectual worth, formal review of the structure of the language, training in oral and written expression of ideas. Classroom discussion and papers in French. 3 rec.; 1 lab.; 3 cr. (No credit toward a major. Open by placement examination, and to students who have passed French 402 with a grade of C. Students making a grade of A in French 504 may take courses numbered 741 and above with the permission of the Section Supervisor.)

505-506. INTRODUCTION TO FRENCH LITERATURE AND THOUGHT
Reading and analysis of significant works in French literature and thought, beginning in the seventeenth century. Outside readings on the historical and cultural background of the works read. Papers and discussion in French. Term paper in English. 3 cr. This course or its equivalent is prerequisite to all higher courses in French. Open to students who have achieved a grade of C or better in French 504 and by placement examination.

514. FRENCH GRAMMAR AND SPEECH HABITS
Thorough study of the structure of the French language and practice of basic speech patterns. 3 cr. Primarily for students who have not taken French 503-504. No credit toward a major. Prereq.: French 506, but may be taken concurrently with French 506.

685-686. JUNIOR YEAR AT DIJON UNIVERSITY
A program of studies at the University of Dijon (France) for students who have completed their sophomore year and have passed with a grade of B or better French 505-506 and French 514. The students chosen for the program will be required to take a non-credit orientation course during the second semester of their sophomore year to prepare them for French university life. Interested students should consult with the Director of the Program, Professor Louis J. Hudon. 32 cr. Students must be approved for this program. Not offered for graduate credit.

695, 696. HONORS WORK IN FRENCH
For seniors writing a research paper in the Honors program in French. Prereq.: Permission of Section Supervisor. Variable credit.

* No student educated in a foreign country will be permitted to register for any language course numbered 650 or below (except Greek 401-402, 503-504) in such student's native language.
741. FRENCH LITERATURE OF THE MIDDLE AGES

Readings in the epic, lyric poetry and the romance. Required of Senior French Majors. Conducted in French. Prereq.: Fr. 506. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

742. FRENCH LITERATURE OF THE RENAISSANCE

Rabelais, Marguerite de Navarre, Ronsard, Du Bellay, Montaigne and others. Conducted in French. Prereq.: Fr. 506. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

759-760. FRENCH LITERATURE OF THE SEVENTEENTH CENTURY

759: Historical and literary background of French Classicism; poetry, Corneille, Pascal, and Molière's early plays. 760: Molière, Racine, La Fontaine, Mme. de La Fayette, Boileau, and La Bruyère. Conducted in French. Prereq.: French 506. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

761-762. EIGHTEENTH CENTURY FRENCH LITERATURE AND THOUGHT

761: Precursors of Age of Enlightenment — Bayle, Fontenelle, Montesquieu; Voltaire's early works; Marivaux and others. 762: Diderot, Encyclopedists, later Voltaire, LaClos, Rousseau and others. Conducted in French. Prereq.: Fr. 506. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

767-768. NINETEENTH CENTURY FRENCH LITERATURE

767: Romanticism; Mme. de Stael, Chateaubriand, Lamartine, Hugo, Vigny, Musset. 768: Late Romanticism; Realism; Stendhal, Balzac, Flaubert; Hugo, the Parnassian school. Conducted in French. Prereq.: French 506. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

770. INTRODUCTION TO MODERN FRENCH POETRY

Baudelaire, Rimbaud, Mallarmé, Valéry and others. Prereq.: French 506. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

781-782. CONTEMPORARY FRENCH NOVEL AND THEATER

781: Zola, the Concourts, Proust, Gide, Becque, Maeterlinck, and others. 782: Mauriac, Malraux, Bernanos, Sartre, Camus, Claudel, Cocteau, Pagnol, Anouilh, Giraudoux and others. Conducted in French. Prereq.: French 506. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

790. ADVANCED LANGUAGE AND STYLE

Translation of literary texts, intensive study of the principal techniques of style, explication de textes. Open to qualified students who have had a minimum of six hours of French courses numbered 650 and above. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

795, 796. SPECIAL STUDIES IN FRENCH LANGUAGE AND LITERATURE

Individual guided study in special topics, with training in bibliography and organization of material. Examples of topics which may be selected are: the work of a major French author, specific topics in any area of French literature, such as literary criticism in the Seventeenth Century. Staff. Prereq.: Permission of the Section Supervisor. Variable credit.
Foreign Languages and Literatures

German (57)

Register for the following courses as Ger. 401, etc.

New students will be assigned to German 401, German 402, German 501, German 502, German 507, German 508, or German 605, on the basis of their scores on the German placement examination.

401-402. Elementary German*

For students without previous knowledge of German. Aural-oral practice, and the study of fundamental speech patterns, reading and writing to achieve a firm basis for an active command of the language. No credit toward a major. 5 rec.; 2 lab.; 5 cr. (Students who offer two or more entrance units of high school work in German and who do not qualify for German 402 will not be permitted to register for credit for German 401. They may, however, audit the course with proper authorization and register for credit for the second half of the course, German 402.

501-502. German Composition and Grammar Review*

A systematic review of German grammar and syntax. Concentration on the writing of compositions of gradually increasing difficulty, proceeding from concrete observations to theoretical and abstract discussion. 3 rec.; 1 lab.; 3 cr. Open by placement examination, and to students who have passed German 402 with a grade of C. Students making a grade of A in German 502 may take courses numbered 750 and above with the permission of the Section Supervisor.

507-508. Oral Practice in German*

A systematic course in oral self-expression, stressing enunciation and intonation. Prepared and extemporaneous talks, dialogues and group discussions. 2 rec.; 1 lab.; 2 cr. Open by placement examination, and to students who have passed German 402 with a grade of C. Students making a grade of A in German 508 may take courses numbered 750 and above with the permission of the Section Supervisor.

605-606. Introduction to German Literature

Reading and analysis of works selected from the most important periods in German Literature. Outside readings on the historical and cultural background of the works read. Papers and discussion in German. Term paper in English. 3 cr. This course or its equivalent is prerequisite to all higher courses in German. Open to students who have achieved a grade of C or better in German 507-508, and by placement examination. Open also to students who have received a grade of C or better in German 501-502 and who have permission of the Section Supervisor.

685-686. Junior Year at Marburg University

A program of studies at the University of Marburg (West Germany) for students at the University who have completed their sophomore year and have passed with a grade of B or better German 504 or the equivalent. Those applying will be expected to attend regularly during the semester preceding their year abroad a non-credit orientation seminar. Interested students should consult with the Director of the Program, Professor Hermann W. Reske. 32 cr. Students must be approved for this program. Not offered for graduate credit.

* No student educated in a foreign country will be permitted to register for any language course numbered 650 or below (except Greek 401-402, 503-504) in such student’s native language.
695, 696. HONORS WORK IN GERMAN
For seniors writing a research paper in the Honors program in German. Prereq.: Permission of Section Supervisor. Variable credit.

755. GERMAN LITERATURE OF THE AGE OF THE BAROQUE
German literature between Reformation and the Age of Enlightenment. Reading, interpretation, and critical analysis of prescribed prose, drama and poetry with emphasis on the philosophical and social ideas of the time. Prereq.: German 605, 606. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

756. GERMAN LITERATURE OF THE AGE OF ENLIGHTENMENT
German literature from the Baroque period to the beginning of the period of Storm and Stress with emphasis on readings and interpretations of works of Lessing and Wieland. Prereq.: German 605, 606. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

757-758. THE AGE OF GOETHE
German literature of Storm and Stress and the Classical Period. Interpretation and critical analysis with emphasis upon selected works of Wagner, Klinger, Lenz, Schiller, and Goethe. Prereq.: German 606. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

759-760. GERMAN ROMANTICISM
German literature from the end of the Eighteenth century to 1830. Interpretation and critical analysis of prescribed prose, drama, and poetry of prominent writers and poets of the period, from Wackenroder to Eichen- dorff. Prereq.: Ger. 606. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

761-762. THE AGE OF REALISM
Representative German writers, dramatists, poets and novelists from the end of Romanticism to the beginning of Naturalism (1830-1880) will be read and discussed with a background of social and philosophical development. Prereq.: German 606. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

763-764. GERMAN LITERATURE SINCE 1880
From Naturalism to the present. Reading, interpretation, and critical analysis of prescribed prose, drama and poetry of Hauptmann, Hofmannstal, Rilke, Mann, Kafka. Prereq.: German 606. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

781-782. HISTORY AND DEVELOPMENT OF THE GERMAN LANGUAGE AND ADVANCED STYLISTICS
A systematic study of style, shades of meaning, adequacy of expression. A thorough knowledge of German grammar is prerequisite. Practice in writing seminar papers and obtaining stylistic flexibility in the use of written German. Prereq.: German 605-606. 3 cr.; 4 cr. for Honors.

795, 796. SPECIAL STUDIES IN GERMAN LITERATURE
Individual guided study in special topics, with training in bibliography, note taking, organization of material. Examples of topics which may be selected by instructor and student in conference are: (1) Wolfram von Eschenbach: Parzival, (2) Walther von der Vogelweide: Lyrics, (3) Mid-
Foreign Languages and Literatures


Greek  (58)

Register for the following course as Gr. 401, etc.

401-402. Elementary Greek
Grammar, composition, translation. Prereq.: Permission of the instructor. 3 cr. No credit toward a major.

503-504. Intermediate Greek
Review: Plato's 'Apology'; Selections from Homer and Elegiac Poets. Prereq.: Gr. 402. 3 cr.

Italian  (59)

Register for the following courses as Gr. 401, etc.

401-402. Elementary Italian*
For students without previous knowledge of Italian. Aural-oral practice, and the study of fundamental speech patterns, reading and writing to achieve a firm basis for an active command of the language. 5 cr. (Students who have had the equivalent of Italian 401 may audit the first part of the course and register for credit for Italian 402). (Alternate years; offered in 1965-66.)

503-504. Intermediate Italian*
Intensive and extensive reading of texts of intrinsic literary and intellectual worth: Dante, Petrarch, Leopardi, and others. (Open by placement examination, and to students who have passed Italian 402 with a grade of C.) 3 cr. (Alternate years; not offered in 1965-66.)

Latin  (60)

Register for the following courses as Lat. 401, etc.

401-402. Elementary Latin
Elements of grammar, reading of simple prose. The changes in meaning and form of English and Romance language derivatives from Latin. 3 cr. (Students who offer two or more entrance units of high school work in Latin will not be permitted to register for Latin 401 for credit. They may, however, audit the course with proper authorization.) No credit toward a major.

503-504. Intermediate Latin
A review of Latin grammar and vocabulary, followed by readings in prose and poetry. Prereq.: Lat. 402 or the equivalent. 3 cr.

* No student educated in a foreign country will be permitted to register for any language course numbered 650 or below (except Greek 401-402, 503-504) in such student's native language.
Foreign Languages and Literatures

505-506. Latin Prose and Poetry

Selections from Livy, Catullus, Ovid, Phaedrus, Martial, and the odes of Horace. Translation, lectures and study of the influence of Latin on English poetry. Prereq.: Lat. 504 or equivalent. 3 cr.

695, 696. Honors Work in Classics

For seniors writing a research paper in the Honors program in Classics. Prereq.: Permission of Section Supervisor. Variable credit.

751-752. Roman Satire

Horaces ‘Satires’ and ‘Epistles’, selected works of Persius, Juvenal, and Martial, and a study of Roman life and thought as reflected in these works. Prereq.: Lat. 506 or the equivalent. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

753-754. The Historians

Livy, Suetonius, and Tacitus in selected works. Illustrated lectures and outside readings on the historical, social, and political background of Rome essential to the student or teacher of Latin. Prereq.: Lat. 506 or equivalent. 3 cr.; 4 cr. for Honors. (Alternate years; not offered in 1965-66.)

755-756. The Golden Age

Roman literature of the classical period, particularly the work of Caesar, Cicero, and Virgil. Prereq.: Lat. 506 or its equivalent. 3 cr.; 4 cr. for Honors. (Alternate years; offered in 1965-66.)

Latin Education (Lat-Ed) 792. Problems in Teaching High School Latin

This course is carried on concurrently with work in composition. Prereq.: Permission of the instructor and Education 758 with grade of C or better. 3 cr. (Not offered in 1965-66.)

Education-Latin (Ed-Lat) 794. Supervised Teaching in High School Latin

Prereq.: Permission of instructor. (Not offered in 1965-66.)

795, 796. Special Studies in Latin Literature

Guided studies in special topics with training in bibliography and organization of material. Examples of topics which may be selected by instructor and student are: (1) Roman Comedy and Elegy, (2) The Roman Epic, (3) Roman Drama, (4) The Silver Age. Prereq.: Permission of the Section Supervisor. Variable credit.

Russian (6)

Register for the following as Ru. 401, etc.

401-402. Elementary Russian*

Elements of Russian grammar, reading of graded prose, and oral use of the language. 3 cr. (Students who offer two or more entrance units of high-school work in Russian will not be permitted to register for Russian 401 for credit. They may, however, audit the course with proper authorization.) No credit toward a major.

*No student educated in a foreign country will be permitted to register for any language course numbered 650 or below (except Greek 401-402, 503-504) in such student's native language.
Foreign Languages and Literatures

503-504. Intermediate Russian*

Intensive and extensive reading of complete texts of intrinsic literary and intellectual worth, formal review of the structure of the language, training in oral and written expression of ideas. Classroom discussion and papers in Russian. 1 lab.; 3 cr. Open by placement examination, and to students who have passed Russian 402 with a grade of C.

505-506. Russian Literature and Thought

Reading and analysis of significant works in Russian literature and thought. Outside readings on the historical and cultural background of the works read. Papers and discussion in Russian. Term paper in English. 3 cr. This course or its equivalent is prerequisite to all higher courses in Russian. Open to students who have achieved a grade of C or better in Russian 504 by placement examination.

Spanish (62)

Register for the following courses as Sp. 401, etc.

New students will be assigned to Spanish 401, Spanish 402, Spanish 503, Spanish 504, or Spanish 505, on the basis of their scores on the Spanish placement examinations.

401-402. Elementary Spanish*

For students without previous knowledge of Spanish. Aural-oral practice, and the study of fundamental speech patterns, reading and writing to achieve a firm basis for an active command of the language. No credit toward a major. 5 rec.; 2 lab.; 5 cr. (Students who offer two or more entrance units of high school work in Spanish, and who do not qualify for Spanish 402 will not be permitted to register for credit for Spanish 401. They may, however, audit the course with proper authorization and register for credit for the second half of the course, Spanish 402).

503-504. Intermediate Spanish*

Intensive and extensive reading of complete texts of intrinsic literary and intellectual worth, formal review of the structure of the language, training in oral and written expression of ideas. Classroom discussion and papers in Spanish. 3 rec.; 1 lab.; 3 cr. Open by placement examination, and to students who have passed Spanish 402 with a grade of C. Students making a grade of A in Spanish 504 may take courses numbered 750 and above with the permission of the department.

505-506. Introduction to Spanish Literature and Thought

Reading and analysis of significant works in Spanish literature and thought. Outside readings on the historical and cultural background of the works read. Papers and discussion in Spanish. Term paper in English. 3 cr. This course or its equivalent is prerequisite to all higher courses in Spanish. Open to students who have achieved a grade of C or better in Spanish 504, and by placement examination.

631, 632. Advanced Spanish Conversation and Composition

For students who wish to perfect their command of written and spoken Spanish, maintain aural-oral fluency in Spanish through intensive work in

* No student educated in a foreign country will be permitted to register for any language course numbered 650 or below (except Greek 401-402, 503-504) in such student's native language.
and out of the classroom, individual conferences, and laboratory sessions. Prereq.: Spanish 503 or 504 or equivalent. 3 lec.; 2½ hr. lab.; 3 cr.

695, 696. HONORS WORK IN SPANISH
For seniors writing a research paper in the Honors program in Spanish. Prereq.: Permission of Section Supervisor. Variable credit.

751. SPANISH LITERATURE UP TO 1600
Readings and discussion of the great human creations of early Spanish literature such as El Poema del Mio Cid, El Libro de Buen Amor and La Celestina, and their social and historical background. Prereq.: Sp. 505 or equivalent. 3 cr.; 4 cr. for Honors.

752. DRAMA AND POETRY OF THE SIGLO DE ORO
The social background of the baroque period. Readings of representative plays of Lope de Vega, Tirso de Molina, Calderon, and the poetry of Lope, Gongora and Quevedo. Development of the prose of the period. Prereq.: Sp. 506 or equivalent. 3 cr.; 4 cr. for Honors.

754. CERVANTES
This course traces the development of Cervantes' literary art. Reading and discussion of selections from all the major works of Cervantes. Comprehensive study of the Quijote, its originality and significance, its antecedents, its religious, philosophical and sociological aspects, and its artistic structure. Conducted in Spanish. Prereq.: Span. 506 or equivalent. 3 cr.

755. LITERATURE OF THE NINETEENTH CENTURY
Preliminary survey of the Eighteenth century and readings in and discussion of the main literary movements of the Nineteenth century. Selections from Quintana, Espronceda, Zorrilla, Larra, Duque de Rivas, Bécquer, Pérez Galdos, Valera, Pereda, Clarin, and Echegaray. Social and historical background of Spain in relation to Nineteenth century thought in Europe. Prereq.: Sp. 506 or equivalent. 3 cr.; 4 cr. for Honors.

756. CONTEMPORARY SPANISH LITERATURE
Starting with the generation of 1898 the readings and discussion of the work of such writers as Unamuno, Azorin, Baroja, Machado, J. R. Jimenez, Ortega y Gasset, García Lorca, Pérez de Ayala, Benavente, Casona, plus a survey of Spanish literature and thought since 1939. Prereq.: Sp. 506 or equivalent. 3 cr.; 4 cr. for Honors.

765, 766. SPANISH-AMERICAN LITERATURE
The main themes of Spanish-American literature studied in the works of its most representative authors and against the historical, social and geographical background of the New World. Prereq.: Sp. 506 or equivalent. 3 cr.; 4 cr. for Honors.

795, 796. SPECIAL STUDIES IN SPANISH LANGUAGE AND LITERATURE
Individual guided study in special topics, with training in bibliography and organization of material. Examples of topics that may be selected by instructor and student in conference are: (1) 18th, 19th or 20th century literature in Spain; (2) literature and civilization in Spain in the Golden Age; (3) the literature of individual Latin-American countries. Prereq.: Permission of the Section Supervisor. Variable credit.
Forestry (30)

PAUL E. BRUNS, Professor and Chairman; CLARK L. STEVENS, Professor Emeritus; OLIVER P. WALLACE, Associate Professor; HAROLD W. HOCKER, Jr., Associate Professor; JOHN L. HILL, Associate Professor; JAMES P. BARRETT, Assistant Professor; ROGER P. SLOAN, Assistant Professor; BENNETT B. FOSTER, Assistant Professor; DAVID P. OLSON, Assistant Professor; RICHARD R. WEYRICK, Assistant Professor; R. MARCEL REEVES, Assistant Professor; ERNST J. SCHREINER, Adjunct Professor

401. CONSERVATION OF FOREST RESOURCES

The wildland renewable resources include game, vegetation including timber, water and soil. Both the use and preservation of forest resources are important to man. Conflicts between use and preservation and among the uses may arise, which men must continually resolve. These concepts and practices are studied within the framework of man's economic and social structures. Elective for all students except freshmen and Forestry majors. Mr. Wallace, staff. 3 cr.

425. DENDROLOGY

The identification, classification and silvical characteristics of trees in the field, in autumn and in winter. The principal forest regions of North America: their location, extent, climatic conditions and flora. Forest types. Grasses important in forest and range management. Required of freshmen in Forestry. Elective for other students. 2 lec.; 1 4-hr. lab.; 4 cr.

426. WOOD TECHNOLOGY

An introduction to the fundamental properties of wood including macro- and microstructure; physical, chemical and mechanical properties. Introduction to seasoning and preservation of wood. Identification of commercially important timbers. Prereq.: For. 425 or permission of the instructor. Mr. Hill. 2 lec.; 2 labs.; 4 cr.

527. SILVICS

The ecological basis of silviculture. Classification of forest communities; environmental factors and their influence on forest vegetation; influence of vegetation on environment. Mr. Hocker. Prereq.: Bot. 411. 2 lec.; 1 lab.; 3 cr.

528. APPLIED STATISTICS I

Statistical procedures with emphasis on biometrics. Computational procedures and interpretation of results will be covered in lecture and laboratory. Mr. Durgin. Prereq.: 3 cr. of Math. 2 lec.; 1 lab.; 3 cr.

543. FOREST MENSURATION

Theory and practice in the basics of forest mensuration. Forest inventory, growth and yield, volume table construction, and elements of photogrammetry. The application of statistical procedures in forest mensuration. Mr. Barrett. Prereq.: For. 528. 3 lec.; 1 lab.; 5 cr.

544. FOREST ECONOMICS

Application of economics and finance to the forest business. Nature of forest investments, forests taxation, and forest resources. Mr. Wallace. Prereq.: 3 cr. of Econ. 4 lec.; 4 cr.
561, 562. INVESTIGATIONS IN FORESTRY


629. SILVICULTURE

The theory and techniques of applying ecological knowledge to the control of establishment, composition, and growth of forest stands for economic purposes. Field practice including marking of stands for various kinds of cutting and for cultural treatment. Mr. Hocker. Prereq.: For. 425; For. 527 or Bot. 742. 2 lec.; 1 lab.; 3 cr.

650. LOGGING ECONOMICS

Application of economic principles to the study of timber harvesting. The use of quantitative methods in developing logging cost and production functions. Field problems. Mr. Foster. Prereq.: For. 528, For. 544, or equivalents. 2 lec.; 1 lab.; 3 cr.

651. WOOD PRODUCTS MANUFACTURE AND MARKETING

A study of wood products manufacturing processes with emphasis on plant management and marketing problems of the wood using industries. Plant visits are employed as a basis for study. Mr. Hill. Prereq.: For. 426. 2 lec.; 1 lab.; 3 cr.

659. FOREST PROTECTION

Principles of protection from fire, insects, fungi, climatic extremes, and other injurious agencies. Principles are illustrated by protection problems of northeastern forests. Emphasis is placed upon the development of resistant forest stands. Mr. Weyrick. Prereq.: Ent. 506, Bot. 751, or equivalent. 2 lec.; 1 lab.; 3 cr.

661. FOREST MANAGEMENT

The management of forest areas on an economic and ecological basis. The integration and application of business methods and the technical phases of forestry. Mr. Foster. Prereq.: Senior standing in Forestry. 3 lec.; 1 lab.; 4 cr.

701. STATISTICAL METHODS II

An intermediate course in statistics. All students elect applied phase with basic phase optional for additional credit. Applied phase presents concepts of statistical models, tests of significance, analysis of variance in one-way and multiway classifications, and factorial experiments. Introduction to covariance, multiple regression, and analysis with unequal subclass numbers; introduction to chi-square tests, discrete distributions; non-parametric statistics, and sampling. Basic phase parallels and supplements applied phase; algebraic derivation of computing formulae, study of models and derivation of expected values; matrix representation of experimental design and multiple regression models; introduction to least squares. Mr. Barrett. Prereq.: An elementary statistics course. 3-4 cr.

730. FOREST TREE IMPROVEMENT

A consideration of the genetics of forest tree improvement with emphasis on variation in natural populations, the basis of selection of desired
Forestry

characters and the fundamentals of controlled breeding. The application of principles will be directed toward silviculture, management and utilization. Mr. Hocker. Prereq.: Permission of the instructor. 2 lec.; 1 lab.; 3 cr.

734. FOREST FISH AND GAME

Fish and wildlife population dynamics and the theory of game management. The characteristics of important game species and management techniques useful in the northeastern forest habitat. Elective with permission of instructor. Mr. Olson. 3 lec.; 1 lab.; 4 cr.

742. FOREST ENGINEERING

Design of logging road systems with an emphasis on the economics involved. Field work in road layout, and timber sale preparation. Mr. Foster. Prereq.: Permission of the instructor. Two-week field session in June. 3 cr.

746. FOREST MANAGEMENT RESOURCE SURVEY

A study of forest land use coordination. Multiple uses treated separately and as integrated concurrent uses of forested lands. Forest management for water, recreation, wildlife and range benefits. Mr. Weyrick. Prereq.: For. 544 and For. 661, or permission of the instructor. 2 lec.; 1 lab.; 4 cr.

755. FOREST WILDLIFE MANAGEMENT

Readings and discussions on the properties of wildlife species and the various phases of management including public relations, law enforcement, and control of undesirable species. Students should be prepared to participate in week-end field trips to game management areas in New England. Mr. Olson. 2 lec.; 1 lab.; 3 cr.

758. PHOTOGRAMMETRY IN FORESTRY

Elementary principles of photogrammetry with emphasis on their application to all phases of forestry. The value and use of aerial photos in forest typing, planimetric, and topographic mapping; measurement of area and volume estimation. Mr. Barrett. Prereq.: Permission of the instructor. 2 lec.; 1 lab.; 3 cr.

763. FOREST RECREATION

The extent, developments, and conflicts in the recreational use of wild lands of North America. Relationships to the conservation of natural resources are considered. Prereq.: Permission of the instructor. Mr. Wallace. 3 cr.

764. FOREST INDUSTRY ECONOMICS

Economy in productive enterprise — logging and manufacturing of forest products; control of harvesting costs as a factor in intensifying applied forest management; planning for minimum cost operations. Mr. Wallace. Prereq.: Permission of the instructor. 2 lec.; 1 lab.; 3 cr.

French

(See Foreign Languages and Literatures)
Geology and Geography

Jerome M. Pollack, Associate Professor and Chairman; T. Ralph Meyers, Professor; Donald H. Chapman, Professor; Cecil J. Schneer, Professor; Glenn W. Stewart, Associate Professor; William H. Wallace, Associate Professor; Robert G. LeBlanc, Instructor

Geology (51)

401-402. Principles of Geology

The earth and its history. A consideration of land forms and a discussion of the materials and structures of the earth's crust. The interpretation of past geologic events, and their effect on the development of life forms. Mr. Meyers, Mr. Chapman, and Mr. Stewart. 3 lec.; 1 lab.; 4 cr. No credit toward a major.

407. General Geology

An introductory course in physical geology. The structures and materials of the earth's crust and the forces which have produced and altered them. Mr. Stewart. For students in Technology and Agriculture. Open to Liberal Arts students by permission only. 2 lec.; 2 cr. (Not available for credit after completing Geol. 401). No credit toward a major.

512. Descriptive and Determinative Mineralogy

The physical and chemical properties of minerals, their associations, modes of occurrence and uses; with training in their identification. Mr. Meyers. Prereq.: Geol. 401 or 407. 2 lec.; 2 lab.; 4 cr.

531. Structural Geology

The structural units of the earth's crust and the mechanics of their formation. Mr. Stewart. Prereq.: Geol. 402 and Math. 407-408, or permission of the instructor. 3 lec.; 1 lab. or field work; 4 cr.

552. Invertebrate Paleontology

The classification, evolution, and stratigraphic occurrence of invertebrate animals as recorded by fossils. Field trips will be made to collect specimens and to study environments of living and fossil material. Prereq.: Geol. 402 or permission of instructor. 3 lec.; 1 lab.; 4 cr.

561. Geomorphology

The factors producing the present aspect of the land surface, particularly that of New England. Special emphasis on the work of running water, glaciers, and marine agents. Field trips during the fall season. Mr. Chapman. Prereq.: Geol. 402 or permission of the instructor. 3 lec.; 1 lab.; 4 cr.

613. Physical-Chemistry Mineralogy

An introduction to the theory of natural solids; the structure of the atom; the crystal, its geometry, its physics and chemistry, its natural history; methods of physical-chemical mineralogy. Mr. Schneer. Prereq.: Chem. 404. 2 lec.; 1 lab.; 3 cr.

622. Elements of Petrology

The origin, modes of occurrence, and classification of rocks. Mr. Stewart. Prereq.: Geol. 402. 2 lec.; 1 lab. or field exercise; 3 cr.
Geology and Geography

632. Field Geology
Training in basic field methods of geologic mapping. Mr. Stewart. Prereq.: Geol. 531. 1 lec.; 1 lab. or field work; 2 cr. (Alternate years; not offered in 1965-66.)

662. Glacial Geology
The characteristics of existing glaciers and an interpretation of Pleistocene glacial features. The abundant and varied evidence of glaciation in northeastern North America and Baltic Europe will be emphasized. New Hampshire examples of both Alpine and Continental glaciation will be studied in the field. Mr. Chapman. Prereq.: Geol. 402. 2 lec.; 1 lab.; 3 cr.

699. Senior Thesis
Open to students during their last semester in residence while completing their senior thesis. May not be taken by students who elect a senior comprehensive examination in place of the senior thesis. Satisfactory completion of the senior thesis represents satisfactory completion of the course. No letter grade will be given. 2 cr.

754. Sedimentology
The properties of sediments and sedimentary rocks, the sedimentary processes and environments, correlation procedures and stratigraphic principles. Prereq.: Geol. 401 and 512 or permission of instructor. 2 lec.; 1 lab.; 3 cr.

771-772. Economic Geology
First semester: the types of coal and their occurrence in the United States; petroleum, the structures in which it is found and the distribution and geology of oil fields, especially in the United States; industrial minerals and their utilization. Second semester; the metals, their ores, and the geology of important ore deposits. Mr. Meyers. Prereq.: Geol. 512. 3 cr.

781. Physical Geology
The materials and structures of the earth and the erosive agents that modify them are described in the lectures and are examined and studied in the laboratory and on field trips. This course is for the high school science teacher who needs an introduction to the Earth Sciences. (Not available for credit after completing Geol. 401 or equivalent.) It will be offered during the summer sessions. To register one must be a certified science teacher with at least 3 years of teaching experience. 4 cr.

782. Historical Geology
The hypotheses concerning the origin of the earth are discussed, the history and evolution of life are described, and the sequence of past geologic events are interpreted. Selected invertebrate fossils are observed in the laboratory and the geologic history of southern New Hampshire is interpreted on the field trips. Prereq.: Geol. 781 or equivalent. This course is for high school science teachers who need an introduction to the earth sciences. (Not available for credit after completing Geol. 402 or equivalent.) It will be offered during the Summer Session. To register one must be a certified science teacher with at least three years of teaching experience. 4 cr.

795. Geological Problems
Special problems by means of conferences, assigned readings, and field or laboratory work, fitted to individual needs from one of the areas listed
below. Mr. Meyers, Mr. Chapman, Mr. Stewart, and Mr. Schneer. Prereq.: Permission of the instructor. 1-2 cr. *This course may be repeated to a total of not more than 5 credits.*

1. Areal Geology
2. Geochemistry
3. Geomorphology, Advanced
4. Geophysics
5. Glacial Geology, Advanced
6. Groundwater Geology
7. Historical Geology, Advanced
8. Industrial Minerals
9. Micropaleontology
10. Mineral Fuels
11. Mineralogy, Advanced
12. Optical Crystallography
13. Ore Deposits
14. Paleontology, Advanced
15. Petrology, Advanced
16. Regional Geology
17. Sedimentation
18. Stratigraphy
19. Structural Geology, Advanced

797. Geology Seminar
Study of selected topics in both classical and modern geological thought. Prereq.: Senior standing and permission of the instructor. 2 cr. (Course not offered regularly.)

Geography (50)
Register for the following courses as Geog. 401, etc.

401, 402. Regional Geography of the World
A survey of the geography of the world, organized in terms of the major cultural areas of the earth. The Polar, European, and Dry World cultural areas are considered during the first semester; the Oriental, African, Pacific, and New World cultural areas are analysed during the second semester. In each area the unique integration of physical and human features that produces the distinctive character of the region is studied. Mr. Wallace and Mr. LeBlanc. 3 cr.

471, 472. Physical Geography
A systematic study of the earth in terms of landforms, vegetation, and soils. Cartography, weather, and climate are studied in Geog. 471. Landforms, vegetation, soils, and the integration of physical features in selected areas are studied in Geog. 472. Mr. Wallace and Mr. LeBlanc. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)

473, (473). The Weather
The interpretation of atmospheric phenomena; the heating and circulation of the atmosphere and the nature and movement of the air masses which influence the weather of North America and particularly of New England. Mr. Chapman. 2 cr.

481. Cultural Geography
The geographic pattern of mankind. The differentiation of the world in terms of population, race, language, religion, and the basic economic activi-
ties. Emphasis is placed on the historical origin and diffusion of these phenomena as well as their significance in understanding the contemporary culture map of the world. Mr. LeBlanc. 3 cr.

511. Geography of Anglo-America

A regional and topical analysis of the United States and Canada. Physical features and human phenomena are studied in terms of their contributions to the character of the area. Mr. Wallace. Prereq.: Geog. 401 or 402, or permission of instructor. 3 cr. (Alternate years; not offered in 1965-66.)

531. Geography of Western European and the Mediterranean

A regional and topical analysis of the geography of Western Europe and the Mediterranean region. Major topics studied include: the patterns of landforms, climates and vegetation; the distribution of races, languages and religions, and the significance of these factors in Western Europe. Most of the course is devoted to the analysis of the following areas: the British Isles, Northern Europe, the Low Countries, Germany, Alpine Europe, France, and Mediterranean Europe. Mr. Wallace. Prereq.: Geog. 401 or 402, or permission of instructor. 3 cr. (Alternate years; offered in 1965-66.)

532. Geography of the U.S.S.R. and Eastern Europe

A topical and regional analysis of the U.S.S.R. and its Eastern European satellites with emphasis on the former. An appraisal of the physical resource base of the U.S.S.R. and its effect on the pattern of population and location of economic activity. Mr. LeBlanc. Prereq.: Geog. 401 or 402, or permission of the instructor. 3 cr. (Alternate years; offered in 1965-66.)

570. Climatology

The description, analysis, and interpretation of the climates of the world. A knowledge of the basic meteorological processes is assumed. Major topics covered include: world patterns of temperature, precipitation, pressure and winds, and the causes of these patterns; local weather and storm types; new concepts in meteorology and their application to climatology; problems of climatic classification and the major systems of climatic classification. Mr. Wallace. Prereq.: Geog. 471 or 473, or permission of the instructor. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

795. Meteorological or Geographical Problems

Special problems by means of conferences, assigned readings, and laboratory work, fitted to individual needs. Mr. Wallace, Mr. LeBlanc and Mr. Chapman. Prereq.: Permission of the instructor. 1-5 cr. This course may be repeated to a total of not more than 5 credits.

797. Seminar in Geography

The purpose of this course is to provide an integration of the various fields of geography, to give an introduction to the history and methodology of geography, and to provide an introduction to the research techniques of the discipline. Major topics to be covered include: the history of geographic thought, source materials and methods of geographic archival research, problems of cartographic representation, statistical techniques in geography, geographic field techniques, and the definition of research problems in geography. Students will prepare short research papers and select topics for independent study the following semester. Course intended primarily for seniors majoring in geography. Mr. Wallace and Mr. LeBlanc. Prereq.: Permission of instructor. 3 cr.
Government

German
(See Foreign Languages and Literatures)

Government (52)

John T. Holden, Professor and Chairman; Robert B. Dishman, Professor; Erwin A. Jaffe, Associate Professor; S. Kenneth Howard, Assistant Professor; Frederic Wurzburg, Assistant Professor; Joseph P. Ford, Instructor; Raymond E. Matheson, Instructor

All students majoring in Government must complete Government 405 and 406 with a grade of C or better. These two courses qualify the student for his major but may not be counted for major credit.

405, (405). Elements of Political Science

An introduction to politics and government in modern society. The scope and method of political science, the behavior of the individual and group in political society, the nature and structure of political power, and competing political ideologies, e.g., communism, elitism, democracy. Staff. Open to all students. 3 cr.


The origins and development of the national government in the United States. The role which legislators, administrators, judges, and the people themselves play in the governmental process and the constitutional and political framework within which they operate. Staff. Open to all students. 3 cr.

408, (408). America in World Affairs

The problems of American foreign relations. The formulation and execution of policy, the emergence of the United States as a world power, contemporary issues confronting the country, and policies adopted to meet the issues. Mr. Holden and Mr. Ford. Open to all students. 3 cr.

513. Introduction to State and Local Government

An examination of the institutions, services, historical background, and social, economic, and political environment of state and local governments. Emphasis will be placed upon the political process and the relation between structure and politics, including an analysis of the impact of this relationship upon executive, legislative, and judicial powers. State-local relations will be examined in some detail. Mr. Howard. 3 cr.

514. Problems in State and Local Government

An examination of selected problems in state and local government and their proposed solutions. Topics to be covered include the role of states in a federal system, metropolitanism, urban planning, reapportionment of state legislatures, taxation, and educational politics. Field trips to town meetings and to the state legislature, when in session, will be included. Prereq.: Gov. 513. Mr. Howard. 3 cr.

515. Western European Democracy

A comparative study of the leading democratic systems in Western Europe, including Great Britain, France, and Bonn Germany, with more em-
phasis on the Common Market and other relevant regional organizations. Mr. Wurzburg. Prereq.: Gov. 405 or permission of instructor. 3 cr.

516. TOTALITARIAN DICTATORSHIP

A comparative study of totalitarian dictatorship emphasizing the Communist regimes of Russia and China but with some attention given to Fascist regimes. Mr. Wurzburg. Prereq.: Gov. 405 or permission of instructor. 3 cr.

525. POLITICAL PARTIES AND THE ELECTORAL PROCESS

Political parties as an instrument for the popular control of government in the United States. The way in which parties are organized, the methods by which they nominate candidates and campaign for their election, and the groups from which they draw most of their electoral support. Mr. Ford. Prereq.: Gov. 406. 3 cr. (Alternate years; not offered in 1965-66.)

561. AMERICAN POLITICAL THOUGHT

A survey and analysis of the major theories which have contributed to American political thinking from the colonial period to the present. Prereq.: Gov. 405, 406 or introductory American history course. Mr. Jaffe. 3 cr.

717. CONTINENTAL EUROPEAN POLITICAL PARTIES

The relationship of theories of representation and political parties to historical circumstance. Following an appraisal of today’s party systems, chronological treatment serves to show how changes within and among political parties are connected with the changing role parties play in the political process. Prereq.: Permission of Department. Mr. Wurzburg. 3 cr.

726. PRESSURE GROUPS AND THE GOVERNMENTAL PROCESS

Political interests groups as an unofficial “third house” of American national and state legislatures. The efforts by pressure groups to influence public officials by lobbying, propaganda, and direct political action. Mr. Ford. Prereq.: Gov. 406. 3 cr. (Alternate years; offered in 1965-66.)

731. THE ADMINISTRATIVE PROCESS

The principal concepts of governmental administration, including theories of organization, administrative leadership, internal management, and administrative responsibility and control. The relationship of group behavior and policy development to the administrative process. Mr. Howard. Prereq.: Gov. 406 or Soc. 400. 3 cr.

741. ADMINISTRATION OF JUSTICE

A comparative study from primitive times to the present of the administration of criminal and civil justice under various legal institutions and systems. The modern role of the police, public prosecutor, judge, jury, counsel, and interest groups in the judicial process in the United States and in other nations, including England and Wales, France, Germany, and the Soviet Union. Mr. Dishman. 3 cr. (Not offered in 1965-66.)

742. THE SUPREME COURT AND THE AMERICAN CONSTITUTION

The Supreme Court considered as both a court of law and a political institution. The origins and development of judicial review and changing conceptions of the judicial process. The Supreme Court as supreme arbitrator in disputes between the nation and the states, the President and Congress,
Government

and majority rule and minority rights. Mr. Dishman. Prereq.: Gov. 406 or permission of the instructor. 3 cr.

745. World Politics

The basic driving forces in international relations, including the nature of political power and its extension or limitation. Geopolitics, nationalism, ideology, imperialism, international economic relations, balance of power, warfare, regulation of arms, international law, and collective security. Mr. Holden. 3 cr.

746. Foreign Policies of the Great Powers

Fundamental factors influencing contemporary foreign policy formulation of the United States, the Soviet Union, the British Commonwealth, and other significant powers. Problems and choices confronting policy makers of these powers in dealing with issues involving the United Nations, regional organizations, Western Europe, Middle East, and Asia. Mr. Holden. 3 cr.

751. Contemporary Southeast Asia

A comparative study of the political and social development of Southeast Asia. The significance of the role of independence and dependence; the competing influence of communism and Western democracy; the special significance of the role of China, India, Great Britain, and the United States. The states to be studied include the Philippines, Laos, Cambodia, Viet Nam, Viet Minh, Thailand, Burma, Malaya and Indonesia. Mr. Holden. 3 cr. (Alternate years; offered in 1965-66.)

752. Government of Emerging Countries

A comparative study of recent developments in the politics and governing systems of Asia and Africa, and regional arrangements indigenous to these areas. Prereq.: Gov. 405 or permission of instructor. 3 cr. (Alternate years; offered in 1965-66.)

754. Governments of Latin America

A comparative study of the politics and governing systems of Latin America with some consideration given to regional arrangements. Prereq.: Gov. 405 or permission of instructor. 3 cr. (Alternate years; not offered in 1965-66.)

763. Political Thought in the West

The principal political theories from Plato and Aristotle to the beginning of the modern liberal tradition. The growth and development of political thinking and institutions in terms of the development of modern government. The development of the modern national state and its fundamental institutions. Mr. Jaffe. 3 cr.

764. Modern Political Thought

Modern western political thought from the emergence of the nation state to the present. The meaning and growth of the basic patterns of thought on the Continent and in England, including liberalism, democracy, nationalism, socialism, communism, and fascism. The contributions of American political thought as it grew from its English origins to the development of the American constitutional system. Mr. Jaffe. 3 cr.

765. Contemporary Political Theory

A survey and analysis of contemporary political theories. The crisis in democratic thought, totalitarian ideology, the search for scientific political
Government

theory. Prereq.: Gov. 763, 764, or permission of instructor. Mr. Jaffe. 3 cr. (Offered in 1965-66.)

771, (771). Research in Government Problems

Independent study of the methods and techniques of research in various fields of government. Students analyze the economic, social, and political structure of their own community, the composition and organization of their state legislature, the record of their Representative in Congress or one of their Senators, the legislative history of an act of Congress, and the judicial process as exemplified by a decision of the U. S. Supreme Court. Students not writing a profile of their home community will be expected to write an extended thesis on some topic of their choice in any field of political science. Open to junior majors in government and others with permission of the instructor. Mr. Dishman. 3 cr.

779. Public Policy and Regionalism

3 cr. (Not offered in 1965-66.)

797, 798. Seminar in Government

A selected current topic from government, political philosophy and history, political behavior, public law, public administration, or international relations will be the vehicle for this seminar. Each student is held responsible for a specific phase of the selected problem. He will also, through the techniques of the seminar, acquaint himself with the whole project. The course is restricted to undergraduates with honor grades and graduate students in Social Science. Advance copies of the syllabus may be secured from the Chairman of the Department. Permission of the instructor is required. Mr. Holden, Mr. Dishman, Mr. Ford, Mr. Jaffe, Mr. Howard, Mr. Wurzburg. 3 cr.

Greek

(See Foreign Languages and Literatures)

History (53)

William R. Jones, Assistant Professor and Chairman; William Yale, Professor Emeritus; Philip M. Marston, Professor; David F. Long, Professor; Hans Heilbronner, Professor; Gibson R. Johnson, Associate Professor Emeritus; Allan B. Partridge, Associate Professor; Robert C. Gilmore, Associate Professor; William Greenleaf, Associate Professor; Charles A. Jellison, Jr., Associate Professor; Marion E. James, Associate Professor; Robert M. Isherwood, Assistant Professor; Allen B. Linden, Instructor

Students are not permitted to enroll concurrently in survey courses and advanced courses of the same area, i.e., History 503 and 707, 708, 711, 719; 504 and 712, 715, 716, 720; 535 and 743, 747; 536 and 747, 749, 756; 580 and 781. Students are not eligible to enroll in elementary courses after having completed advanced courses in the same area. Exemptions from this rule are possible only through petition.
Basic Course

The following course is required of all students.

401, 402. Introduction to Contemporary Civilization

A historical analysis of the fundamental forms and forces of human societies, Western and non-Western, from the Paleolithic Age to the present. Special attention will be given to the history of science and technology, of education and learning and of artistic expression. Staff. 3 cr. No credit toward a major.

Group I

503, 504. History of the United States

American history from Washington’s first administration to the present. Political, social, economic, and diplomatic aspects. Mr. Jellison and Mr. Long. Not open to freshmen. 3 cr.

707, 708. Colonial and Revolutionary American History

Colonial beginnings in America, national rivalries, the English colonies, the Revolution, and our national life to 1789. Early forms of Americanism in the making. Mr. Marston. 3 cr.

711, 712. Nineteenth-Century America

The historical factors, both domestic and international, involved in the development of the American Republic, its institutions and people, from the inception of the new nation in 1789 to the emergence of the United States as a world power in 1900. Mr. Jellison. 3 cr.

715, 716. Twentieth-Century America

United States history since 1896, from the triumph of industrialism on the national scene to the emergence of America as a world power in the nuclear age. Political, economic, and diplomatic developments. Mr. Greenleaf. 3 cr.

719, 720. The Foreign Relations of the United States

Primarily the history of American diplomacy, with attention given to the non-diplomatic aspects of foreign relations. Mr. Long. 3 cr.

725. Business History

A survey of the development of business enterprise and its institutions in Western Europe and the United States from the late Middle Ages to the era of the giant diversified corporation. Emphasis is placed on the role of the entrepreneur, the impact of public policy on business, and the case study of individual firms. Mr. Greenleaf. 3 cr.

Group II

535, 536. Modern European History

Europe from the end of the Middle Ages to our own times. The evolution of the national state; international relations; the expansion of Europe overseas; and the background of our modern Western civilization especially its ideas, literature and art. A basic course for those who wish to proceed further in the study of European history as well as a survey for those who
History

are interested in special aspects of Western cultural development. Not open to freshmen. 3 cr.

559, 560. HISTORY OF ENGLAND
The history of the British Isles from earliest times to the present, and a consideration of the British Empire and Commonwealth of Nations. A parallel to English literature, a background to American political history, and a study of English culture and institutions in the democratic and social integration of the world. Mr. Partridge. Not open to freshmen. 3 cr.

739, 740. THREE MEDIEVAL CIVILIZATIONS
A study of the demise of classical antiquity in the lands bordering the Mediterranean and the genesis and fruition of three new cultural traditions: the Latin Christian; the Islamic; and the Byzantine. Stress will be put on religious, literary and scholarly survivals and innovations from 400 A.D. to 1400 A.D. Mr. Jones. 3 cr.

743. RENAISSANCE AND REFORMATION
The history of Europe during the fifteenth and sixteenth centuries with primary emphasis on the Italian Renaissance, the Protestant Reformation and the emergence of the national state. 3 cr.

747. THE AGE OF ABSOLUTISM
The theory and practice of absolutism from its origin in the seventeenth century to its apogee in Enlightened Despotism. Mr. Isherwood. 3 cr.

749. THE AGE OF REVOLUTION
Revolution as a socio-political phenomenon in its historical setting. Comparative approach to Puritan, American and French Revolutions with reference to contemporary movements. Mr. Gilmore. 3 cr.

756. TWENTIETH-CENTURY EUROPE
European history in the Twentieth Century will be treated from the point of view of a civilization in a constant state of crisis. World War I, the inter-war period, World War II, and the attempts to solve the conflicts of modern society after that war in terms of new economic, political, and cultural patterns will represent the core of the study. The effects of extra-European influences, the loss of European primacy and continued strife within the structure of the European state and cultural system. Mr. Heilbronner. 3 cr.

763, 764. HISTORY OF RUSSIA
The development of the Russian state from its foundation to its present status as a world power. The course is designed to increase the understanding of the present in terms of the past. Political developments, foreign relations, and intellectual and ideological currents. Mr. Heilbronner. 3 cr.

774. EUROPEAN HISTORIOGRAPHY
An examination of selected works of historical literature since the Reformation. Emphasis will be placed on the comparison of different schools of historical interpretation, the development of historical methods, and the impact of Romanticism, Idealism, Nationalism, and Positivism on the composition of historical literature. Mr. Isherwood. 3 cr.
Group III

531, 532. LATIN-AMERICAN HISTORY
The development and influence of Spanish and Portuguese culture as a widespread world force; the history of the Latin-American peoples; the relationship of Latin America to North America, particularly in view of recent growth in friendly and diplomatic relations. Mr. Partridge. Not open to freshmen. 3 cr.

575. THE ANCIENT NEAR EAST
A history of the Near East from the neolithic revolution to the time of Alexander the Great. Special attention will be given to the rise of civilization, the nature of man's artistic and intellectual development in the earliest civilizations of Mesopotamia and Egypt, and Judaism in its historical setting. Miss James. Not open to freshmen. 3 cr. (Not offered in 1965-66.)

576. THE AEGAN WORLD
A history of the Aegian area from Crete to the death of Alexander the Great in 323 B.C. Miss James. Not open to freshmen. 3 cr.

577. THE HELLENISTIC-ROMAN WORLD
History of the Ancient World from the death of Alexander in 323 B.C. to the end of Constantine's reign in 337 A.D. The course will cover major political, economic, and social developments, but will give most consideration to artistic, scientific, philosophical, and religious trends — with particular emphasis on the rise of Christianity and the transformation of the classical world. Miss James. Not open to freshmen. 3 cr.

579, 580. THE HISTORY OF CHINA AND JAPAN
The development of Chinese and Japanese civilizations from their origins to the present. The course is intended to help the student understand how modern Chinese civilization and modern Japanese civilization reflect the conflict of traditional values of the Chinese and Japanese peoples and modern values learned from Europe and America. Mr. Linden. Not open to freshmen. 3 cr.

(781). HISTORY OF MODERN CHINA, 1850-1950
A study of the modernization of China. The course will be concerned with the political, social, and cultural changes which have occurred in China from its early contacts with the West to the establishment of the Communist Regime. Mr. Linden. 3 cr.

Group IV

695, 696. HONORS PROGRAM
An honors program involving two types of work: (1) The student carries on independent study in some specialized areas (according to the requirements of the existing independent study program). (2) The student attends a seminar in which he discusses the nature of history, historical method, and a survey of historical writing, various historical philosophies, and interpretations. Prereq.: A student must have a cumulative average of 3.0, or must show an exceptional aptitude for history. Each case will be judged individually. 3 or 6 cr.
History

(789). Seminar in the History of Science

Selected topics, conducted through special lectures, individual study, oral and written reports. The subject will vary from year to year. This course is the same as Phys. Sci. (789). Mr. Schneer. Cannot be used for credit in History without permission of the History Department. Prereq.: Permission of adviser and instructor. 3 cr.

History-Education 791. Problems in the Teaching of High School History and Other Social Studies

Bibliography and new interpretations of history; the social studies curriculum, past and present; aims and objectives in the social studies; selection and organization of teaching material; teaching and testing techniques. Special emphasis on teaching American history and the problems of American democracy. Open to students who have satisfactorily completed History 503, 504; six credits in other history courses, exclusive of History 401, 402; six credits from American Government, Principles of Economics or Principles of Sociology; and Education 758. 3 cr. This course may not be used to satisfy major requirements.

Home Economics (31)

Marjory A. Wybourn, Professor and Chairman; Elizabeth M. Rand, Associate Professor; Earl O. Goodman, Associate Professor; Ruth E. Pearce, Assistant Professor; Dawn A. Mcclowry, Instructor; Sylvia E. Hoffman, Instructor; Virginia H. Roll, Instructor; Patricia M. Tengel, Instructor

407. Home Economics Professional Seminar

Designed to help the student define and clarify professional and educational objectives and to become acquainted with the philosophy of home economics, educational experiences in college, and professional opportunities in the field. Trips will be planned to meet home economists in various positions. Miss Wybourn and staff. 2 cr. NLG.

(548), 548. Field Work

A supervised experience which provides an opportunity for students to explore various professional fields. Prereq.: Permission of adviser. Staff. 2-6 cr.

Child Development and Family Relations

415, (415). Personality and Courtship

The effects of family interaction on the personality development of the individual from birth through courtship with an emphasis on the student gaining insight into his own involvement in courtship and mate selection. Mr. Goodman. 3 cr.

425-426, (425). Child Development

The development and guidance of the child from the prenatal to the adolescent period with emphasis on the preschool child. Observation and work at the University Nursery School. Study of children in other situations may be included during the second semester. Not open to freshmen. Miss Rand. 3 cr.
685. ONE SEMESTER AT THE MERRILL-PALMER INSTITUTE
A junior or senior student in the Department of Home Economics may attend The Merrill-Palmer Institute in Detroit, Michigan. Enrollment by application to the Department of Home Economics. 15-17 cr.

783. FAMILY RELATIONSHIPS
A study of husband-wife, parent-child, and sibling interactions throughout the family life cycle. Mr. Goodman. 3 cr.

(792). METHODS IN FAMILY RELATIONS EDUCATION
A study of the methods and materials used in family relations education in high schools, colleges, churches, and social agencies. Mr. Goodman. 2-4 cr.

795, (795). PROJECTS IN CHILD DEVELOPMENT
Discussion, conferences, and supplementary projects based upon special interests of the student. Work with children in the University Nursery School or in other situations. Prereq.: H.E. 426 and permission of the instructor. 1-3 cr. each semester. Miss Rand. Maximum of 6 cr.

Clothing and Textiles

(404), 404. TEXTILES
The textile fibers and their characteristics, natural and man-made, as related to their selection, care, and ultimate use. Miss Roll. 3 cr.

405, (405). CLOTHING SELECTION AND CONSTRUCTION
Selection of clothing to meet individual needs with consideration given to design appropriateness and social, psychological, and economic forces. Principles involved in clothing construction with application to garments. Miss Roll. 3 cr.

531, (531). INTERIOR DESIGN
An application of the principles of design to the decorating of the home. Economic and social factors relating to housing for the family. 3 cr.

560. FLAT PATTERN
Application of the principles of flat pattern designing to the development of design ideas for apparel. Prereq.: H.E. 405. Miss Pearce. 3 cr.

561. DRAPING
Basic principles of fabric manipulation in the draping processes and the development of patterns and garments through this method. Prereq.: H.E. 405 or equivalent. 3 cr.

563. TAILORING
The appreciation and application of tailoring principles to making and buying tailored garments. Prereq.: H.E. 560. Miss Pearce. 3 cr.

765. HISTORY OF COSTUME
A broad historical survey of western world costume from primitive times to the present. The influence of social, religious, and political conditions of the eras studied to costume evolution. 3 cr. Miss Pearce. (Alternate years; offered in 1965-66.)
Home Economics

768. Socio-Psychological Aspects of Clothing
The analysis of research and theory in the social psychological aspects of clothing. An exploration and study of clothing behavior of individuals and groups. 3 cr.

(769). Advanced Textiles
Investigation and evaluation of fabrics in everyday use. Consumer problems with emphasis on economic and social implications. Prereq.: H.E. 404. Miss Roll. 3 cr.

Foods and Nutrition

(418), 418. Principles of Food Selection and Preparation
Fundamental principles of selection, preparation, meal planning and service of food. Miss McClowry. 3 cr.

521, (521). Quantity Foods and Purchasing
Principles and methods of quantity food production and purchasing. Laboratory experiences in the University Dining Halls. Prereq.: H.E. 418. Miss Hoffman. 3 cr.

573, (573). Nutrition
A study of the nutrients essential to human life and well-being, their functions in metabolism, sources in food, and relationship between food habits and health. Miss Hoffman and Miss McClowry. 3 cr.

674. Nutrition in Health and Disease
Dietary modification and management and the metabolic bases for nutritional therapy in the treatment of disease. Prereq.: H.E. 573. Miss Hoffman. 3 cr. (Alternate years; not offered in 1965-66.)

771, (771). Experimental Foods
Application of the experimental method of study to the principles underlying food preparation. Includes laboratory and individual projects. Prereq.: H.E. 418. Miss Hoffman. 3 cr.

778. Food and Nutrition Trends and Developments
Investigation and evaluation of current problems in food production, preparation and preservation or of current nutritional developments. The course may be carried as an independent directed study. Miss Hoffman. 3 cr.

797. Nutrition Seminar
Theoretical approach to nutrient metabolism. Critical review of literature in the field of nutrition relative to the principles on which human nutrition is based. Prereq.: H.E. 573. Miss Hoffman. 3 cr. (Alternate years; offered in 1965-66.)

Home Economics Education

791. Methods in Home Economics Education
Home economics education in the school program, curriculum materials, methods, and resources in teaching home economics. Miss Wybourn. 3 cr.
(794), 794. Supervised Teaching in Home Economics
Eight weeks of supervised teaching in a school. Prereq.: Educ. 757, 758 and H.E. 791. 7 cr.

(798), 798. Seminar in Home Economics Education
Recent developments and problems in teaching home economics at all levels. Individuals or small groups may work on specific problems in the field. Prereq.: H.E. 791 or equivalent. Miss McClowry. 2-4 cr.

Home Management

(654), 654. Family Financial Management
Family financial decision-making at various stages of the family life cycle in relationship to values and goals. Family expenditures, methods of keeping records, use of credit, investments, and various forms of insurance. Miss Tengel. 3 cr.

658. Home Management Residence
Management principles in the operation of the home. Permission of instructor. Miss Tengel. 2-4 cr.

757, (757). Home Management
The management of individual and family resources as related to human needs, values, and goals throughout the life cycle of the family. Miss Tengel. 3 cr.

796, (796). Projects in Home Management
The student, under the guidance of the instructor, will undertake selected areas of study in the field of home management. Such investigations may include: (a) family finance, (b) consumer education, (c) management processes, (d) current research. Miss Tengel. 1-3 cr. each semester. Maximum of 6 cr.

Hotel Administration (74)
Richard H. Pew, Associate Professor; Louis Fiorey, Lecturer

401. Introduction to Hotel Management
The scope of the hotel-motel business, both resort and transient. History of hospitality including current trends in the lodging and feeding industries. 2 cr.

410, 412, 514, 516. Lectures on Hotel Management
Delivered by notable representatives in the hotel-motel, club, food service, institutional, student union, and allied fields. ½ cr. for each course. NLG

509. Hotel and Restaurant Accounting
A study of hotel and restaurant accounting systems with emphasis on internal control. Includes study and interpretation of operating statistics and financial reports. Food and beverage cost accounting is also presented. Open to Hotel Administration majors only. Prereq.: B.A. 402. 3 cr.
Hotel Administration

555. **Hotel Operation**

The organization, personnel, and work of the departments; front office procedure; housekeeping. B.A. 509 should precede or accompany this course. 3 cr.

556. **Hotel Engineering Problems**

Basic principles of electricity and heat, laundry practices and equipment, kitchen planning and layouts, pumps and vacuum systems, water supply and use, fire protection, and other mechanical problems of hotel-motel and food service operations. 3 cr.

666. **Hotel Promotion and Sales**

The principles and practices used internally and externally for stimulating hotel and restaurant sales. 2 cr.

667. **Stewarding and Catering**

Purchasing, receiving, and control of foods and beverages. Organized as staff-type meeting for laboratory research, planning, preparation, and service of exceptional functions, including the critique. 3 cr.

669. **Hotel Honors Seminar**

A research and problems course concerned with advancing knowledge in the lodging and feeding fields. 3 cr.

670. **Senior Seminar**

Assigned readings, followed by discussion of techniques, procedures and policies in hotels, clubs, motels, restaurants, hospitals, institutions, and student unions; contract feeding; university lodging and feeding. 2 cr.

**Humanities (43)**

Register for this course as Hu. 501-502.

501-502. **Humanities**

A course in general education involving the departments of English, Foreign Languages and Literatures, Philosophy, The Arts, and Music. It aims to develop an appreciation of literature, the various arts, and philosophy, and to give an understanding of western cultural traditions. The course will operate within an historical framework but is not intended to be an historical survey. Weekly lectures or demonstrations, readings, slides, films, recordings, class recitations, and discussion. There will be at least one museum trip each semester. Mr. Casas, Mr. Daggett, Mr. Fasanelli, Mr. Maynard, and guest lecturers. Not open to freshmen. 3 cr.

**Italian**

(See Foreign Languages and Literatures)

**Languages**

(See Foreign Languages and Literatures)
Latin
(See Foreign Languages and Literatures)

Liberal Arts (40)
The following courses are non-departmental. Register for them as L.A. 651, etc.

651, (651). Senior Synthesis: American Civilization in Transition
An interdisciplinary course designed to promote an awareness of some major issues facing the contemporary world. Assigned readings and weekly evening lectures by guest speakers constitute the basis for reflection and discussion in two one-hour seminar sections. Mr. Menge, Mr. Anderson. Pre-req.: Senior standing. 3 cr. Open to all Colleges.

695, 696. Independent Study
Independent study for the College of Liberal Arts junior or senior honor student whose major department has no independent study course. Prereq.: Junior or senior with honor standing (cumulative average of at least 3.0), approval of student's supervisor, and the department. A junior may register for a total of 6 credits and a senior for a total of 12 credits. See description of the College of Liberal Arts Honors Program.

Mathematics (84)

M. Evans Munroe, Professor and Chairman; Marvin R. Solt, Professor Emeritus; William L. Kichline, Professor; Robert J. Silverman, Professor; A. Robb Jacoby, Professor; Shan S. Kuo, Professor of Applied Mathematics; James Radlow, Professor of Applied Mathematics; Shepley L. Ross, Associate Professor; Edward H. Batho, Associate Professor; Donald M. Perkins, Assistant Professor; Robert O. Kimball, Assistant Professor; Frederick J. Robinson, Assistant Professor; David M. Burton, Assistant Professor; Richard H. Balomenos, Assistant Professor; William E. Bonnice, Assistant Professor; William G. Witthoft, Assistant Professor; Eric Nordgren, Assistant Professor; J. Roger Teller, Assistant Professor; Merle D. Guay, Assistant Professor

301. Digital Computer Programming
The elements of the FORTRAN language; basic instruction in the use of the IBM 1620 computer. 0 cr. NLG.

302. Intermediate Algebra
0 cr. (Offered through the Extension Service only.) NLG.

303. Trigonometry
0 cr. (Offered through the Extension Service only.) NLG.

405. Introductory College Mathematics
Enrichment and development of the material presented in the last part of the senior high school mathematics program. Content: Trigonometry,
Mathematics

analytic geometry, theory of equations, inequalities, number systems, permutations and combinations; elementary set theory. Prereq.: At least 3 entrance units in mathematics taken exclusively from the fields of algebra, geometry, and trigonometry, and including work in all three of these subjects. 3 cr. Does not count for major credit in Mathematics.

407-408. FUNDAMENTAL MATHEMATICS

Introduction to logic, selected topics in mathematical structures; limits, continuity, introduction to calculus; finite mathematics; probability and statistical inference; theory of games. Recommended for non-technical students desiring a year's work in mathematics at the University level. Prereq.: At least 3 entrance units in mathematics taken exclusively from the fields of algebra, geometry, and trigonometry, and including work in all three of these subjects. 3 cr. Does not count for major credit in Mathematics.

421. CALCULUS B 1

Review of topics from algebra and trigonometry; introduction to differential and integral calculus. Students electing calculus will be placed in the 421-422-523 sequence or in the 425-426 sequence on the basis of an achievement test in algebra and trigonometry. Prereq.: 2 years of algebra, 1 year of geometry, 1/2 year of trigonometry. 3 cr. Does not count for major credit in Mathematics.

422. CALCULUS B 2

Continuation of differential and integral calculus with analytic geometry. Prereq.: Math. 421. 3 cr. Does not count for major credit in Mathematics.

425. CALCULUS A 1

First course in analytic geometry and calculus. Students electing calculus will be placed in the 421-422-523 sequence or in the 425-426 sequence on the basis of an achievement test in algebra and trigonometry. Prereq.: 2 years of algebra, 1 year of geometry, 1/2 year of trigonometry. 4 cr. Does not count for major credit in Mathematics.

426. CALCULUS A 2

Conclusion of introductory course in calculus of functions of one argument. Prereq.: Math. 425. 4 cr.

523. CALCULUS B 3

Conclusion of introductory course in calculus of functions of one argument. Prereq.: Math. 422. 3 cr.

527. DIFFERENTIAL EQUATIONS

Basic concepts, methods, and applications of ordinary differential equations; exact and approximate methods for solving first order equations; higher order linear equations; series solutions; systems of equations; boundary value problems. Prereq.: Math. 523 or 426. 4 cr.

528. MULTI-DIMENSIONAL CALCULUS

Vectors, matrices and linear transformations, partial derivatives, maximum-minimum problems, implicit function theorem and applications, vector differential calculus, exterior products and multiple integrals, the generalized Stokes theorem and its classical specializations. Prereq.: Math. 523 or 426. 4 cr.
531. **Introduction to Set Theory and Number Systems**

Fundamental concepts of logic and set theory; formal development of the rational, real; and complex number systems. Prereq.: Math. 422 or 426. 3 cr.

542. **Probability**

Discrete and continuous distributions; random variables; moments; normal and Poisson distributions; the central limit theorem; laws of large numbers. Prereq.: Math. 531. 3 cr.

601-602. **Foundations of the Number System**

Postulates and mathematical structures. A study of various mathematical systems designed to show the nature and significance of the fundamental principles of arithmetic. Intended primarily for elementary school teachers. Prereq.: Consent of instructor. 3 cr.

603. **Basic Concepts of Algebra**

An introduction to generalization and abstraction in algebra designed primarily for prospective elementary school teachers. Prereq.: Math. 602. 3 cr.

604. **Informal Geometry**

An introduction to the objects and methods of study in a modern treatment of Euclidean geometry designed primarily for prospective elementary school teachers. Prereq.: Math. 602. 3 cr.

629. **Methods of Applied Mathematics I**

Solutions of ordinary differential equations by D-operators, Laplace Transforms, and by series; representation of functions by definite integrals (Gamma, Beta, and error functions); Bessel functions; Fourier Series. Prereq.: Math. 527. 4 cr.

630. **Methods of Applied Mathematics II**

Vector analysis (line, surface, and volume integrals); elementary variational techniques; development of some partial differential equations of mathematical physics; solutions of partial differential equations by Laplace transforms and by Green's functions. Prereq.: Math. 629. 4 cr.

653-654. **Methods and Techniques of Modern Computation**

Methods of numerical analysis which are believed to be particularly suitable for high speed computation, including some newly developed methods. Methods for making analytical approximations will also be emphasized. An introduction to programming techniques, assembly and compiler programs, interpretive systems and symbolic operations. In the laboratory portion of the course, the practical aspects of modern computation, such as loss of precision, round-off error, overflow and underflow, etc., will be illustrated by means of short problems on both the desk calculator and the digital computer in the UNH Computation Center. A long range project for investigation on the computer will be assigned. Prereq.: Math. 527 and 301. 3 lec.; 1 lab.; 4 cr.

696. **Independent Study**

Individual study projects in various areas of mathematics as determined to be of interest and value to the student and the Department. Supervision
Mathematics

is by an appropriate faculty member. Consent of the faculty supervisor and Department chairman is required. 1 to 6 cr.

698. Senior Seminar

Individual study on special topics. Preparation and presentation of reports on topics assigned. Prereq.: Senior standing in mathematics. 3 cr.

741. Mathematical Statistics I

Sampling theory; estimation of parameters; the multivariate normal distribution. Prereq.: Math. 542. 3 cr.

742. Mathematical Statistics II

Testing statistical hypotheses, confidence intervals, regression and correlation, non-parametric methods, and other topics. Prereq.: Math. 741. 3 cr.

755. Fundamental Concepts of Geometry

Systems of postulates of various geometries; geometric invariants; synthetic and analytic projective geometry; introduction to non-Euclidean geometry, topology, and the elementary differential geometry of curves and surfaces. Prereq.: Math. 523 or 426. 3 cr.

756. Topics in Number Theory

Elementary properties of integers; the Euclidean algorithm; divisibility; diophantine equations of the first degree; congruences; residue classes and the Euler function; distribution of primes; quadratic residues; diophantine equations of the second degree; selected topics in diophantine approximation and number-theoretic functions. Prereq.: Math. 426 or 523. 3 cr.

761. Higher Algebra I

The integers; the rational and complex number systems; congruences; polynomials; groups; rings; integral domains; fields. Prereq.: Math. 531. 3 cr.

762. Higher Algebra II

Vector spaces and transformations matrices and determinants. Prereq.: Math. 761. 3 cr.

767. Real Analysis I

The real number system; elements of set theory; theory of limits; continuous functions and their properties; differentiability and the mean value theorem. Prereq.: Math. 531. 3 cr.

768. Real Analysis II

The Riemann integral; uniform convergence; double and iterated limits; applications of double limit theorem to series, limits under the integral sign and existence theorems for differential equations. Prereq.: Math. 767. 3 cr.

771. Group Theory and Principal Ideal Domains

Finite groups and their applications; Galois theory; Sylow theorems; structure of principal ideal domains with applications to elementary divisor theory; unique factorization domains. Prereq.: Math. 762. 3 cr.
781. Theory of Approximation
The theorems of Weierstrass on approximation of continuous functions; the Tschebycheff approximation problems; Tschebycheff polynomials; trigonometric polynomials of best approximation; interpolation; the formulas of Lagrange and Newton; trigonometric interpolation. Prereq.: Math. 527. 3 cr.

782. Non-Linear Differential Equations
Phase plane analysis of lineal systems and non-linear conservation systems; stability theorems; limit cycles and periodic solutions; the Van der Pol equation; the method of Kryloff and Bogoliouboff. Prereq.: Math. 527. 3 cr.

783. Introduction to Differential Geometry
A first course in the metric differential Geometry of curves and surfaces in Euclidean space. Prereq.: Math. 527. 3 cr.

784. Introduction to Topology
Elementary point-set topology in metric and topological spaces, in particular the real line and plane. Prereq.: Math. 761. 3 cr.

788. Complex Analysis
The complex number system; analyticity; elementary functions; Cauchy integral theorem and formulas; Taylor and Laurent series; singularities and residues; conformal mapping. Prereq.: Math. 527. 3 cr.

791. Mathematics-Education (Math-Ed)
The aims and values of secondary-school mathematics; the recommendations of the national committee on mathematics requirements, and the State Board requirements; the subject matter and the sequence in which it should be presented in both junior and senior high schools; techniques and instructional aids used in teaching secondary-school mathematics; errors, testing program, remedial teaching. Students preparing to teach mathematics in high school should register for this course — it is a prerequisite for Supervised Teaching in Mathematics. Lectures, assigned readings and discussion. Prereq.: Education 758 and Math. 523 or 426. 3 cr. May be counted as major credit only by students preparing to teach mathematics in the secondary schools.

796. Introduction to Theory of Differential Equations
Existence and uniqueness theorems for ordinary differential equations; theory of linear ordinary differential equations of order n; oscillation and comparison theorems for second order linear ordinary differential equations; first order partial differential equations; linear partial differential equations of the second order. Prereq.: Math. 767. 3 cr.
Mechanical Engineering

Mechanical Engineering (85)

Robert W. Corell, Associate Professor and Chairman; Edward T. Donovan, Professor; E. Howard Stolworthy, Professor; Tenho S. Kauppinen, Associate Professor; Russell L. Valentine, Associate Professor; E. Eugene Allmendinger, Associate Professor; Douglas M. Norris, Jr., Associate Professor; William Mosberg, Associate Professor; Victor D. Azzi, Associate Professor; William E. Clark, Assistant Professor; Frederick G. Hochgraf, Assistant Professor; Wei Tseng Yang, Assistant Professor; Harvard B. Emery, Instructor; Lyman J. Batchelder, Instructor Emeritus; Elias M. O'Connell, Instructor Emeritus

405. Engineering Graphics
Communication of engineering information and concepts by multiview drawings, pictorial views, sketches, and graphs; the fundamentals of descriptive geometry. 2 lab.; 3 cr.

413. Engineering Graphics
Communication of engineering information and concepts by multiview drawings, pictorial views, sketches, and graphs. 1 lab.; 1 1/2 cr.

414. Engineering Graphics
The analysis of various engineering problems employing the fundamentals of descriptive geometry. Prereq.: M.E. 413. 1 lab.; 1 1/2 cr.

510. Manufacturing Processes and Design
A study of the machines and processes that are used in manufacturing and an analysis of the effect of these processes on the design of manufactured parts. Prereq.: M.E. 405. 3 labs.; 3 cr.

511. Machine Shop Practice
Advanced work in machine tools and their use; production methods, inspection, and quality control. Prereq.: M.E. 510. 2 lab.; 2 cr.

522. Materials I
An introduction to the structure and properties of metals, plastics, and ceramics; the influence of atomic structure on physical properties; equilibrium multiphase relations; deformation models. Prereq.: Chem. 401, 403, or 405. 3 cr.

523. Mechanics of Solids
Statics of rigid and deformable bodies; stress, strain, and constitutive laws; stress and deformation in structural elements and simple structures; elastic and plastic stability. Prereq.: Physics 404, Math. 426. 4 cr. (Note: M.E. 523, 524 replace M.E. 525, 526, 527. Students now in the later sequence will complete it as required in their curriculum.)

524. Dynamics
Review of particle dynamics; kinematics and dynamics of rigid bodies; moving reference frames; vibration of linear systems. Prereq.: Physics 404, Math. 426. 4 cr.

525. Statics
Forces, moments, and couples; resultants and equilibrium of force systems by vector and scalar methods; properties of areas and solids. Prereq.: Phys. 404, Math. 426. 2 cr.
526. **Dynamics**

   Particle and rigid body motion; relation between force, mass, and acceleration; work and energy; impulse and momentum. Prereq.: M.E. 525. 3 cr.

527. **Strength of Materials**

   Tension, compression and shear; strain; deflection in beams; combined stresses; strain energy; columns. Prereq.: M.E. 525. 3 cr.

533. **Thermodynamics**

   The fundamental laws of thermodynamics and their relation to working substances. Prereq. or concurrent: Phys. 502. 3 cr.

534. **Thermodynamics**

   A comprehensive study of the laws of thermodynamics and their affect on the behavior of media; microscopic thermodynamics; thermodynamics of combustion reactions; heat transmission. Prereq.: M.E. 533. 3 cr.

536. **Fluid Dynamics**

   Introduction to the dynamics and thermodynamics of compressible and incompressible fluid flow; analysis of the behavior of fluids as expressed by hydrostatic, continuity, momentum, and energy equations. Prereq.: M.E. 524 or 526, and M.E. 533. 3 cr.

537. **Mechanical Laboratory**

   Introduction to instrumentation and measurement of mechanical systems; design and management of experimental studies; preparation of engineering reports. Prereq. or concurrent: M.E. 533. 2 lab.; 2 cr.

538. **Mechanical Laboratory**

   Experimental methods in the solution of engineering problems; experimental design, data analysis, and management of experiments. Prereq.: M.E. 527, 537. Prereq. or concurrent: M.E. 534, 536. 2 lab.; 2 cr.

643. **Machine Design and Analysis**

   The concepts of strength of materials and dynamics are developed further and applied in the analysis and design of mechanical elements and systems. Prereq.: M.E. 526, 527, Math. 527. 3 cr.

644. **Mechanical Vibrations**

   Theory of vibratory motion applied to the analysis of discrete mechanical systems. Prereq.: M.E. 524 or 526, Math. 527. 3 cr.

653. **Heat Transfer**

   Analysis of heat transfer phenomena; steady-state and transient conduction, radiation, and convection; engineering applications. Prereq.: M.E. 534, 536, Math. 527. 3 cr.

657-658. **Heat and Power Systems**

   The utilization of thermodynamics, fluid mechanics, combustion, heat transfer, and other engineering sciences in the analysis and engineering evaluation of heat and energy conversion systems. Prereq.: M.E. 534, 536, 538. Prereq. or concurrent: M.E. 653. 2 lec.; 1 lab.; 3 cr.
Mechanical Engineering

663. MATERIALS II
Theoretical and experimental application of the theory of elasticity, displacement theory, and fracture mechanics to the determination of physical design parameters of crystalline and amorphous solids. Prereq.: M.E. 522. 2 lec.; 1 lab.; 3 cr.

664. X-RAY METALLOGRAPHY
Theoretical and experimental studies of x-ray diffraction and microradiography. Prereq.: Math. 301 and consent of instructor. 3 cr.

671. NAVAL ARCHITECTURE I
Introduction to naval architecture; geometry and hull form delineation; hydrostatic characteristics of floating and submerged bodies; introduction to ship strength; computer applications to problems. Prereq. or concurrent: M.E. 527. 3 cr.

691. ENGINEERING ECONOMY
The principles that form the basis for making engineering decisions to obtain the most favorable economic results. Prereq.: Senior standing. 3 cr.

692. INDUSTRIAL MANAGEMENT
Principles and methods of industrial management which form the basis for making engineering decisions in modern industrial practice. Prereq.: Senior standing. 3 cr.

695. MECHANICAL ENGINEERING PROJECT
A special study involving investigation of problems germane to mechanical engineering. Prereq.: Permission of department. 1-3 cr.

697-698. MECHANICAL ENGINEERING SEMINAR
Study and discussion of topics related to engineering with student-faculty participation. 1 cr.

699. UNDERGRADUATE THESIS
Individual experience in organizing an investigation of an engineering problem and its solution. Elective for seniors in Mechanical Engineering. Prereq.: Permission of the Department. 2 cr.

701. THERMODYNAMICS I
An introduction to statistical thermodynamics. Prereq.: M.E. 534. 3 cr.

727. ADVANCED STRENGTH OF MATERIALS
Energy methods; beams on elastic foundation; bending and buckling of thin plates; membrane stresses in shells; numerical methods. Prereq.: M.E. 523 or 527, Math. 629. 3 cr.

729. KINEMATICS
The vector equations of relative motions are used to analyze mechanisms of varying complexity; graphical and analytical methods for space linkages. Prereq.: M.E. 524 or 526. 2 lec.; 1 lab.; 3 cr.

751. GAS DYNAMICS
Basic equations of motion applied to compressible, ideal fluid flow; normal and oblique shock waves; vorticity and circulation; irrotational flow;
linear approach to two-dimensional flow problems; method of characteristics. Prereq.: M.E. 534, 536. 3 cr.

755. **INTERNAL COMBUSTION ENGINES**

Basic science and basic engineering courses are related to engineering problems through a study of spark ignition engines. Associated laboratory gives practice in organization of personnel and equipment to conduct and report engineering investigations. Prereq.: M.E. 533. 2 lec.; 1 lab.; 3 cr.

756. **TURBOMACHINERY**

Application of basic and engineering sciences to the engineering problems of turbomachinery; design, management, and reporting of experimental studies. Prereq.: M.E. 533, 536. 2 lec.; 1 lab.; 3 cr.

772. **NAVAL ARCHITECTURE II**

Hydrodynamic resistances of surface ships and submerged bodies; model testing theory; powering and propellers; use of “Standard Series” tests; introduction to ship motion, control steering, and rudders; concepts of ship design; computer application to problems. Prereq.: Consent of instructor. 3 cr.

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**Microbiology (47)**

**Lawrence W. Slanetz, Professor and Chairman; Theodore G. Metcalf, Professor; William Chesbro, Associate Professor; George J. Hageage, Jr., Assistant Professor**

501. **PUBLIC HEALTH AND SANITATION**

The nature and types of microbes which cause infectious diseases; the prevalence, transmission, and control of these diseases. Sanitation of water, sewage, food, and air. Community hygiene and public health administration. Mr. Slanetz. Prereq.: Biol. 401-402 or consent of instructor. 3 lec. or demonstrations; 3 cr.

503. **GENERAL MICROBIOLOGY**

Principles of microbiology; morphology, physiology, and classification of bacteria and other microorganisms, and their relationships to agriculture, industry, sanitation, and infectious diseases. Mr. Slanetz, Mr. Hageage, and Mr. Chesbro. Prereq.: Chem. 401-402 or equivalent. 2 lec.; 2 lab.; 4 cr.

600. **FOOD AND SANITARY MICROBIOLOGY**

Relation of microorganisms to food production; food preservation; food infections and intoxications; standard laboratory methods for the bacteriological examination of foods. Microbiology and sanitation of milk, water, sewage, air, and eating utensils. Disinfection and disinfectants. Mr. Slanetz and Mr. Chesbro. Prereq.: Microb. 503. 2 lec.; 2 lab.; 4 cr.

700. **SOIL MICROBIOLOGY**

The nature and types of bacteria and other microorganisms present in soil and their activities in carrying out decomposition of plant and animal matter; their role in the nitrogen, carbon, and sulfur cycle in soil; their relationship to other soil inhabitants; and their contribution to soil fertility. Mr. Chesbro. Prereq.: Microb. 503. 2 lec.; 2 lab.; 4 cr. (Alternate years.)
701. **ADVANCED MICROBIOLOGY**

The growth, nutrition, and metabolism of microorganisms; consideration of cell structure and localization of function; aspects of genetic and non-genetic regulation of metabolism; study of the influence of chemical and physical factors of the environment upon microorganisms. Mr. Chesbro. Prereq.: Microb. 503. 2 lec.; 1 lab.; 4 cr.

702. **PATHOGENIC MICROBIOLOGY**

The morphological, cultural, biochemical, serological, and pathogenic characteristics of microorganisms causing human and animal diseases. Mr. Metcalf. Prereq.: Microb. 503. 2 lec.; 2 lab.; 4 cr.

705. **IMMUNOLOGY AND SEROLOGY**

The defensive elements possessed by man and animals which serve to protect them from infectious microorganisms. The principles of serological techniques used in the recognition and identification of biological materials including microorganisms. The preparation of vaccines and the production of antisera in animals. Mr. Metcalf. Prereq.: Microb. 702. 2 lec.; 2 lab.; 4 cr.

706. **VIROLOGY**

The animals and plant viruses, including bacteriophages and the rickettsiae; a consideration of techniques for the propagation and recognition of animal viruses; a study of the interactions between virus and host cell and the application to problems of plant or animal infections caused by viruses. Mr. Metcalf. Prereq.: Microb. 702. 1 lec.; 3 lab.; 4 cr.

761-762. **CLINICAL LABORATORY METHODS**

An 11-month course in medical technology taken at the Mary Hitchcock Memorial Hospital School of Medical Technology, Hanover, New Hampshire. This course starts about June 20, and includes lectures and laboratory work in bacteriology, blood bank and serology, clinical chemistry, hematology, laboratory management and ethics, mycology, parasitology, histology, and clinical microscopy. Credits will be allowed when the University has received a transcript of the candidate's record and upon certification by the Director of the School and the Supervisor of the Medical Technology curriculum that the work has been successfully completed. This course qualifies a candidate for the examination for the Medical Technologist's Certificate administered by the Registry of Medical Technologists of the American Society of Clinical Pathologists. 32 cr. This course cannot be taken for graduate credit.

795, 796. **PROBLEMS IN MICROBIOLOGY**

Elective problems, depending upon the training and desire of the student. Elective only upon consultation. Mr. Slanetz and staff. Credits to be arranged.

797, 798. **MICROBIOLOGY SEMINAR**

Reports and discussions on current literature and recent developments in microbiology. Mr. Slanetz and staff. Prereq.: Microb. 600 or 702 and consent of the instructor. 1 2-hr. period; 1 cr.
Music

DONALD E. STEELE, Professor and Chairman; ROBERT W. MANTON, Professor Emeritus; KARL H. BRATTON, Professor; JOHN B. WHITLOCK, Associate Professor; ANDREW J. GALOS, Associate Professor; IRVING D. BARTLEY, Associate Professor; JOHN W. WICKS, Associate Professor; RAYMOND A. HOFFMAN, Assistant Professor; DONALD A. MATTRAN, Assistant Professor; WENDELL E. ORR, Assistant Professor; PAUL F. VERRETTE, Instructor; KEITH POLK, Instructor

Students majoring in Music or enrolled in the Music-Education Curriculum are required to attend all student and faculty recitals as a part of the assigned work of their program.

Music Laboratory  (63)

Registration for musical organization courses should be completed during the registration period. These courses cannot be used to satisfy major requirements except in the Music-Education Curriculum. Each participant must be registered for either credit or audit by permission of the instructor. All Music laboratory courses may be repeated.

A maximum of 8 credits earned in music laboratories may be used toward graduation.

440, (440). Band — Techniques and Literature

The Concert Band studies and performs the finest in wind instrument literature and is open to all students on the basis of audition. Performances include campus concerts and appearances on tour throughout New England. The Marching Band is open to all students and performs during the football season at home and away games. Rehearsals of the Marching Band conclude at the end of the football season. Mr. Mattran. Prereq.: Permission of instructor. 2 lab.; 1 cr. NLG.

441, (441). University-Community Symphony Orchestra — Techniques and Literature

Open to all students and others on basis of individual tryouts. The orchestra gives several concerts of the finest symphonic literature during the year and also accompanies the vocal groups and solo instrumentalists on various occasions. Membership includes students, faculty, and members of the surrounding communities. Mr. Galos. Prereq.: Permission of instructor. 2 lab.; 1 cr. NLG.

442, (442). Women’s Glee Club — Techniques and Literature

Open to all students interested in singing the finest literature in this medium and who can fulfill the requirements of a tryout. Recommended for all women voice majors. Mr. Bartley. Prereq.: Permission of the instructor. 2 lab.; 1 cr. NLG.

443, (443). The New Hampshiremen — Techniques and Literature

The Male Chorus of the University. Open to all students interested in singing the finest of literature in this medium and who fulfill the requirements of a tryout. Recommended for all men voice majors. Mr. Orr. Prereq.: Permission of the instructor. 2 lab.; 1 cr. NLG.
Music

444, (444). Concert Choir — Techniques and Literature
A choral group devoted to study and performance of the best classical and modern choral literature. Recommended for men and women voice majors. Open to all interested students. Mr. Bratton. Prereq.: Permission of instructor. 2 lab.; 1 cr. NLG.

446, (446). Ensemble — Techniques and Literature
1) Brass; 2) Strings; 3) Tudor Singers; 4) Woodwind; 5) Opera Workshop. Small groups of instrumentalists and vocalists organized to provide advanced students experience in such groups, plus an acquaintance with the more advanced literature in the areas. Prereq.: Permission of instructor. 2 lab.; 1 cr. NLG.

447, (447). String Orchestra — Techniques and Literature
Open to all students on basis of individual tryouts. This group appears at all the University-Community Symphony Orchestra concerts. The most select of string compositions are studied and played. 1 rec.; 1 cr. NLG.

Applied Music (63)

Lessons in Applied Music are based on ½-hour private instructor per week. One semester hour of credit may be earned with one lesson per week; two semester hours of credit may be earned with two lessons per week. Five one-hour practice periods per credit will be sought out by the music students themselves. The special semester fee for Applied Music is $25 for one lesson a week, and $50 for two lessons a week. These fees include the use of a practice room for the required preparations.

 Majors in Applied Music are required to present 16 semester hours in Applied Music taken over a period of four years. Two lessons per week are required each semester. Four semester credits taken in the freshman year are regarded as prerequisite to the Applied Music option.

Registration in Applied Music courses is open to all students in the University, subject to approval by the instructor who will determine the course level. A student may register for credit in the same course in successive semesters.

461, 462. Voice Class for Beginners
To develop the basic fundamentals in voice production, such as breathing, phrasing, pure tone, resonance, posture, and the study of vocal literature through group activity with some of the finest work of the masters. A basic knowledge of the piano keyboard and ear training is necessary. Permission of the instructor. Mr. Bratton. 2 cr.

463, 464. Functional Piano Class
Piano instruction primarily for beginning students in a class. Training in the following subjects will constitute the course: pianoforte techniques and reading of music; keyboard harmony geared to the practical harmonization of grade school melodies; transposition; sight reading; improvisation. Especially for students interested in Occupational Therapy and Elementary Teacher’s curriculum. Beginning students in Music Education curriculum may take this course for 1 semester. Enrollment limited to 8. Permission of instructor. 2 cr.
Music

570. Piano

The methods of presentation and the material used vary with each pupil and his degree of advancement. With beginners, training is given in the fundamentals of pianoforte technique and in the reading of keyboard music. As early as is practicable, emphasis is placed on musical values, musicianship, and sound piano technique. For this purpose, the literature employed is selected from the masters. Musical understanding is developed and quality of performance is stressed. With the attainment of advanced technique, the student's repertory is broadened to include works of all periods of literature. Mr. Steele, Mr. Bartley, Mr. Wicks, and Mr. Verrette. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.

571. Organ

A thorough foundation in pedal and manual technique, including hymn playing, followed in subsequent semesters by literature chiefly from the Baroque, Romantic, and Contemporary periods. Permission of instructor. Mr. Bartley and Mr. Wicks. 1 or 2 lessons; 1 or 2 cr.

572. Violin, Viola

The choice of literature and method in violin teaching depends entirely on the individual pupil's background and ability, therefore no single course of study is set up as a requirement for all pupils. Emphasis is placed primarily on musicianship and musical values, and the development of a sound, reliable technique as a means to that end. Technique is developed in these lessons not so much through exercise and drill as it is through the best in literature. Mr. Galos. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.

573. Voice

Instruction in voice will seek to develop those qualities which are essential for intelligent interrelations, such as correct posture, breathing, pure tone, resonance, clear enunciation, and technical facility. Each voice is given the treatment best suited to its individual needs. A higher ideal than the perfection of mere mechanical skill is sought, namely a musicianly style of singing and a thorough appreciation of the best works of the masters, both classic and modern. Mr. Bratton and Mr. Orr. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.

574. Violoncello, String Bass

Objectives are based primarily on the student's ability and experience. A general awareness of the instrument as regards technique and tone are the first essential prerequisites. These elements will gradually broaden to include the attention and cultivation of the student's musical perception and repertoire. Mr. Hoffman. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.

575. Woodwind

Instruction in the technique and literature for the flute, oboe, clarinet, bassoon, and saxophone. Ability and previous background determines a student's course of study. Competence in basic fundamentals of tone production, embouchure, articulation and phrasing lead to concentration in the solo and chamber music repertoire for each instrument. The development of sound musicianship through study of music representative of all periods and styles is stressed. At least one public solo performance each semester is required. Mr. Mattran. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.
Music

576. Brass

Instruction in any of the following instruments: trumpet, trombone, French horn, baritone, and tuba, or any brass instrument. Correct tone production, articulation, and musical interpretation are stressed. Mr. Whitlock and Mr. Polk. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.

577. Percussion

Snare drum rudiments. The technique, tuning and sticking of the pedal and hand timpani. Cymbals and all other percussion effects (claves, maracas, triangle, tambourine, wood-block, chimes, etc.) glockenspiel, bells, or bell lyre, as well as xylophone. Mr. Whitlock. Permission of instructor. 1 or 2 lessons; 1 or 2 cr.

Theory and Composition  (63)

321-322. Sightsinging, Ear Training, Dictation I*

Intensive training in the acquisition of the basic essentials of music. Development of rhythmical sense, the identification and singing of intervals, accurate response to melodic, harmonic, and rhythmical dictation, the basic laws of musical notation, knowledge of scales, and terminology. Mr. Hoffman. 3 labs.; 0 cr. NLG.

423-424. Harmony I

Basic techniques in harmonization in four parts of basses (figured and unfigured) and soprano melodies using triads and their inversions, non-harmonic tones, the dominant seventh and its inversions, and secondary dominants. Attention will also be given to harmonic rhythm and modulation. Harmonic analysis of Bach chorales will be an integral part of this course. Keyboard harmony will also be stressed. Mr. Wicks. 2 cr.

521-522. Sightsinging, Ear Training, Dictation II


523-524. Harmony II

Continuation of harmonization techniques developed in Harmony I. The use of irregular resolutions; the diminished 7th; the incomplete major 9th; the complete dominant 9th; the sequence; the nondominant 7th, 9th, 11th, and 13th; the raised supertonic and submediant; the Neapolitan sixth; the four augmented 6th chords; and other chromatically altered chords. Formal and harmonic analysis of preludes in the Well-Tempered Clavier and works of the Classical and Romantic periods. Continued emphasis on keyboard harmony. Mr. Wicks. Prereq.: Mus. 423, 424. 2 cr.

525-526. Conducting Methods — Band and Orchestra

The development of conducting — physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. The reading and analysis of full and condensed scores. Essential instrumental conducting techniques, band and orchestra literature, psychology of rehearsal. Mr. Galos and Mr. Mattran. 1 cr.

* Mus. 321-322 is normally taken concurrently with Mus. 423-424. Qualified students are exempted from Mus. 321-322 when so determined by the Department of Music.
719-720. COUNTERPOINT
First semester: Sixteenth century polyphony based on the style of Palestrina. Second semester: free instrumental counterpoint based on the styles of Bach and Handel. Twentieth century counterpoint will be discussed in the closing classes of the course. Mr. Wicks. Prereq.: Mus. 523-524 or permission of instructor. 2 cr.

721-722. CANON AND FUGUE
Free counterpoint in three and four parts, double counterpoint, the writing of simple two-part inventions, choral preludes, etc. The canonic and fugal studies will be based largely upon the works of Bach and will have as their objective the composition of a two-, a three-, and a four-voiced fugue. Prereq.: Mus. 719-720 or permission of instructor. 2 cr.

723-724. COMPOSITION
The various smaller harmonic forms, the variation, the rondo, and the sonata forms will serve as models for composition. Prereq.: Permission of the instructor. 2 cr.

725-726. ORCHESTRATION AND Chorestration
Instruments and methods of combining them into coherent arrangements arriving at successful balances for the band and orchestral arranger. The characteristics, range, and tone quality of the instruments are fully covered and transcriptions are made. Orchestral effects are studied. Chorestration is offered during the latter part of the second semester. The techniques of writing for solo voices, for mixed voices, men's and women's voices, are taken up through the medium of arrangements, and original work. Mr. Polk. Prereq.: Permission of the instructor. 2 cr.

History, Literature, and Appreciation (63)

401. MUSIC APPRECIATION
Masterpieces drawn from the works of Palestrina, Bach, Handel, Haydn, and Mozart. Selections will be analyzed by the students and the instructor and played several times in the classroom. Supplementary assigned recordings at the University Library. 2 cr. (Special Summer Session course.)

402. MUSIC APPRECIATION
Intelligent listening through formal analysis of the irreductible minimum of great musical masterpieces. A selection of the most important works of Beethoven, Shubert, Mendelssohn, Chopin, Liszt, Brahms, Franck, Tchaikowsky, d'Indy, and many others analyzed by the students and the instructor and played several times in the classroom. 2 cr. (Special Summer Session course.)

403-404. INTRODUCTION TO MUSIC
A beginning listener's approach to the great music of the ages. Emphasis will be placed not only on the means of acquiring a discerning ear, but also on the presenting a broad perspective of music in relation to the history of Western civilization. For non-music majors only. Mr. Polk and Mr. Hoffman. 3 cr.
Music

405-406. History and Literature of Music

Through analysis, performance, and reading, the course aims at a practical knowledge of the techniques of composition, styles, and forms of the principal periods in the history of music. Mr. Polk. Required of all music majors. 3 cr.

501. Summer Session Chorus and Basic Conducting

A choral group devoted to the study and performance of the best classical and modern choral literature. The basic elements of choral conducting, for elementary and secondary teachers, church choir directors, and those interested in singing. May be taken for credit or as recreation. Mr. Bratton. 1 cr. (Special Summer Session course which may be repeated.)

502. Survey of Music in America

The development of music in the United States from Colonial times to the present. The various influences, such as the English tradition, the German era, the French impressionistic influence, and finally the quest for an American style with the music of the most representative composers. 2 cr. (Not offered in 1965-66.)

701. Masters of the Renaissance

Important composers of the fifteenth and sixteenth centuries and their works: Vittoria, Palestrina, Byrd, and others. Mr. Wicks. 2 cr.

702. Music of the Eighteenth Century

The lives and outstanding works of Bach, Handel, Haydn, and Mozart. Mr. Wicks. 2 cr.

703. Romantic Music of the Nineteenth Century

The sonata form as a basis for the symphonies, concerti, chamber music, and keyboard works of Beethoven, Berlioz, Schubert, Mendelssohn, Schumann, Brahms, Franck, Chopin, and Liszt. Romantic elements contained in the development of harmony orchestration, sonority, expressive content. The rise of the short piano piece, the German art song, the symphonic poem, nationalism in music. Mr. Steele. 2 cr.

704. Twentieth Century Music

Music of the twentieth century, including its literature, its trends, and an analysis of techniques, styles, forms, and expression. Mr. Steele. 2 cr.

705. The Life and Works of Beethoven

The piano sonatas, symphonic works, and the string quartets. Lectures, analysis, reports, required readings, and listening. Mr. Galos. 2 cr.

707-708. Survey of Opera and Oratorio

A historical and musical survey of the opera and oratorio, from their common birth, through the development of each specific form to the present day. Particular stress is given to political and religious influences. Mr. Orr. 2 cr. (Not offered in 1965-66.)

709, 710. Survey of Pianoforte Literature

The history and development of keyboard literature from Bach to the present. A discussion and performance of the works of Bach, the sonatas and concertos of Haydn, Mozart, Beethoven, Schubert, the Romantic composers, and of contemporary writers. Mr. Steele. 2 cr. (Not offered in 1965-66.)
Music Education (64)

The Department of Music offers a four-year curriculum for teachers of elementary and secondary school music. (See Music-Education curriculum.)

551. TECHNIQUES AND METHODS IN STRINGED INSTRUMENTS

Class-teaching of stringed instruments simulating classroom situations and methods. Mr. Galos. 2 cr.

552. TECHNIQUE AND METHODS IN WOODWIND INSTRUMENTS

Basic fundamentals of performance in woodwind instruments, techniques of class instruction, and an introductory study of woodwind literature. Mr. Mattran. 3 cr.

553. TECHNIQUES AND METHODS IN BRASS AND PERCUSSION INSTRUMENTS

Correct tone production and technique of brass instruments and of rudimentary percussion technique. Materials and procedures for class instruction. Mr. Whitlock. 3 cr.

751, 752. TECHNIQUES AND METHODS IN CHORAL MUSIC

A lecture workshop course touching upon some of the problems and solutions in the organization and performance of high school and college glee clubs and community choirs. Emphasis is placed on techniques of choral conducting and rehearsal, repertory, and materials. Offered to Mus. Ed. students who wish to place a greater emphasis on a vocal option in the Mus. Ed. curriculum rather than instrumental. A student taking 751, 752 may substitute them for two of the instrumental techniques and methods courses. Mr. Bratton. 3 cr.

753. ESSENTIALS OF MUSIC FOR THE CLASSROOM TEACHER

A course designed to provide training in the elements and appreciation of music for application to the grade-school classroom situation. Emphasis will be placed on melodic and rhythmical accuracy, basic keyboard harmony, elementary conducting, music literature. Recommended for the gradeschool teacher. No performing ability required. Mr. Steele. Prereq.: Permission of the instructor. 2 cr. (Special Summer Session course; not offered, 1965.)

754. MUSIC FOR THE ELEMENTARY CLASSROOM TEACHER

For the non-music specialist interested in utilizing music as a means of enriching children's lives. The correlation and integration of music in the school curriculum and the basic skills and techniques necessary. Also open to music specialists and school administrators. Mr. Whitlock. 3 cr. (Summer Session course.)

791. PROBLEMS IN THE TEACHING OF SECONDARY SCHOOL MUSIC

The application of educational principles to the teaching and learning of music, and the organization of the music curriculum on the junior and senior high-school levels. The adolescent voice and the classification of voices; the selection of vocal and instrumental materials to fit the needs of the individual group, in order to insure the maximum growth and musical development of the students; and the building of unified concert programs. Problems of administration and management, and the relationship of the teacher to school and community. Observation of music programs in secondary schools. Mr. Whitlock. Prereq.: Educ. 758. 3 lec.; 1 lab.; 3 cr.
Music

792. Problems in the Teaching of Elementary School Music
Aims, scope, and organization of materials and activities in the elementary schools in keeping with modern trends in educational philosophy. The child voice, its care and development. A demonstration of materials and methods for the various grades. Observations of elementary school music. Mr. Whitlock. Prereq.: Educ. 758. 3 lec.; 1 lab.; 3 cr.

Prereq.: Mu-Ed. 792, 791. 7cr.

796. Organization and Administration of School Music Groups
Problems of organizing and administering school orchestras, bands, glee clubs, choruses and small ensembles, such as objectives, motivation, schedule, discipline, equipment, programs, finances, rehearsal techniques, contests and festivals, materials, personnel selection and grades. Mr. Whitlock. 3 cr. (Special Summer Session course; not offered in 1965.)

797. Music Education Seminar — Instrumental and Choral
A study and discussion of instrumental and choral music methods in the elementary and secondary schools with emphasis given to voice and instrumental classes, as well as the development of music organizations. This seminar is especially designed for classroom music teachers and supervisors of considerable experience. Opportunity will be given the class members to observe the University of New Hampshire Summer Youth Music School organizations during the sixth week. Prereq.: Teaching experience in instrumental and/or choral music. Mr. Bratton and Mr. Whitlock. 3 cr. (Special Summer Session course; not offered in 1965.)

Nursing (54)

Mary Louise Fernald, Assistant Professor and Chairman

The following courses are required for students majoring in nursing. Only Nursing 401-402 will be offered in 1965-1966.

401-402. Introduction to Nursing
An introductory course discussing the influences of the past and present and the issues of the future as they affect nursing. The role of the nurse as a professional person will be discussed. Miss Fernald. 1 cr.

503-504. Fundamentals of Nursing
Beginning skills, understanding, and knowledge of nursing. The student will have introduction to nursing in hospitals under the supervision of and with instruction from the University faculty. Students will care for ill people. Prereq.: Nurs. 401-402. 2 lec.; 1 lab.; 3 cr.

551. Medical and Surgical Nursing
Medical and surgical nursing will be introductory in this course. Lectures in medical and surgical conditions and the nursing care involved will be planned. Prereq.: Nurs. 503-504. 2 lec.; 2 lab.; 4 cr.

602-610-621. Comprehensive Nursing
Psychiatric nursing, maternal and child nursing, public health nursing, and medical and surgical nursing will be taught during the calendar year.
Lectures, discussions, and nursing laboratory experience in all areas will be planned. Nursing laboratory experience will be provided using the local hospitals, a medical center, public health agencies, and other health facilities. Comprehensive nursing will be stressed. Prereq.: Nurs. 551. 602, 14 cr.; 610, 6 cr.; 621, 14 cr. Total 34 cr.

701. Rehabilitation Nursing

Geriatric nursing, nursing of long-term illness, including rehabilitation nursing, will be included. Experience and field trips to nursing homes and rehabilitation centers will be planned. Prereq.: Nurs. 621. 3 lec.; 1 lab.; 4 cr.

702. Senior Seminar in Nursing

Responsibility of the professional nurse will be discussed, including team leadership, head nursing, responsibility as a beginning practitioner, as an individual, and as a citizen. Prereq.: Nurs. 621. 4 cr.

Occupational Therapy (65)

Marguerite Abbott, Associate Professor and Chairman; R. Virginia Bell, Assistant Professor; Priscilla T. Chandler, Instructor; Angelina A. Howard, Adjunct Assistant Professor

Medical Lecturers

William Amman, M.D., Ear, Nose, Throat Conditions; Arthur DiMambro, M.D., Orthopedics; Charles H. Howarth, M.D., General Medicine, Surgery, and Chest Conditions; Gerhard Nothmann, M.D., Psychiatry; Lawrence Doyle, M.D., Medical Psychiatry; Gerald Shattuck, M.D., Pediatrics

The following courses are for Occupational Therapy students; elective for others by permission of the Department Chairman. Grade of 2.0 or above required.

411. Survey of Occupational Therapy

Survey course of the scope and area of occupational therapy and its functions as a profession. History and philosophy of medicine reviewed, with an emerging O.T. philosophy as a basic frame of reference for the treatment of patients. Films, guest lecturers, and instruction trips to hospitals and clinics. Miss Abbott. 2 cr.

412. Therapeutic Crafts

Therapeutic crafts and skills in selected handicrafts, such as stenciling, copper tooling, bookbinding, fly tying, basketry, cord knotting, paper mache, and chip carving. Crafts are analyzed relative to their therapeutic suitability for patients. Individual (craft) study projects are introduced, together with the basic methods of presenting activities to patients, by demonstration and return demonstration method. Minimum laboratory fee $6.00. Miss Bell. Prereq.: O.T. 411 with grade of C or better. 2 lab.; 3 cr.

515. Therapeutic Crafts, Advanced

Projects and methods in leather work; 1/2 semester. Graphic arts with emphasis on printing and silk screen techniques, 1/2 semester. Therapeutic analysis of activities will be introduced. Minimum laboratory fee $12.00. Miss Bell. Prereq.: O.T. 412. 2 lab.; 3 cr.
Occupational Therapy

522. Application of Occupational Therapy Treatment to General Medicine and Surgery

Also includes cardiac and chest conditions. Special problems of sensory disturbances are presented. Conditions of special significance with pediatrics and geriatrics discussed. Miss Abbott and Miss Bell. Prereq.: O.T. 661, Psych. 437 or Home Ec. 425. 2 cr.

524. Application of Occupational Therapy to Psychiatric Conditions

Principles of dynamic psychiatry as applied by occupational therapy to assist in establishing an atmosphere conducive to recovery (containing minimum anxiety and maximum support) by utilizing individual and group activity programs. Miss Bell. Prereq.: O.T. 683, Psych. 654. 2 cr.

526. Application of Occupational Therapy to Physical and Neurological Disabilities

Techniques used in treating patients with orthopedic and neurological conditions. Cerebral palsy, poliomyelitis, and degenerative neurological conditions are presented and discussed, upon the basic principle of the application of therapeutic exercise to these conditions; to improve joint motion or muscle power; to develop coordination and improve the neuromuscular pattern of movement; and to assist the patient in adjustment, by building up a wholesome psychological climate conducive to recovery. Films, guest lecturers, demonstrations. Miss Abbott. Prereq.: O.T. 522, 681, 682, Zool. 606, 601. 2 cr.

681. General Medical Lectures

Etiology, pathology, symptoms, and treatment of general medicine, surgery, and chest diseases; sensory disturbances, ophthalmology, otology; overview of pediatric disabilities and common childhood diseases. Films. Dr. Charles H. Howarth, Dr. William Amman, Dr. Gerald Shattuck. Prereq.: Zool. 507-508. 3 cr.

682. Orthopedic Medical Lectures

Etiology, pathology, symptoms, and treatment of orthopedic conditions. Films. Dr. Arthur DiMambro. 2 cr.

683. Psychiatric Medical Lectures

A basic course in medical psychiatry, including both child and adult psychiatric conditions. Etiology, symptomology, prognosis, and medical treatment of the psychoneurosis, functional psychoses, the organic reaction types, plus the various types of drug therapy, currently in use. Films. Dr. Lawrence Doyle. Prereq.: Psych. 654. 2 cr.

698. Advanced Reading Seminar

A conference-seminar to assist the senior O.T. student to integrate the knowledge and skills he has acquired. The student is put into contact with a variety of ideas and modalities of social psychological-medicine, forming a frame of reference for a philosophy of professional O.T. Ideas, methods, and techniques, by way of the seminar conference method. This will be followed by a plan of integrated independent study in a specific field of the student's major O.T. interest. Miss Abbott and Miss Chandler. Prereq.: senior standing. 3 cr.

702. Administration and Organization for Hospital and Agency Community Work

The general principles of organization and administration, which include a body of knowledge of group dynamics, supervisory practices, includ-
ing employer-employee relationships, personal policies, layout of O.T. physical plants, floor plans, purchasing, and various methods of inventory. Miss Abbott. Prereq.: senior standing. 2 cr.

711. **Clinical Affiliation in General Medicine, Surgery, and Pediatrics**
Full time — three months. No credit.

712. **Clinical Affiliation in Psychiatry**
Full time — three months. No credit.

713. **Clinical Affiliation in Physical Disabilities**
Full time — three months. No credit.

*All occupational therapy affiliation fees must be paid prior to entering any affiliation, starting either in the summer following the junior year or after the senior year.*

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**Philosophy (66)**

Robert P. Sylvester, Assistant Professor and Chairman; Donald C. Babcock, Professor Emeritus; Asher Moore, Professor; Paul Brockelman, Instructor

400. **Logic**

An introduction to the principles of good reasoning, including practice in their application. The correct use of language, the logical structure of arguments, the detection of fallacies in reasoning, and the nature of scientific method. Open to all students. 3 cr.

410. **Introduction to Philosophy**

An examination of representative philosophies and of some of the persistent problems of philosophy. An introductory course designed to acquaint the student with the nature of philosophy and to help him think about his experience philosophically. Open to all students. 3 cr.

500-501. **History of Philosophy**

The history of Western philosophy through the study of the major figures and movements from the early Greek philosophers to the nineteenth century. 4 cr. Students who are interested in advanced work in Philosophy should take Philosophy 500-501 as early as possible. This course is not ordinarily open to freshmen, but freshmen who expect to major in philosophy or who intend to take advanced work in philosophy may elect the course by securing the permission of the instructor. Students who wish to register for Philosophy 501 without having taken Philosophy 500 must secure the permission of the instructor.

502. **Mediaeval Philosophy**

The philosophic thought of the Middle Ages from Augustine to Scotus but with particular emphasis upon the writings of St. Augustine and St. Thomas Aquinas. Prereq.: Phil. 500 or permission of the instructor. (Not open to freshmen.) 4 cr. (Alternate years).
Philosophy

503. 19TH CENTURY PHILOSOPHY
An historical survey of philosophic thought in the 19th century, its emergence from 18th century thought, and its bearing upon contemporary philosophy, with particular emphasis upon major figures and movements in Germany, France, and England. Readings from such figures as Fichte, Schelling, Hegel, and Schopenhauer in German classical philosophy, Auguste Comte and Henri Bergson in French philosophy, and Herbert Spencer, Jeremy Bentham, and John Stuart Mill in English philosophy. Prereq.: Phil. 500-501. 4 cr.

510. PHILOSOPHY OF RELIGION
A philosophical study of the nature and significance of religious experience, with historical and systematic analysis of such traditional problems of philosophical theology as faith and reason, evil, and the existence of God. A part of this course will consist of an intensive phenomenological study of the religious experience and an attempt to deal with the traditional problems from this point of view. Mr. Brockelman. (Not open to freshmen.) 4 cr.

520. AESTHETICS
An examination for representative theories concerning the nature of art and aesthetic experience. (Not open to freshmen.) 4 cr. (Alternate years.)

521. PHILOSOPHY AND THE ARTS
A consideration of contemporary works of literature, music, theatre, film, and the plastic arts, in an attempt to elicit those philosophic concerns and perspectives which dominate the present. Attention will be given to social discontent, to the impact of science and technology, and to the search for authentic personal existence. Intensive use will be made of the cultural resources of the University and the region, so there will be some expense involved. Open to all students. Mr. Moore. 4 cr.

522. PHILOSOPHY OF ART
The nature of art; the nature of creation and appreciation; the art media; judgments of worth; the relation of expression, form, and subject; the relevance of aesthetic experience to the larger philosophical picture. Mr. Moore. Prereq.: Phil. 521 or other evidence of adequate experience of at least two of the arts. 4 cr.

530. ETHICAL THEORIES
A study of the problems of moral philosophy through the critical examination of important traditional and contemporary theories of ethics. Mr. Sylvester. (Not open to freshmen.) 4 cr.

535. SOCIAL AND POLITICAL PHILOSOPHY
An examination of the distinctively philosophical problems encountered in social and political philosophy through the study of representative figures in the history of this branch of philosophy. An essential aim of this course will be to bring the student to serious and intensive reflection upon his own social and political philosophy. Mr. Sylvester. (Not open to freshmen.) 4 cr.

610. ANALYTIC PHILOSOPHY
A study of analytic philosophy, its roots in the nineteenth century, its relation to science, and its development to the present day. The application of the analytic method to the solution of philosophic problems. Readings
from such recent and contemporary figures as Russell, Wittgenstein, Ayer, Carnap, and Ryle. Prereq.: Phil. 500-501. 4 cr. (Alternate years.)

620. EXISTENTIALISM

A study of existentialism, its roots in the nineteenth century, its relation of phenomenology, and its development to the present day. Readings from such recent and contemporary figures as Sartre, Marcel, Heidegger, and Jaspers. Prereq.: Phil. 500-501. 4 cr. (Alternate years.)

630. PHILOSOPHY OF SCIENCE

A discussion of various philosophical problems raised by science. For example: induction and probability, the nature of law, the significance of statistical techniques, the purpose and general principles of experimental design, theory construction, operationism, the nature of mathematics and its application in science, the place of speculation in science, the unity of science, special problems of the biological and social sciences. The relation of science to ethics, the humanities, and everyday life. 4 cr. (Alternate years.)

700, (700). STUDIES IN THE HISTORY OF PHILOSOPHY

Intensive study of individual philosophers, important movements, schools, or periods in the history of philosophy. Subjects and instructors to be announced each year. Prereq.: Phil. 500-501. Lectures, lectures-discussion, or seminar. 4 cr. Barring duplication of subject this course may be repeated for credit.

701. TOPICS IN SYSTEMATIC PHILOSOPHY

Intensive study of selected problems of philosophy in such areas as epistemology, metaphysics, and theory of value. Topics and instructors to be announced each year. Prereq.: Phil. 500-501. Lectures, lectures-discussion, or seminar. 4 cr. Barring duplication of subject this course may be repeated for credit.

795, 796. INDIVIDUAL STUDY

Students who are adequately prepared to do independent work involving extensive reading and writing may do advance work on an individual basis. Before registering for this course the student must formulate a project and secure the consent of a member of the department who will supervise his work. Conferences and/or written work as required by the supervisor. Credits to be arranged.

Physical Education for Men (90)

JAMES W. LONG, Professor and Director, Division of Physical Education and Athletics; CARL J. LUNDBLADEN, Professor; PAUL C. SWEET, Professor; ANDREW MOORADIAN, Associate Professor; E. WILLIAM OLSON, Associate Professor; ROBERT E. WARE, Associate Professor; E. J. BLOOD, Assistant Professor; WALTER E. WEILAND, Assistant Professor; THEODORE W. CONNER, Instructor; F. WILLIAM HAUBRICH, Instructor; DONALD R. COCHRAN, Instructor; RUBEN BJORKMAN Instructor; WARREN E. HARRIS, Instructor

The Department of Physical Education for Men strives to meet the needs of college students for physical fitness, mental alertness, emotional stability, and social acceptability by providing opportunities for exercise, for self-expression, for emotional expression, for skill development in a wide variety
of physical and recreational activities, and for professional preparation of men wishing to enter the fields of Health and Physical Education or Recreation Education.

In the Physical Education courses, basic and elective activity, instruction is aimed at developing skills above the mediocre level, including health knowledge and habits, stressing applied physiological principles of living, administering general motor ability, fitness proficiency tests, and posture examinations with follow-up.

Requirements

A minimum of two semesters of Physical Education is required for men students. Freshmen men should register for P.E. 431-432 unless they are interested in selecting Health and Physical Education or Recreation Education as a field of concentration in which case they will take 441-442. Transfer students will register for the appropriate courses after consulting Department advisers. See description below.

Each student must, before entering the University, have had a physical examination by a physician. Students with physical disabilities or limitations must register for Physical Education as other students. In most cases, modified activities, as recommended by the University Physician, will be taught. The Physical Therapist of the Division of Physical Education and Athletics will serve as the liaison with the University Health Service.

The standard uniform required of all students consists of white trunks, white sleeveless jersey, white sox, and rubber-soled or basketball shoes. Limited sports equipment is furnished, but, as a general rule, students are required to furnish their own equipment in the individual sports. In elective courses, students should check the requirements for equipment and special fees before enrollment.

Physical Education Activity Courses

431-432. Basic Activity Courses

First quarter: lectures and laboratory experience. Second, third, and fourth quarters: required activities will be based upon the results of testing in the basic course and the student's needs and interests. Required activities will include badminton, bowling, golf, gymnastics and tumbling, handball, beginners skating, figure skating, beginners skiing, social dance, squash rackets, riding, soccer, beginners swimming, advanced swimming, weight-training and conditioning, tennis and wrestling. 2 hrs.; ⅓ cr. NLG.

433, 434. Elective Activity Courses

Additional elective activity courses may be elected by sophomores, juniors, and seniors. Activities may be chosen from those listed under P.E. 431-432. No activity may be repeated for credit. Prereq.: P.E. 431. 2 hrs. ⅓ cr.

Teacher Preparation Courses

441-442-443-444. Physical Education Activity Courses

Opportunity for students to become acquainted with basic skills in a variety of physical activities taught in the secondary school. Required of students in the Physical Education Curricula in lieu of P.E. 431-432. 3 periods; Staff. 1 cr.
453. **Principles of Physical Education**

The historical factors, biological, psychological and sociological principles influencing the methods and practices in health, physical education, and recreation today. The relationship of physical education to education and educational aims and objectives will be discussed. Miss Browne. 3 cr.

520. **Physiology of Exercise**

Course provides the essential background necessary for an understanding of the response of the body to exercise. Available research data in physiological phenomena associated with exercise will be discussed and analyzed, supplemented by individual study. Mr. Wear. Prereq.: Zool. 507. 2 cr.

521. **Problems of Coaching Basketball***

Theory and practice in the fundamentals of individual offense and defense. The various styles of team offense and defense and rules of the game. Problems in handling and conditioning a team. Mr. Olson. 1 lec.; 2 lab.; 2 cr.

522. **Problems of Coaching Football***

Analysis of various systems of play. Instruction in team and individual offensive and defensive fundamentals. The rules, theory, strategy, generalship of team play, coaching methods, physical conditioning, and rules. Football Staff. 1 lec.; 2 lab.; 2 cr.

524. **Problems of Coaching Baseball***

Theoretical and practical consideration of basic principles of batting and fielding; the fundamentals of each position; special stress on problems of team play, coaching methods, physical conditioning and rules. Mr. Mooradian. 1 lec.; 2 lab.; 2 cr.

525. **Theory of Teaching Team Sports for Men***

Theory and practical teaching methods in the team sports which form the foundation for a broad program of physical education. Staff. 2 lec.; 1 lab.; 2 cr.

526. **Theory of Teaching Individual Sports for Men***

Theory, practical teaching methods and the development of advanced skills in the individual sports which form the foundation for a broad program of physical education. Staff. 2 lec.; 1 lab.; 2 cr.

527. **Theory of Teaching Aquatics***

Theory, teaching methods, and skills in swimming, diving and water safety. Staff. 2 lec.; 1 lab.; 2 cr.

528. **Problems of Coaching Track and Field***

Instruction and practical demonstration in starting, sprinting, middle distance and distance running, relay, hurdling, high and broad jumping, pole vault, shot putting, discus, hammer and javelin throwing. Methods of preparing contestants for the various events. Mr. Sweet. 1 lec.; 2 lab.; 2 cr.

* Students in the Physical Education Curriculum must complete no less than six of these courses and not including more than two of the Problems of Coaching courses.

* Students in the Academic Teaching Option must complete no less than four of these courses and not including more than two of the Problems of Coaching Courses.
Physical Education for Men

529. **Theory of Teaching Gymnastics and Tumbling***

Theory, practical teaching methods, and advanced skills are taught including tumbling, gymnastic routines and the use of gymnasmium apparatus. Mr. Weiland. 1 lec.; 2 lab.; 2 cr.

553. **Theory of Teaching Dance***

A survey of methods, materials and techniques in teaching dance. Instruction in performance and teaching rhythms, social, folk, and square dance. Miss Murray. 2 lec.; 1 lab.; 2 cr.

582. **Personal and Community Health***

Course deals with the individual aspects of healthful living and the problems of community health as they relate to disease prevention and control. Mr. Long. Prereq.: Biol. 401-402. 3 cr.

622. **First Aid-Safety; Athletic Training***

Nature and causes of injuries incident to physical activities. The common hazards of play, and preventive measures for children and athletes are discussed. First aid principle are presented. Mr. Cochren. Prereq.: Zool. 507. 2 cr.

652. **Kinesiology; Adaptive Physical Education***

A course in body mechanics and kinesiology which deals with a program for the handicapped and individual problems in health and physical education. Mr. Cochren. Prereq.: Zool. 507. 3 cr.

656. **Problems of Health Education***

A course designed to acquaint the student with methods, materials and principles of developing a broad school health program. Mrs. Wooster. Prereq.: P.E. 582. 3 cr.

665. **Administration of Physical Education in Secondary Schools***

Administrative methods in the conduct of physical, health, and recreation education. The planning of programs and policies in the light of past and present philosophies and in regard to current programs facilities, equipment, selection of staff, and public relations. Mr. Lundholm. 3 cr.

668. **Measurement Procedures in Physical Education***

Procedures used in the evaluation, construction, administration, and interpretation of measurement techniques used in physical education. Essential, elementary statistical methods are covered so that measurement data may be scientifically evaluated for application to the program. Mr. Weiland and Miss Knowlton. 2 cr.

P.E.-Ed. 692. **Problems of Teaching Physical Education in the Elementary School***

Methods, materials and organization of a comprehensive program of activities for use primarily in the elementary school. Miss Newman. 3 cr.

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* Students in the Physical Education Curriculum must complete no less than six of these courses and not including more than two of the Problems of Coaching courses.

Students in the Academic Teaching Option must complete no less than four of these courses and not including more than two of the Problems of Coaching Courses.
Physical Education for Women (91)

Marion C. Beckwith, Chairman and Professor of Physical Education for Women; Evelyn Browne, Professor; Caroline S. Wooster, Associate Professor; Barbara K. Newman, Associate Professor; Joan T. Stone, Assistant Professor; Janet Atwood, Assistant Professor; Marilyn D. Tavares, Assistant Professor; Ruth E. Murray, Assistant Professor; Patricia Farrell, Assistant Professor; Elizabeth E. Knowlton, Instructor; Linda Hall, Instructor

The Department of Physical Education for Women aims to develop in each individual the physical, social, and mental qualities which will enable her to meet successfully the demands of modern society. The course includes recreational and leisure-time activities, vigorous team sports and gymnastics, rhythmic and dance activity, and the opportunity to participate in club activities which are provided primarily for the more highly skilled. This program is supplemented by the extra-curricular competition sponsored jointly by the Women's Recreation Association and the Department.

Requirements and Regulations

All women students are required to complete at least one credit of a basic instructional course for each of the first four semesters they attend the University. Freshmen women (except majors) should register for P.E. 401, 402; sophomores for P.E. 403, 404. Freshmen interested in majoring in Physical Education or Recreation Education should elect P.E. 411 and 412 in place of 401 and 402. In addition they should also elect P.E. 421 and 422 for a second credit of laboratory work. A second activity may be elected each semester by any student for additional credit P.E. 405, P.E. 406. Unless there is an elementary and an intermediate section, the same activity shall not be credited more than twice.

Each student must, before entering, have had a physical examination by a physician. A posture test will be given by the Physical Education staff. Individual gymnastics is required of each freshman whose physical condition indicates this need. Students with physical disabilities must follow the same procedure as other students including registration for physical education. In most cases, modified activities are recommended by the University Physician. All students are expected to take the Humiston Motor Ability Test the fall that they enter the University.

Special gymnasium uniforms consist of blue cotton tennis-type dress and shorts, white socks, and regulation gymnasium sneakers. Students are required to furnish their own individual equipment for such activities as tennis, skiing, and skating. Equipment is furnished for golf, fencing, badminton, hockey, archery, lacrosse, riflery, and softball. The special riding fee is $35 a quarter for two periods a week.

Advanced Instruction

To provide for the more highly skilled student and to encourage the interest and ability of the less skilled, the Department includes in its pro-
Physical Education for Women

gram numerous club and other activities in which advanced instruction is given by a member of the teaching staff. Membership is open to any University student. Qualifications are club standards or membership requirements of the group. The clubs and their instructors follows:

Dance Club — Miss Murray; Rifle Club — Miss Browne; Durham Reelers — Miss Farrell; Skating Club — Mrs. Judith Jones; Ski Club — Miss Hall; W.R.A. — Miss Farrell and staff. A Riding Club is also available — Mrs. Janet Briggs, Instructor, Animal Science Department.

Women students following any Teacher Training curriculum are urged to elect for required Physical Education the following activities: folk and square dancing, recreation workshop, volleyball, hockey and basketball.

Basic Instructional Program

401. MOVEMENT FUNDAMENTALS

Designed to develop basic concepts of movement through experiences in body mechanics, dance, and gymnastics. A preparation course for further work in specific movement areas. Motor ability testing, posture analyses, fitness orientation included. Required of all Freshmen women first semester. Prospective majors elect 411 and 421. 3 hrs.; 1 cr. NLG.

402, 403, 404. PHYSICAL EDUCATION ACTIVITY COURSES

Required of all second semester freshmen and of sophomore women. Select from list below. 3 hrs.; 1 cr. NLG.

405, 406. PHYSICAL EDUCATION ACTIVITY COURSES

Elective for juniors and seniors plus freshmen and sophomores desiring to take an elective. 3 hr.; 1 cr. See list below.

407, 408. PHYSICAL EDUCATION ACTIVITY COURSES

Elective for juniors and seniors desiring to register for a second activity beyond 405 or 406. 3 hr.; 1 cr. See list below.

PHYSICAL EDUCATION ACTIVITY COURSES (Specialized)

Specialized courses for students majoring in physical education. Others by permission of instructor. 411, 412, 421, 422 are for freshmen; 413, 414, 423, 424 are for sophomores; 415, 416 are for juniors; 417 is for seniors. 3 hr.; 1 cr.

Activities

(Elect one each quarter)

FIRST QUARTER

Apparatus, archery (elem. + inter.), badminton, golf (elem. + inter.), movement fundamentals, modern dance (elem. + inter.), hockey, individual gym, riding (elem. + inter. + adv.), speed ball, swimming (majors), tennis (elem. + inter.).

SECOND QUARTER

Basketball, badminton (elem. + inter.), elementary games (majors), fencing, folk and square dance, movement fundamentals, gymnastics, modern dance (elem. + inter.), individual gym, riding (elem. + inter. + adv.), riflery, figure skating (elem. + inter.), skiing (beg.), recreation workshop, stunts and tumbling.
Physical Education for Women

THIRD QUARTER

Badminton (elem. + inter.), dance composition, elementary games, fencing, folk and square dance, gymnastics, individual gym, modern dance (elem. + inter.), riding (elem. + inter. + adv.), riflery (elem. + inter.), figure skating (elem. + inter.), skiing (beg. + elem. + inter. + adv.), recreation workshop, stunts and tumbling, volleyball.

FOURTH QUARTER

Archery (elem. + inter.), outdoor education, dance composition (elem. + inter.), individual gym, lacrosse, modern dance, riding (elem. + inter. + adv.), softball, swimming (majors), tennis (elem. + inter.).

Theory Courses

453. PRINCIPLES OF PHYSICAL EDUCATION

The historical factors, biological, psychological, and sociological principles influencing the methods and practices in health, physical education, and recreation today. The relationship of physical education to education and educational aims and objectives will be discussed. Miss Browne. 3 cr.

454. ORGANIZED CAMPING

The methods, objectives, and purposes of organized camping; standards, facilities, equipment, food, sanitation, health, and safety requirements; program planning and leadership qualifications; integration of camping in the public schools; basic outdoor living skills. Miss Atwood and Mrs. Wooster. Permission of instructor. 3 cr.

455. INTRODUCTION TO COMMUNITY RECREATION

History, trends, community organization, financial aspects of administration, program planning, and leadership of community recreation, including playgrounds. Principles and philosophy of recreation. Miss Farrell. Elective for sophomores, juniors, and seniors. 3 cr.

520. PHYSIOLOGY OF EXERCISE

Course provides the essential background necessary for an understanding of the response of the body to exercise. Available research data in physiological phenomena associated with exercise will be discussed and analyzed, supplemented by individual study. Mr. Wear. 2 cr. Prereq.: Zool. 507.

553, 554. THE THEORY OF TEACHING DANCE

A survey of methods, materials and techniques in teaching dance. Includes instruction in performance and teaching of rhythms, social, international folk and square dance, first semester; modern dance, second semester. Prereq.: concurrent with second quarter international folk and American square dance; concurrent with third quarter: modern dance (elem. and inter.). Miss Murray. Open to Physical Education majors or by permission of instructor. 2 lec.; 1 lab.; 2 cr.

563, 564. THE THEORY OF TEACHING TEAM SPORTS FOR WOMEN

The methods and principles involved in the teaching of team sports and lead-up games with emphasis on coaching methods strategy and techniques of officiating. Discussion of equipment, history, tactics, and rules of each sport. Miss Stone. Prereq.: Elementary courses in team sports. 2 lec.; 1 lab.; 2 cr.
Physical Education for Women

573, 574. The Theory of Teaching Individual Sports for Women
The methods and principles involved in the teaching of tennis, badminton, bowling, skiing, skating, golf, and archery. The history, equipment, courtesies, rules, techniques, and strategy of each sport will be discussed. Miss Atwood and Miss Beckwith. Prereq.: Elementary work in the courses listed above. Open to junior and senior majors or others by permission of instructor. 2 lec.; 1 lab.; 2 cr.

582. Personal and Community Health
Course deals with the individual aspects of healthful living and the problems of community health as they relate to disease prevention and control. Mr. Long. Prereq.: Biol. 401-402. 3 cr.

655. Remedial Gymnastics
The adaption of exercise to individual needs, capacities, and limitations; causes and treatment of physical abnormalities. Theory and techniques of massage. Mrs. Wooster. Prereq.: Zool. 601 or concurrently. 2 lec.; 2 lab.; 3 cr.

656. Problems of Health Education
Methods, materials, and principles of teaching school health. Mrs. Wooster. Open to Physical Education majors and others by permission of instructor. Prereq.: P.E. 582. 3 cr.

665. Administration of Physical Education in Secondary Schools
Administrative methods in the conduct of physical education, health education, and recreation. The planning of programs and policies in the light of past and present philosophies and in regard to current programs, facilities, equipment, selection of staff, and public relations. Miss Browne. 3 cr.

668. Measurement Procedures in Physical Education
Procedures used in the evaluation, construction, administration, and interpretation of measurement techniques used in physical education. Essential, elementary statistical methods are covered so that measurement data may be scientifically evaluated for application to the program. Miss Knowlton and Mr. Weiland. 2 cr.

788. Recreation Field Work
Opportunity for participation in the planning and operation of a variety of recreation programs, under supervision, in nearby agencies and community centers. Prereq.: P.E.-Ed. 792 or concurrently. Miss Farrell. 1 lec.; 2-5 hr. lab.; 6 cr.

Ed.-P.E. (790), 790. Directed Teaching of Physical Education
Opportunity for teaching physical education activities under supervision primarily in the elementary and secondary schools. Miss Newman. Prereq.: P.E.-Ed. 792 or concurrently. 1 lec.; 2-5 hr. lab.; 6 cr.

P.E.-Ed. 692. Problems of Teaching Physical Education in the Elementary School
The methods, materials, and organization of a comprehensive program of activities for use primarily in the elementary school and in recreation programs. Miss Newman. Prereq.: Elementary games or its equivalent. 3 cr.
Physical Science (44)

Register for these courses as Ph. Sci. 401, etc.

401-402. THE EVOLUTION OF PHYSICAL SCIENCE

The principles and methods of physical science illustrated by the development of major scientific ideas in the physical world. The course is directed toward an understanding of the intellectual achievements and problems of science as part of culture. Mr. Schneer. 3 lec.; 1 lab.; 4 cr. No credit toward a major.

(789). SEMINAR IN THE HISTORY OF SCIENCE

Selected topics in the history of science, conducted through the use of special lectures, individual study, oral and written reports. The subject of the seminar will vary from year to year. This course is the same as Hist. 789. Mr. Schneer. Prereq.: Permission of the instructor. 3 cr. (Course usually offered in the second semester.)

Physics (86)

JOHN A. LOCKWOOD, Professor and Chairman; DAVID G. CLARK, Associate Professor and Associate Chairman; HARRY H. HALL, Professor; LYMAN MOWER, Professor; HORACE L. HOWE, Professor Emeritus; EDWARD L. CHUPP, Associate Professor; JOHN E. MULHERN, Jr., Associate Professor; ROBERT E. HOUSTON, Jr., Associate Professor; LAURENCE J. CAHILL, Jr., Associate Professor; ROBERT H. LAMBERT, Associate Professor; JOHN W. DEWDNEY, Associate Professor; RICHARD L. KAUFMANN, Assistant Professor; GEORGE H. MULLEN, Assistant Professor; ROBERT E. SIMPSON, Assistant Professor

401-402. INTRODUCTORY PHYSICS

A broad survey of both classical and modern physics, designed to enable the student to appreciate the role of physics in our society. The main emphasis is on the fundamental laws of nature upon which all science is based. This includes such topics as the conservation laws, structure of matter, relativity, atomic and nuclear phenomena, and elementary particles. (A student who decides to major in Physics in the College of Liberal Arts may substitute this course for Phys. 404 with the permission of the department.) 2 lec.; 1 rec.; 1 lab.; 4 cr.

403. ELEMENTARY PHYSICS

An elementary course with emphasis on selected topics from the various fields of physics. A knowledge of high school algebra and plane geometry is a prerequisite. Open only to students in the College of Agriculture. 1 lec.; 2 rec.; 1 lab.; 4 cr.

404. GENERAL PHYSICS I

An elementary course emphasizing the role of mechanics as a foundation underlying all of physics. This is the first semester of the three semester sequence: Phys. 404, 501-502. Prereq.: Math. 421 or 425 passed or taken concurrently. Should be taken as the introductory course for Physics majors in the College of Liberal Arts*; cannot be counted for major credit. 2 lec.; 2 rec. (in alternate weeks one of the recitations is a laboratory exercise); 4 cr.

* See description of Liberal Arts Physics major program, page 87.
Physics

406. Introductory Astronomy
A brief descriptive course covering celestial coordinate systems and contemporary astronomical and astrophysical techniques with a review of current knowledge and theories concerning the solar system, galaxies, and the Universe. Recommended for Liberal Arts and beginning science students. 3 cr.

501-502. General Physics II, III
Selected topics from electrostatics, electromagnetism, wave motion, kinetic theory, relativity, and quantum theory. Prereq.: Phys. 404 or Phys. 401-402, Math. 422 or 426. Must be taken as the introductory course for Physics majors in the College of Liberal Arts; cannot be counted for major credit. 2 lec.; 1 rec.; 1 lab.; 4 cr.

503. Modern Physics
An introduction to twentieth century physics, including the structure of atoms and nuclei, including the basic ideas of quantum mechanics and solid state theory. Prereq.: Phys. 501, 502, Math. 523, 527. 3 cr.

601-602. Physical Mechanics
An analytical treatment of classical mechanics covering the methods of statics and dynamics of particles and rigid bodies, both in a plane and in space, and the application of these methods to physical problems; oscillations; constrained motion; generalized co-ordinates and Lagrange's Equations. Prereq.: Phys. 501, 502, Math. 629-630 passed or taken concurrently. 3 lec.; 4 cr.

605-606. Experimental Physics I and II

607. Physical Optics

608. Thermodynamics
An introduction to thermodynamics and kinetic theory. 3 cr.

609-610. Experimental Physics III-IV
Work of research type. Special problems are assigned to the individual student. Prereq.: Senior standing in Physics. 2 lab.; 4 cr.

611-612. Physical Colloquium
Participation in departmental colloquium reading, and study. Prereq.: Senior standing in Physics. 1 cr. May be taken more than once. NLG.

613-614. Special Topics
Any selected topics not sufficiently well covered in a general course. Prereq.: Math. 629-630 passed or taken concurrently, and senior standing in Physics. 1, 2, or 3 cr.
696. **Independent Study**

Individual study projects in physics under the direction of a faculty adviser. Open only to physics honors students. 1-15 cr.

701. **Introductory Quantum Mechanics**

An introduction to quantum mechanics, with applications to atomic and molecular spectra. Prereq.: Phys. 703 and Math. 629-630 passed or taken concurrently. 4 cr.

702. **Atomic and Nuclear Physics**

Natural radioactivity, nuclear reactions, nuclear scattering, models of the nucleus, high energy nuclear physics, cosmic rays. Prereq.: Phys. 701. 4 cr.

703-704. **Electricity and Magnetism**

Foundation of electromagnetic theory, including electrostatics, dielectric theory, electromagnetism, magnetic properties of matter, alternating currents, Maxwell’s field theory, and an introduction to electrodynamics. Prereq.: Phys. 501-502; Math. 629-630 passed or taken concurrently. 4 cr.

**Plant Science (32)**

**Lincoln C. Peirce, Professor and Chairman; Gerald M. Dunn, Professor; Russell Eggert, Professor; Ford S. Prince, Professor Emeritus; Paul T. Blood, Associate Professor; Leroy J. Higgins, Associate Professor; Clarence A. Langer, Associate Professor; Lorne A. McFadden, Associate Professor; Elwyn M. Meader, Associate Professor; Douglas G. Routley, Associate Professor; James R. Mitchell, Assistant Professor; Owen M. Rogers, Assistant Professor; Radcliffe B. Pike, Extension Specialist**

401. **Plants and Man**

A brief but important review in basic plant sciences having in mind the creation of positive thinking in relation to significant food and ornamental plants and their response to environment and culture. Staff. 3 cr.

402. **Crops for Feed and Fiber**

The distribution, growth, and management of crops for livestock and industry. Mr. Higgins. 2 lec.; 1 lab.; 3 cr.

403. **The World of Plants**

The distribution of economically important plants, and man’s efforts to control the growth of these plants for production of food and utilization of beauty. Mr. Peirce. 2 cr. Not open to Plant Science majors.

406. **Plant Propagation**

Controlled reproduction of plants with a discussion of microclimate and subsequent plant development. Mr. Rogers. Prereq.: Bot. 411. 2 lec.; 2 lab.; 4 cr.

427. **Landscaping the Home Grounds**

The design and maintenance of small properties with emphasis on the principles of arrangement and the use and identification of plant materials in the beautification of home surroundings. Mr. Rogers. 2 lec.; 1 lab.; 3 cr.
Plant Science

603. Seed Testing
The identification of seeds and the techniques used in official methods of sampling and analyzing agricultural seeds for purity and germination. Mrs. Sanborn, Seed Analyst. Prereq.: Bot. 411 and permission of instructor. 1 lab.; 1 cr.

667. Turfgrass Management
Characteristics of growth of fine turfgrasses, their adaptation to use, and their response to competition and environment. Mr. Higgins. 2 lec.; 1 lab. (optional); 2-3 cr. (Alternate years, offered in 1966.)

678. Herbaceous and Woody Ornamentals
A survey of the more important ornamental plants, their growth characteristics, culture, maintenance, and use. Mr. Rogers. Prereq.: Bot. 411, 506. 3 lec.; 1 lab.; 4 cr. (Alternate years; offered in 1967.)

697-698. Senior Seminar
Required of all Plant Science seniors and open to seniors of related departments. Discussions in production and technological aspects of plant science. Staff. 1 cr. each semester.

704. Annual Crops
A study of annual grains, silage crops, and potatoes and their characteristics of growth as affected by culture and management. Mr. Higgins. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1966.)

706. Pasture-Hay Crops
A survey of the important forage and pasture crops, their characteristics of growth, culture, and management. Mr. Higgins. Prereq.: Bot. 411, Pl. Sci. 402. 3 lec.; 1 lab.; 4 cr. (Alternate years; offered in 1967.)

708. Nutrition and Water Relations
Mineral requirements of plants and response to deficiencies. Effect of soil and atmospheric environments on plant growth and differentiation of plant parts. Mr. Eggert. Prereq.: 3 cr. in plant physiology. 2 lec.; 1 lab.; 3 cr. (Not offered in 1966.)

753. Fruit Crops
The growth and management of tree and small fruit crops. Pest control, storage, marketing, and response to pruning and grafting. Mr. Eggert. Prereq.: 7 cr. Bot., Pl. Sci. 406, 7 cr. soils. 3 lec.; 1 lab.; 4 cr. (Alternate years; offered in 1966.)

764. Vegetable Crops
Systematic classification of vegetable crops, their use, management, and response to environment and competition in food and seed production. Mr. Peirce. Prereq.: Bot. 411, Pl. Sci. 406 or equivalent. 3 lec.; field trip; 3 cr. (Alternate years; offered in 1967.)

765. Systematic Pomology
Taxonomic relationships and group characteristics among varieties of trees and small fruits. Mr. Eggert. Prereq.: 6-8 cr. in Botany. 1 lec.; 1 lab.; 2 cr. (Alternate years; offered in 1967.)
768. PLANT GROWTH AND DEVELOPMENT
Biochemical and physiological aspects of crop production. Bases for changes in growth or development of plants effected by environment or treatments. Mr. Eggert. Prereq.: Chem. 545, Bot. 756 or equivalent. 3 cr. (Alternate years; offered in 1966.)

774. METHODS AND THEORY OF PLANT BREEDING
History and use of plant breeding systems, including bulk and pedigree methods, recurrent selection, gamete selection, and testing. Mr. Peirce. Prereq.: 3 cr. in genetics. 3 cr. (Alternate years; offered in 1966.)

795-796. INVESTIGATIONS IN PLANT SCIENCE
Selected topics for crop or library research. Prereq.: Permission of instructor. 1-4 cr.
2. Breeding and Genetics: Messrs. Dunn, Peirce, Rogers.

Poultry Science
(See Animal Sciences)

Psychology (67)

EUGENE S. MILLS, Professor and Chairman; HERBERT A. CARROLL, Professor Emeritus; GEORGE M. HASLERUD, Professor; BRIAN R. KAY, Professor; RAYMOND L. ERICKSON, Associate Professor; FREDERICK M. JERVIS, Associate Professor; WALTER R. DURYEA, Assistant Professor; ROBERT G. CONGDON, Assistant Professor; WILLIAM W. LOTHROP, Assistant Professor; EDWARD F. RUTLEDGE, Assistant Professor

401-402. GENERAL PSYCHOLOGY
An introduction to psychology as a behavioral science with emphasis on both its theoretical and applied aspects. A systematic study is made of the basic determinants of behavior and the nature of psychological inquiry. In the first semester, such topics as the history of psychology, scientific method, perception, conditioning, motivation, and frustration and conflict are considered. In the second semester, complex learning and problem solving, psychological testing, personality, social behavior, and psychopathology are among the areas studied. Staff. Not open to seniors in the College of Liberal Arts. 3 cr. Both semesters are prerequisites for all other courses in the department, except with permission of the instructor. This course cannot be counted for major credit. (Not open to students who have taken Psych. 1).

437. DEVELOPMENTAL PSYCHOLOGY
Man's behavioral and psychological development and their relation to physical growth. Phylogenetic and ontogenetic development is examined and pertinent animal studies are introduced. The prenatal period is considered along with childhood, adolescence, and early maturity. The developmental
methods of study are also an integral part of the course. Not open to freshmen. Mr. Duryea. Prereq.: Psych. 402 or permission of instructor. 3 cr.

544. PSYCHOLOGY OF PERSONALITY

A survey of the major theories of personality with an examination of clinical and research literature as it is related to the nature and development of personality. Mr. Jervis. Prereq.: Psych. 402. Not open to freshmen. 3 cr.

605. MENTAL HYGIENE IN TEACHING

The fundamental needs of human beings, with emphasis on the mental and emotional conflicts of secondary-school students arising from the thwarting of these needs. Ways of recognizing these conflicts by their manifestations and of helping students to resolve them. The mental hazards of the teaching profession. Prereq.: Psych. 402. 3 cr.

654. PSYCHOPATHOLOGY

A systematic examination of the more severe behavioral disorders as found in the major forms of the neuroses and psychoses. The ego defense mechanisms and the construct of anxiety are seen as central to the understanding of these disorders. The search for causes, the interpretations of symptoms, and the methods of treatment are considered in detail. Mr. Erickson and Mr. Congdon. Prereq.: Psych. 402. 3 cr.

663. THE EXCEPTIONAL CHILD

The gifted, the retarded, the physically handicapped, and emotionally disturbed, as compared on basic psychological variables such as intellectual functioning, personality dynamics, and adjustment problems. Mr. Lothrop. Prereq.: Psych. 402. 3 cr.

667. STATISTICS IN PSYCHOLOGY

The problems and methods involved in the statistical treatment of quantitative data in psychology. The computation and interpretation of elementary statistical measures such as mean, median, standard deviation and the various methods of correlation. Prereq.: Psych. 402. 3 cr.

695. HONORS IN PSYCHOLOGY

Open to seniors with a 3.0 average in psychology courses and the recommendation of a member of the psychology faculty, or in unusual cases to those who receive special departmental permission. As individuals, or as members of a seminar group, students make library and/or laboratory investigations of problems of mutual interest to professor and student. Oral or written reports will be made by members of the seminar as the basis for discussion. Prereq.: 15 semester credits in Psychology. 3 cr.

697. THE INTEGRATING OF PSYCHOLOGY

By lectures, discussions and papers senior majors recall and reassess their previous psychology courses, fill gaps in their background and work on the growing edge of the science. The examination in this course satisfies the departmental requirement of a comprehensive examination. Mr. Haslerud. Prereq.: 12 semester credits in Psychology. 3 cr. Required of all undergraduate majors in Psychology.

757. EXPERIMENTAL PSYCHOLOGY

Discussion of theory and practices in applying experimental methods to a variety of psychological phenomena. Each student in the class will be re-
Psychology

758. Psychology of Learning

The experimental support for contemporary theories of learning and their practical implications. Mr. Haslerud. Prereq.: Psych. 667. 2 lec.; 1 lab.; 4 cr.

760. Psychology of Motivation

The drives and motives which underlie normal human behavior and the forms of adjustment which arise when motives conflict or encounter external frustration. Mr. Rutledge. Prereq.: Psych. 402. 3 cr.

776. Comparative Psychology

Similarities and differences in behavior of infrahuman organisms at different phylogenetic levels as aids to understanding how behavior evolved and to the clarification of behavior principles. The historical and biological foundations of such special topics as instinct, consciousness, abnormal behavior, social influence, reasoning and judgment are surveyed by use of the comparative method. Mr. Duryea. Prereq.: Psych. 402. 3 cr.

778. Physiological Psychology

The relation between behavior and the structure of the organism. Special attention to the sensory, nervous, and glandular functions as the organic base for motivation, emotion, learning, etc. Prereq.: Psych. 402. 3 cr.

782. Social Psychology

Attention is directed to the social factors affecting perceptual-cognitive processes, influence, group structure and man in the social system. Prereq.: Psych. 402. 3 cr.

783. Systematic Psychology

The complex expansion of contemporary psychology as seen in historical perspective. Some of the major antecedents in philosophy, theology, and the physical sciences. The subsequent extensive development of psychology in the United States in the form of complementary schools and systems of thought and research. Mr. Mills. Prereq.: Psych. 402. 3 cr.

789. (789). Special Topics in Psychology

Taught by a different instructor each year. The course will present advanced material in an area in which the instructor has developed specialized knowledge through research and special study. Students may repeat the course. Prereq.: 15 semester credits in psychology and/or permission of instructor. 3 cr.
Reserve Officers Training Corps

Reserve Officers Training Corps
Department of Military Science (98)

Colonel Pierre S. Boy, Professor of Military Science; Major Wayne C. Smith, Jr., Infantry, Assistant Professor; Captain Robert H. Nourse, Infantry, Assistant Professor; Captain Robert D. Latour, Artillery, Assistant Professor; Captain Martin P. Sorensen, Artillery, Assistant Professor; Sergeant Major Emery A. Myshrall, Assistant; Master Sergeant Joseph E. R. Guerten, Assistant; Staff Sergeant Gilbert Phillips, Assistant; Master Sergeant Clarence P. Andersen, U. S. Army (Retired), Army ROTC Property Officer

The Army Reserve Officer Training Corps offers a course of instruction leading to a commission as a second lieutenant in one of fourteen branches of the United States Army. Successful completion of the course and the award of a baccalaureate degree by the University qualify the graduate for this commission.

The Military Science courses follow the student's normal academic progression, i.e., a student takes Military Science 413-414 during his freshman year and Military Science 523-524 during his sophomore year. If he elects and is accepted for Advanced ROTC, he will take Military Science 633-634 and Military Science 743-744 during his junior and senior years respectively.

To qualify for the advanced course and its military allowance, applicants are required to have earned a minimum overall cumulative grade average of 2.0, to have demonstrated positive leadership potential in the basic course, to be physically qualified, to be selected by the Professor of Military Science, and to be approved for admission to the program by the President of the University.

A two-year intensified program leading to a commission in the U. S. Army also will be offered. For details, contact the Professor of Military Science.

413. Fundamentals of Military Science
The organization of the Army and ROTC and the Army and national security. Practical training in leadership, marksmanship, military drill, and command provides a balanced picture of the mission of the Army and an introduction to the military program. Two hours of classroom instruction plus leadership laboratory. 2 cr. (Formerly 13)

414. Concurrent Development
An integrated course consisting of leadership laboratory conducted by the Army ROTC Department and an elective University subject which, in the opinion of the student's faculty adviser and the Professor of Military Science, will develop the cadet's potential. The elective course must be selected from the areas of effective communication, science comprehension, general psychology, or political development and political institutions. A course falling within one of these areas, which is also required in the student's college curriculum, is acceptable. Credit is awarded after satisfactory completion of the elective course and leadership laboratory. Cr. NLG.

523. American Military History
A survey of American military history from the origins of the American Army to the present with emphasis on the factors which led to the organ-
izational, tactical, logistical, operational, strategic, social and similar patterns found in our present-day Army and society. Practical application of leadership, drill, and command. Two hours of classroom instruction plus leadership laboratory. 2 cr. (Formerly 23)

524. Land Navigation and the Principles of Military Operations

The science of military maps and land navigation. An introduction to military operations with emphasis on the principles of firepower and maneuver. Practical application of leadership, drill, and command. Two hours of classroom instruction plus leadership laboratory. 2 cr. (Formerly 24)

633. Professional Development

Military instruction for two hours each week plus a three-credit academic subject which, in the opinion of the student's faculty adviser and the Professor of Military Science, will contribute to the cadet's potential as a prospective Army officer. The academic subject must be selected from the areas of effective communication, science comprehension, general psychology, or political developments and political institutions. Military instruction, a prerequisite for cadet subsistence pay and commissioning, will include leadership laboratory and branches of the Army. The integrated course of instruction outlined above must provide for a minimum of five hours of instruction per week. Credit is awarded upon satisfactory completion of the elective course and leadership laboratory. Cr. NLG.

634. Military Leadership and Command

The principles of leadership. The theory and practice of military teaching methods. Small unit tactics. Military communication facilities. Leadership laboratory to include exercise of command of small units. Five hours of instructor per week. 3 cr. (Formerly 34)

743. Principles of Command and Staff

An introduction to the military staff and military staff work to include the relationship between command and staff, relationship of staff to subordinate units, command channels, liaison, military intelligence, and training management. Military logistics to include troop movements, motor transportation, and supply and evacuation. Army administration and military law. Leadership laboratory to include practical application of leadership principles and exercise of command. Minimum of five hours of instruction per week. 3 cr. (Formerly 43)

744. Professional Development

Military instruction for two hours each week plus a three-credit academic subject which, in the opinion of the student's faculty adviser and the Professor of Military Science, will contribute to the cadet's potential as a prospective Army officer. The academic subject must be selected from the areas of effective communication, science comprehension, general psychology, or political developments and political institutions. Military instruction, a prerequisite for cadet subsistence pay and commissioning, will include leadership laboratory, service orientation, and a study of the role of the United States in world affairs. The integrated course of instruction outlined above must provide for a minimum of five hours of instruction per week. Credit is awarded upon satisfactory completion of the elective course and leadership laboratory. Cr. NLG.
Army ROTC Band

Open only to freshmen and sophomore men enrolled in the Army ROTC program on basis of individual tryouts. This band furnishes music for all Army ROTC military functions. 2 labs.; ½ cr. per year. NLG.

Army Flight Training

A program conducted by licensed flight instructors which includes a thirty-five hour ground school and a thirty-six hour flying phase. Successful completion may lead to a private pilot's license and a career in Army aviation. Open to Army ROTC senior advanced-course students who can meet physical and aptitude requirements. No credit.

Department of Aerospace Studies (99)

Lieutenant Colonel William J. Luckey, USAF, Professor; Lieutenant Colonel William B. Canning, USAF, Assistant Professor; Captain Donald P. Uhl, USAF, Assistant Professor; Captain Denis P. Driscoll, USAF, Assistant Professor; Master Sergeant Jefferson T. Joyner, USAF, Assistant; Technical Sergeant Charles E. Mooers, USAF, Assistant; Staff Sergeant John B. MacDonald, USAF, Assistant; Staff Sergeant James H. Allen, USAF, Assistant; Staff Sergeant Alfred Seppy, USAF, Assistant

Air Force ROTC offers a new and revitalized program beginning in the Fall term of 1965-66. Two separate but related programs are available to provide education and training in the leadership skills that are essential to qualify young men for a commission in the U. S. Air Force.

The traditional four-year program is available to entering freshmen, in which they will pursue courses in aerospace studies in all four of their undergraduate years. In addition, a new two-year Air Force program is offered to those students with advanced standing who have not previously completed freshmen and sophomore ROTC courses. This program applies specifically to transfer students, graduate students, and those at the junior level who have not completed two years of the basic ROTC program. Students entering the new two-year program must have two years of college remaining, either undergraduate or graduate, in order to complete the course of study leading to a commission in the Air Force. In both the four- and the two-year programs, the courses emphasize quality educational development in those skills considered necessary for a career in the Air Force.

The Air Force ROTC curriculum is divided into two phases. The lower division (Basic) program is established as the General Military Course and consists of aerospace studies for one semester in each of the freshman and sophomore years. Completion of the General Military Course entitles the student to six hours of academic credit. He acquires training in leadership skills, a broader understanding of the vital issues at play in national and international affairs, and the role of the military services in national security.

The upper division (Advanced) program is established as the Professional Officer Course, open to both the four-year student as he enters his junior year or any qualified student who enters directly into the special two-year Air Force ROTC program. The course of study leading to a commission includes specialized instruction in the growth and development of aerospace power, astronautics and space operations, and management principles and practices. Completion of the Professional Officer Course entitles the student to twelve hours of academic credit. Students intending to apply
for enrollment in the Professional Officer Course should consult their adviser or the Professor of Aerospace Studies in regard to application of AFROTC academic credits toward specific degree requirements in the various schools and colleges of the University.

Attractive financial aid is available to students entering both the four-year and the two-year program. Some highly qualified students will be eligible to receive financial assistance up to as much as $1,300 per year while enrolled in the four-year program. This will be a selective and highly competitive program. All students accepted for entry into the Professional Officer Course of AFROTC will be eligible to receive a retainer pay at the rate of $40-50 per month while pursuing courses of study leading to an Air Force commission. Special pay is authorized cadets who attend summer training at an Air Force base.

Selection for the Professional Officer Course in both flying and non-flying categories is based upon character, attitude, academic record, and leadership ability. Each cadet selected must be a student in good standing with the University, must successfully complete a battery of Air Force officer qualifying tests, and be physically qualified for a commission. About one-third of those admitted into the Professional Officer Course are physically qualified for, and desire, flight training as pilot or observer. Pilot cadets will receive, during their senior year, 36½ hours of flight instruction under the supervision of the Federal Aviation Agency, leading toward a private pilot's license.

Successful completion of the Professional Officer Course and the award of a degree by the University qualifies the student for a commission as an officer in the U. S. Air Force Reserve.

413. Air Leadership

Leadership training of one hour each week, plus satisfactory completion of any 3-credit University course in English, foreign languages, social sciences, biological sciences, physical sciences, or mathematics. Successful completion of any University course in these disciplines satisfies the academic portion of A.S. 413. Cr. NLG.

416. World Military Systems

An introductory course exploring the causes of the present world conflict, the role and relationship of military power to that conflict, and the responsibility of an Air Force officer. The course begins with a discussion of the factors from which differing political philosophies have evolved. It continues with a tri-dimensional analysis of the three prime political philosophies which have guided segments of society in the twentieth century. This is followed by a discussion of the means that nations develop to pursue their objectives and how they confront each other in the use of these means. The course then treats individual military systems with emphasis on the U. S. Department of Defense and the U. S. Air Force. Three classroom hours per week. 3 cr.

525. World Military Systems

This course continues the study of world military forces and the political-military issues surrounding the existence of these forces. This includes a study of the U. S. Army, and the U. S. Navy, their doctrines, missions, and employment concepts; a study of the military forces of NATO, CENTO, SEATO, and their role in free world security; and an investigation of the military forces of the USSR, the Soviet Bloc, and the Chinese Communist forces. This phase concludes with an analysis of the trends and implications of world military power. 3 cr.
Reserve Officers Training Corps

528. AIR LEADERSHIP

Leadership training of one hour each week, plus satisfactory completion of any 3-credit University course in English, foreign languages, social sciences, biological sciences, physical sciences, or mathematics. Successful completion of any University course in these disciplines satisfies the academic portion of A.S. 528. Cr. NLG.

635. THE UNITED STATES AIR FORCE

A study devoted to the nature of military conflict and the development of aerospace power into a prime security element. Considers the modes of employment of aerospace forces in general war, limited war, and actions short of war. Includes training in the development of leadership skills. Three classroom hours per week and one hour of leadership laboratory. 3 cr.

636. ASTRONAUTICS AND SPACE OPERATIONS

A study of the development and the importance of the national space effort, the characteristics of the solar system that affect space exploration and operation, and current and planned capabilities for space operations. Includes training in the development of leadership skills. Three classroom hours per week and one hour of leadership laboratory. 3 cr.

745. MILITARY PROFESSIONALISM

A study of the meaning of military professionalism, responsibilities of the professional man, and his relationship to the military services and national security. Includes a study of the military justice system and specific aspects of military life. Includes training and development of leadership skills. Three classroom hours per week. Flight instruction, training in weather and air navigation, and an opportunity to qualify for a private pilot's license is offered to selected cadets. 3 cr.

746. LEADERSHIP AND MANAGEMENT

A study of leadership theory, functions, and practices; management principles and functions; problem solving; and management tools, practices, and controls. A study is also made of materials to help the cadet make a rapid, effective adjustment to active duty as an Air Force officer. For those selected, flight instruction continues in weather, air navigation, and preparation for a private pilot's license. Three classroom hours per week. 3 cr.

Resource Economics (21)
(Agricultural Economics)

WILLIAM F. HENRY, Professor and Chairman; JAMES R. BOWRING; Professor; HAROLD C. GRINNELL, Professor; WILLIAM H. DREW, Professor; RICHARD A. ANDREWS, Associate Professor; SILAS B. WEEKS, Associate Professor; ROBERT L. CHRISTENSEN, Assistant Professor; GEORGE E. FRICK, Adjunct Professor

402. ECONOMICS OF AGRICULTURE

A survey of economics as related to the agricultural industry. Includes the nature of farming costs and farm prices, the economics of marketing, the economic bases of consumer decision making, and agricultural policy. Mr. Henry. 3 cr.
501. Agricultural Business

The organizational, legal, and financial aspects of businesses engaged in buying farm products and selling farm supplies. Farm cooperatives are covered as a special case. Agricultural marketing problems are integrated with the course content. Mr. Christensen. 3 cr.

505. Agricultural Marketing

Food processing and distribution comprise one of the world’s most important industries. This course examines the marketing structure for the major food industries and the kinds of market decisions and agreements made for profit and general welfare by firms, processors, and government policy makers. Consideration is given to market development, plant location, prices, grades, and specification buying as related to the demand for food by institutional buyers, processors, and retailers. Emphasis is given to international trade in food products and the place of the surplus productive capacity of the United States in relation to world trade, Mr. Bowring. 3 cr.

507. Economics of Consumption

The significance to the economy of consumer decisions about spending and saving. The economic theories of consumer decision making. Factors influencing consumer choice, such as product prices and grades, retail merchandising, and consumer incomes. Process of maximizing consumer satisfaction. Mr. Henry. 3 cr.

604. Farm Management Analysis

Principles of managing farms for maximum income, including methods of making management decisions; enterprise selection and resource combination; adjustment to prices; management of land, labor, and equipment; obtaining capital; farm planning; records and analysis of performance. The principles are applied to several kinds of farms through examples, laboratory problems, and farm visits. Mr. Andrews. 3 lec.; 1 lab.; 4 cr. (Alternate years; not offered in 1965-66.)

697-698. Seminar in Resource Economics

Presentation and discussion of reports on economic theory and current economic topics with departmental staff. Prereq.: Junior standing. May be repeated. 1 cr.

706. Economics of Resource Development

This course will offer as background some of the classical and modern theories of economic development. Economic problems of land and resources in relation to market location, urban-rural conflicting demands, and conservation and water supply will be discussed. Population mobility, capital needs, and the roles of public and private leadership will complete the framework for discussion of the major resource development problems of New England. Mr. Bowring. Prereq.: Econ. 1. 3 cr.

708. Research Methods in Social Sciences

Designed to teach the scientific method of research to advanced students. Emphasis will be placed on the meaning of logic and the scientific method and on the application of research techniques to identifying and solving problems. Prereq.: 3 hours of statistics. Mr. Drew. 3 cr.

711. Public Policy for Agriculture

The study of problems which are the basis for government and private policies in the production and marketing of agricultural products. Prices,
Production controls, marketing agreements, conservation, and farm credit are appraised relative to the objectives of agriculture and the concept of general welfare. Mr. Drew. 3 cr.

715. Linear Programming
The course covers setting up and solving problems by the simplex and distribution methods, variations in linear programming problems, solving input-output and game theory problems, and parametric programming. Situations dealt with include least cost combinations, maximum profit combinations, transportation and spatial equilibrium and intersector flows. Prereq.: Math. 407 or permission of instructor. Mr. Andrews. 3 cr.

795-796. Investigations in Resource Economics
Special assignments in readings and problems to satisfy students’ needs. Mr. Andrews, Mr. Bowring, Mr. Christensen, Mr. Drew, Mr. Henry, and Mr. Weeks. 1-3 cr.

Russian
(See Foreign Languages and Literatures)

Secretarial (73)

Doris E. Tyrrell, Associate Professor; Myra L. Davis, Assistant Professor

401-402. Shorthand
Principles of Gregg shorthand with practice in transcribing from shorthand plates and class notes. Secl. 407-408 must be taken in conjunction with this course or precede it. Miss Tyrrell. Prereq.: Permission of instructor. 3 cr.

405, (405). Personal Use Typewriting
Practice in acquiring correct typing techniques, arranging letters, outlines, notes, themes, bibliographies, and simple tabulations. Open to any student who does not know how to typewrite. Miss Davis. Prereq.: Permission of instructor. 5 lab.; 1 cr. NLG.

407-408. Typewriting
Practice in acquiring correct typewriting techniques and in arranging letters, tabulations, and simple manuscripts. Miss Davis. Prereq.: Permission of instructor. 5 lab.; 2 cr. (See Secl. 427).

427. Typewriting
Practice in acquiring correct typewriting techniques, and in arranging letters, tabulations, and simple manuscripts. This course, which begins on November 8, 1965, is to be taken instead of Secl. 407 by Secretarial students who have had Secl. 405 or the equivalent. Prereq.: Secl. 405 or equivalent and permission of instructor. Miss Davis. 5 lab.; 1 cr.

503-504. Advanced Shorthand
A review of fundamental principles, the building of shorthand vocabulary, practice in taking dictation at increasing rates of speed, and practice in
developing skill and speed in transcription. Miss Tyrrell. Prereq.: Secl. 402 or equivalent and permission of instructor. 3 cr.

509-510. **Advanced Typewriting**

Practice in tabulating and in writing business letters, legal papers, and various business forms. Miss Davis. Prereq.: Secl. 408 or the equivalent and permission of the instructor. 5 lab.; 2 cr.

511. **Filing**

Various alphabetic, numeric, geographic, and subject-matter systems of correspondence filing; cross reference; follow-up methods; filing supplies and equipment. Miss Davis. Prereq.: Secl. 407 and permission of instructor. 2 cr.

513. **Office Machines**

Duplicating methods, practice in typing master copies and stencils, and in operating an electric typewriter, a mimeograph, a mimeoscope, and a liquid process duplicator; practice in machine transcription; and an introduction to adding and calculating machines. Miss Davis. Prereq.: Secl. 408 and permission of instructor. 5 lab.; 2 cr.

517. **Secretarial Office Procedure**

Discussion of secretarial duties and traits; problems in the discharge of various duties; problems in office management. Miss Tyrrell. Prereq.: Secl. 503 and 509, or these courses taken in conjunction with Secl. 517, and permission of instructor. 3 cr.

518. **Secretarial Office Practice**

Practice secretarial work in business offices. Miss Tyrrell. Prereq.: Secl. 504 and 510, or these courses taken in conjunction with Secl. 518, and permission of instructor. 10 hours a week; 3 cr. *(This course is open only to students who entered before the fall of 1963.)*

523-524. **Business Writing**

Review of grammar, word usage, punctuation, and sentence construction. Practice in writing various types of business letters and reports; proofreading; editing. Prereq.: One semester of typewriting preceding this course or taken in conjunction with it. Miss Tyrrell. 3 cr.

622. **Advanced Dictation**

Speed building in dictation and transcription. Miss Tyrrell. Prereq.: Secl. 504 and permission of instructor. 3 cr.

**Social Science (45)**

These courses are given under the auspices of the Division of Social Science of the College of Liberal Arts.

681, (681). **Internships**

Field work in a department, agency, or institutional setting of the state or local government, or in a selected and approved private agency. The work will be under the supervision of the department or agency to which the student is appointed. The chairman of the department involved or his
representative will be responsible for arranging the student's individual internship program. Prereq.: Internships for seniors only may be approved by the departments of Government, History, Psychology, or Sociology or the Whittemore School of Business and Economics. Not more than 16 credits. No more than 9 credits may be counted toward the completion of major requirements.

697, 698. Social Science Colloquium
A seminar devoted to the study of the social sciences. The unique aspects of government, psychology, sociology, economics, and history are emphasized through extensive written work and discussion, as well as interdisciplinary implications. Limited to Ford Foundation scholars. May be repeated to a total of 12 credits. 3 cr.

Sociology (68)

Stuart Palmer, Professor and Chairman; Charles W. Coulter, Professor Emeritus; Richard Dewey, Professor; Melville Nielson, Associate Professor; Melvin T. Bobick, Associate Professor; Solomon Poll, Associate Professor; Peter Dodge, Associate Professor; Richard E. Downs, Assistant Professor; Pauline Soukaris, Instructor; Owen B. Durgin, Lecturer; Forbes Bryce, Lecturer

Anthropology Courses

411, (411). Cultural Anthropology
The concepts and methods of anthropology. The structure of culture; culture and personality; economic, family, educational, political, and religious institutions; art; language. Data concerning various primitive societies are presented. 3 cr.

512. Introduction to World Ethnography
Primarily for sociology majors and minors but also for those with a general interest in sociology or anthropology. Selected studies of peoples in the major ethnographic areas of the world. Particular attention will be paid to historical and geographic factors involved in these areas, types of social and economic organization, and problems involved in the comparative study of human societies and institutions. Prereq.: Soc. 411 or the consent of the instructor. 3 cr.

755. Ethnography of Southeast Asia
A study of the geographical, racial, cultural, and historical factors in the development of the area, together with detailed examinations of selected peoples and aspects of their cultures. Prereq.: Soc. 411 or equivalent, or the consent of the instructor. 3 cr.

Social Service Courses

621-622. Introduction to Social Welfare
The field of social welfare: history, public welfare, case work, social group work, community organization for social welfare. For sociology majors and students enrolled in the Social Service curriculum; others may be
admitted by permission of the instructor. 3 cr. (Counts for major credit in Sociology at discretion of adviser.)

631. Social Welfare Field Experience
To give the student an understanding of social welfare through observation and participation. Students will work in a social welfare setting for a period of eight weeks (or its equivalent). This field work is generally done during the summer following the junior year. Weekly seminar sessions constitute the classroom work of the course. Prereq.: Soc. 621, 622 and permission of the instructor. Does not count for major credit in Sociology. 6 cr.

Sociology Courses

(400), 400. Introductory Sociology
Man's social and cultural relationships as revealed in his customs and institutions. Social theory, methods and techniques of research, and current research findings. 3 cr.

(500), 500. Social Psychology
Individual actions, attitudes, ideas, and perceptions as influenced by socio-cultural environments. Individual-cultural relations in education, religion, economics, aesthetics, ethics, and deviant behavior. Prereq.: Soc. 400 and Psych. 401 or sophomore standing. 3 cr.

(520), 520. The Family
An anthropological and institutional approach comparing customs and organizations in several societies. Not open to freshmen. 3 cr.

(530), 530. Race and Ethnic Relations
Majority-minority group relations. Special attention is given to the nature and results of Negro-White and ethnic group relations in the United States. Not open to freshmen. Prereq.: Soc. 400. 3 cr.

(540), 540. Social Problems
How culture in the form of customs and institutions is related to such human problems as crime and delinquency, alcoholism, physical and mental disease, sex pathologies, poverty, old age, broken families, and racial and religious prejudices. Especially for students who do not intend to major in sociology. Prereq.: Soc. 400. 3 cr.

550. Population Problems
Basic concepts of population analysis; theories of population change; the world population growth in the past and present; population problems and policies in hungry and affluent nations. 3 cr.

560, (560). Rural-Urban Sociology
Application of sociology principles to the study of customs and institutions in rural and urban settings. Differentiation between influences upon community organization of culture on the one hand and population size and density on the other. Prereq.: Soc. 400. 3 cr.

571. Communication in Society
Social aspects of the communication process. Cultural prerequisites of communication; premises, purposes, and procedures of communication con-
Sociology

tent analysis; communication in crowd, mass, and public; the organization of mass communication systems in traditional totalitarian and democratic societies; and audience reactions to communicated messages. Prereq.: Permission of the instructor. 3 cr.

640, 641, 642. Readings in Sociology and Anthropology
A three-semester reading sequence of specified books. Required of and restricted to sociology majors. 1 cr. per semester.

695, 696. Honors Seminar
Students work individually on a problem selected by the Department member in charge of the Seminar. A number of projects are assigned in which emphasis is placed upon the tools of academic research and upon oral and written reports. 3 cr.

698. Senior Seminar
Various subject areas of sociology: their growth and development, their relationship to one another, and their current status with regard to research and theory. Recent developments and the newer subject areas of sociology. Future developments as extensions of present trends. Students not majoring in sociology may be admitted by permission of the instructor. 3 cr.

701. Statistics
Use of elementary statistical techniques in analysis of prepared data. Topics surveyed include probability, discrete and continuous probability distribution, distributions of sample statistics, small sample theory, elementary analysis of variance, regression, correlation, and the chi square. 3 cr.

702. Quantitative Methods of Social Research
Analysis of research problems; designing field studies and experiments; demonstration and practice in sampling, schedule construction, and interviewing techniques. Students not majoring in sociology nor enrolled in Social Service Curriculum may be admitted by permission of instructor. Prereq.: Soc. 701. 3 cr.

703, (703). Criminology
The scientific study and control of crime. The following are considered: indexes, rates and theories of crime and delinquency, police, courts, probation, prison and parole. 3 cr.

711, 712. Development of Sociological Theory
Social thought from Plato to the present. First semester: the works of selected individuals from Plato to Comte. Second semester: the 19th century European social philosophers; the ideas of U. S. social scientists, especially their contributions to present day sociological thought. Students not majoring in sociology may be admitted by permission of the instructor. 3 cr.

740. Culture Change
The study of various types of society, leading to the development of a theory of culture change. Descriptive studies of institutional as well as theoretic materials selected from the writings of Comte, Marx, Spencer, Durkheim, Spengler, Sorokin, Redfield, and others. Prereq.: Soc. 400 or consent of instructor. 3 cr.
743. SOCIAL MOVEMENTS

The factors related to the origin and development of reform, revolutionary, religious, and other social movements. Generalizations concerning the organization, structure, tactics, and leadership of social movements. The purposes and consequences of selected movements, as well as to the relationships between social movements and social change. Prereq.: Soc. 400. 3 cr. (Not offered in 1965-66.)

745. SOCIAL STRATIFICATION

Nature, functions, patterns, and effects of social stratification. Social mobility. The social class system in the United States. Prereq.: Soc. 400. 3 cr.

770. CULTURE, PERSONALITY, AND SOCIETY

A cross-cultural view of the development of personality as emergent from the matrix of genetic, situational, and sociocultural determinants; and an analysis of the dynamic interplay of sociocultural and psychological behavior system. Prereq.: Consent of instructor. 3 cr.

795, 796. READING AND RESEARCH IN SOCIOLOGY AND ANTHROPOLOGY


Soil and Water Science (23)

ALLAN B. PRINCE, Professor and Chairman; GORDON L. BYERS, Associate Professor; NOBEL K. PETERSON, Associate Professor; FRANCIS R. HALL, Associate Professor; PAUL A. GILMAN, Associate Professor of Agricultural Engineering Technology, Thompson School of Agriculture

Soils

501. INTRODUCTORY SOILS

The physical, chemical, and biological properties of soils in relation to plant growth. Mr. Peterson. 3 lec.; 1 lab.; 4 cr.

502. SOIL-PLANT RELATIONSHIPS

Soils in relation to their natural fertility, productivity, and the practices and amendments employed to maintain or increase fertility. Mr. Peterson. Prereq.: S. and W. 501. 3 cr.

701. METHODS OF SOIL ANALYSIS

Principles and practices of the more important physical and chemical methods of soil analysis including sampling techniques, particle size distribution, moisture retention, rheological properties, particle density, volume weight, cation exchange capacity, mineral element analysis, etc. Opportunity for experience in the application of flame photometry, spectrophotometry,
and isotopic tracer techniques to soil analytical problems will be provided. Mr. Prince. Prereq.: Biochem. 501 or Chem. 517 or their equivalent. 1 lec.; 2 labs. 3 cr. (Alternate years; not offered in 1965-66.)

702. PHYSICS AND CHEMISTRY OF SOIL

Physical and chemical properties of soils; their measurement and relation to structure, water movement, temperature; and liberation absorption, and fixation of elements in soils. Mr. Prince. Prereq.: Chem. 401-402 or Chem. 403-404 or their equivalent. 3 cr. (Alternate years; not offered in 1965-66.)

704. SOIL CLASSIFICATION AND MAPPING

The genesis, morphology, classification and mapping of soils. Mr. Peterson. Prereq.: S. and W. 501 and Geol. 401 or 407. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

795-796. INVESTIGATIONS IN:

1. Physics and Chemistry of Soil — Mr. Prince
2. Soil-Plant Relationships — Mr. Peterson
3. Agricultural Engineering — Mr. Byers

Elective only after consultation with the instructor in charge. Hours to be arranged. 1-4 cr.

797-798. SOIL AND WATER SCIENCE SEMINAR

Library and reference work on special phases of soil and water problems. Practice in looking up literature and in preparation and presentation of reports and abstracts. Staff. Required each semester of seniors and graduate students majoring in Soil and Water Science; elective for other qualified students. 1 cr.

Hydrology

503. SOIL AND WATER CONTROL

Elementary surveying and its application to agricultural problems. The design principles, mapping, and layout of drainage, erosion control, and irrigation systems along with the presentation of construction practices for farm ponds, diversion ditches, terraces, and other mechanical methods of water control. Farmstead water systems and pumps are included. Mr. Byers. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)

507. INTRODUCTORY HYDROLOGY

An introduction to the field of hydrology from the viewpoint of the hydrologic cycle and hydrologic budget, with particular emphasis on drainage basins as natural hydrologic units. Topics to be covered include precipitation, evaporation, evapotranspiration, runoff, infiltration, ground water and water quality. Some consideration will be given to water law, water economics, and water problems. Mr. Hall. 3 cr.

703. SOIL AND WATER ENGINEERING

The hydrologic, soil, vegetal, and stream flow factors involved in the design and operation of erosion control structures, drainage systems, and irrigation systems. Mr. Byers. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)
710. Ground-Water Hydrology

Basic principles with emphasis on physical properties of water-bearing materials, Darcy's law and the coefficient of permeability, selected steady and non-steady state solutions of the basic flow equation for ground-water motion, well hydraulics, and chemical quality of water. Mr. Hall. Prereq.: S. and W. Sci. 703 or permission of instructor. 3 lec.; 1 lab.; 4 cr.

Mechanized Agriculture

404. Fabrication Technology

An introductory study of the nature of metals and plastics used in agriculture which deal specifically with heating, welding, forming, and repairing. Lectures, demonstrations, and laboratory practices are provided. Mr. Gilman. 1 lec.; 2 labs.; 3 cr.

504. Agricultural Power

Tractors, tractor engines, and electrical energy in farm work. The factors involved in the management, preventive maintenance, and repair procedures required by tractor motors and their power transmission systems. Mr. Byers. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

505. Agricultural Machinery

The selection, care, operation, and management of conventional farm machinery and processing equipment involved in the production of farm commodities. Mr. Byers. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

506. Agricultural Buildings

The planning and design of agricultural structures for animals and crops. Construction practices, farmstead layout, building material selection and application, material estimates, heating systems, lighting, refrigeration, sewerage disposal, ventilation, environmental controls, certain phases of crop processing, and basic concepts of architectural drafting are introduced. An agricultural building problem, related to the student's major or field of interest, serves as the base for the application of all principles presented in lecture. Mr. Byers. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)

Agricultural Engineering

705. Field Machinery

The design of the engineering elements of farm machinery; capacity and power requirements of farm implements. Mr. Byers. Prereq.: or concurrently: M.E. 26. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)

706. Agricultural Structures

The functional planning and the analysis used in farm building design; problems arising from the physiological processes of animals and crops. Mr. Byers. Prereq. or concurrently: M.E. 35. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

707. Electric Power and Processing

The utilization of electrical energy on farms for power, illumination, and temperature control, including the study of equipment used in crop
Soil and Water Science

processing water systems, materials handling, and the analysis of farmstead wiring problems. Mr. Byers. Prereq. or concurrently: E.E. 39. 2 lec.; 1 lab.; 3 cr. (Alternate years; offered in 1965-66.)

708. FARM TRACTORS

The design and operation of farm tractors, tractor power units, chassis mechanics, tractor tests and performances. Mr. Byers. Prereq. or concurrently: M.E. 26; M.E. 33. 2 lec.; 1 lab.; 3 cr. (Alternate years; not offered in 1965-66.)

Spanish

(See Foreign Languages and Literatures)

Speech and Drama (69)

JOSEPH D. BATCHELLER, Associate Professor and Chairman; EDMUND A. CORTEZ, Professor; JOHN C. EDWARDS, Associate Professor; PHYLLIS D. WILLIAMSON, Instructor; GILBERT B. DAVENPORT, Instructor; JUDITH K. DAVENPORT, Lecturer; MARIANNE H. JAFFE, Lecturer; MRS. ALICE BOWES, Adjunct Instructor

301. SPEECH IMPROVEMENT

All entering freshmen and transfer students are required to take a speech test. They are classified as Group I, having no apparent problem; Group II, needing speech improvement; or Group III, having a relatively serious speech problem. Those students classified in Group III are required to meet individually or in groups with the staff and students in clinical practice for non-credit Speech Improvement until such time as they have made sufficient improvement. A student may be remanded to Speech Improvement by any instructor with the approval of the Speech staff. Mrs. Jaffe. No cr.

401, (401). BASIC SPEECH

A beginning course in the social, psychological, physiological, and phonetic bases of speech. Projects in informal public speaking, oral interpretation, discussion, and elementary phonetic transcription are used: (1) to illustrate the bases and (2) for the improvement of the individual student. This course is strongly recommended for those students who are classified in Group II on the speech test. Required of all majors, but without major credit. Staff. 3 cr.

411. DISCUSSION

The means and ends, values, and limitations of the various types of discussion. Group dynamics, logic and evidence, and parliamentary procedure as applied to learning and problem solving. Practice in using various methods to gain the objectives of discussion. Mrs. Williamson. 3 cr.

431. INTRODUCTION TO THEATER ARTS

The basic elements common to the varied media of theater; legitimate, musical, cinema, and television. The place of the theater in our lives. An introduction to theater practices from the script to production. Mr. Batcheller. 2 lec.; 1 lab.; 3 cr.
436. **Theater and Its Drama**

The relation of theater and its drama to the society in which it is produced. A comparative study of outstanding modern plays and historical counterparts. Mr. Batcheller. 1 lab.; 3 cr.

457. **Oral Interpretation of Literature**

The analysis of literature as a basis for performance; demonstrate and experiment with methods of performance which will enhance particular pieces of literature; the development of a critical standard for evaluation performance, and, consequently, literature. Mr. Edwards. 3 cr.

459, (459). **Stagecraft**

An introduction to stage and television scenery, costumes, properties, lighting, sound, and backstage organization. Practical application in University Theater productions. Mr. Davenport. 1 lec.; 2 lab.; 3 cr.

501, (501). **Public Speaking**

The basic speaker, materials, presentation, occasion, and audience relationships. An introduction to extemporaneous and impromptu speaking for the purposes of informing and convincing. Practice in speaking with evaluation and constructive comment by the instructor and audience. Cannot be counted for major credit. Mr. Cortez and staff. 3 cr.

504. **Debate**

The various forms of advocacy as an extension of discussion. The analysis of propositions, the construction of a case, logic and ethical persuasion, and the presentation of speeches of advocacy. Mrs. Williamson. 3 cr.

508. **Speech for Prospective Teachers**

Developing an adequate conversational form of speaking before the class; speech improvement for the prospective teachers; voice recording and analysis; oral interpretation of both prose and poetry; making and using visual aids; and the means of developing a communicative speaker-audience relationship. Mr. Cortez. 3 cr.

531. **Speech Correction**

Further study of the psychological, physiological, and phonetic bases of speech with the addition of the neurological, genetic and physical bases towards the end of recognizing abnormalities of speech, some of their causes, and their basic therapy. Delayed speech, articulatory and voice disorders, foreign dialects, stuttering, aphasia, cerebral palsy, and audiology are the principal problems studied. Prereq.: Basic Speech or approval of the instructor. Mrs. Jaffe. 3 cr.

551. **Acting**

The relation of the actor to other theater workers in producing a play. Analysis of the role, creation of images, rehearsal and performance problems of legitimate theater and television. Prereq.: 6 credits in Speech and Drama or approval of the instructor. Mr. Edwards. 1 lec.; 2 lab.; 3 cr.

555. **Television and Radio Workshop**

The application of basic theater techniques to electronic means of mass communication. The place of television and radio in our society. Production techniques. Actual practice in campus studios. Mr. Batcheller. 1 lec.; 2 lab.; 3 cr.
Speech and Drama

601, (601). Speech Practice
Application of the theory of specific speech areas, other than theater, i.e. Discussion, Debate, Speech Correction, in individual or group projects. May be repeated to 4 credits toward graduation but cannot be counted for major credit. Prereq.: the basic courses in which practice credit is taken and the approval of the instructor. Staff. 1 cr.

605. Bases of Theater Arts
An exploration of the fundamental factors common to all types of theater art with emphasis upon appreciation through involvement as well as theoretical study. Not open for credit to students who have taken Speech and Drama 431. (Summer Session only). 3 cr.

611. Rhetoric in the Western World
A study of great speeches in the history of western civilization; an analysis of the reasons for their success or failure on a basis of the speaker, his materials, the logical and persuasive appeals, the audience background and attitude, and the occasion. Of special interest to history, government, sociology, and psychology majors as well as students interested in relationships of language and social problems. Prereq.: 6 credits in Speech and Drama or approval of the instructor. Mrs. Williamson. 3 cr. (Alternate years).

617. Oral Interpretation of Literature
An analysis of prose and poetry with the view of problems which will be found in the performance of selected works. Reading performances, solo and group performances, with attention to problem of high school teachers of literature and speech. (Summer Session only). 3 cr.

622. Theater for Children
An introduction to the art of Theater for Children, including a dual study of Creative Dramatics as a teaching technique for both school and recreation programs, and the formal presentation of plays for children. As part of the course of study, students will observe actual classes in Creative Dramatics and will take part in the production of a play for children. Mrs. Davenport. 3 cr.

632. Clinical Methods
A continuation of Speech Correction dealing with the theory of remedial practices for various speech problems and providing experience in speech therapy by demonstration and laboratory in conjunction with Speech Improvement. Prereq.: Speech Correction. Mrs. Jaffe. 1 lec.; 2 lab.; 3 cr. (Alternate years).

634. Procedures and Practices in Rehabilitation Methods

641. Theater Practicum
The study of roles, production techniques, etc., combining class lecture and demonstration with actual rehearsal and production experience in
the Summer Theater program. This course and/or Speech and Drama 655
may be repeated to a total of 8 credits toward graduation. (Summer Session
only). 3 cr.

643. Speech for Teachers in Service

Unit one: Voice analysis and recordings; pronunciation, enunciation,
speech rate, pitch changes, inflections, quality. Unit two: interpretative
speech; poetry, prose, story; the manuscript; the techniques of delivery on
stage and radio. Unit three: Choric speech for lower and upper grades and
for adults. Unit four: Forms and requirements of public address. Unit five:
Simple parliamentary procedure. Unit six: Topic or area suggested by the
class (optional). For juniors, seniors, or graduate students. (Summer Ses-
son only). 3 cr.

645. Educational Television Workshop for Teachers

Basic philosophy of educational television; studio equipment and tech-
niques; use of lighting facilities and cameras; methods of producing a TV
program; use of films; lay-out of a TV program for a school system; mag-
netic sound recording; laboratory experience with the facilities of WENH-
TV; educational trips to metropolitan TV stations; guest lecturers. (Sum-
mer Session only). 3 cr.

647. Play Production in High Schools

The stage as an environment of the action of a script. Problems of
scenery, lighting, costumes, properties, and sound effects as applied to the
high school situation. Application in laboratory and public performance.
(Summer Session only). 3 cr.

649. Principles and Methods of Drama

The philosophy of educational theater. Courses of study and extra-
curricular programs. The problems of dramatic activities. Practical solu-
tions applied in laboratory and public performance sessions. (Summer Ses-
son only). 3 cr.

652. Scenic Design and Lighting

A study of the problems of stage design and lighting for theater and
television. Individual projects, models, and participation in University
Theater and television productions. Prereq.: Stagecraft or approval of the
instructor. Mr. Davenport. 1 lec.; 2 lab.; 3 cr.

655, (655). Theater Practice

Application of the theory of acting, directing, or the technical aspects
of production to specific assigned responsibilities in University Theater pro-
ductions. This course and/or Speech and Drama 641 may be repeated to a
total of 8 credits toward graduation, but cannot be counted for major
credit. Prereq.: the basic courses in which the practice credit is taken and
approval of the instructor. Mr. Batcheller. 1 cr.

658. Directing

The analysis of the script, the determination of specific treatment of
the production, the development of a prompt script, casting, rehearsal, and
production for legitimate theater and television. Prereq.: 6 credits in
Speech and Drama or approval of the instructor. Mr. Edwards. 1 lec.; 2
lab.; 3 cr.
Technology (79)

401. Problems in Engineering

To acquaint students with the broad scope of the engineering profession and to help them develop the ability to analyze, to formulate, and to solve engineering problems. The relation of engineering problems to problems and techniques from science and mathematics. Although the problems considered must be relatively simple because of the limited experience of students, they are true engineering problems designed to demonstrate that engineering problems, in general, may have many possible solutions and that professional decisions must often be based on limited data. The use of machine computation techniques are discussed and each student may use the IBM 1620 Computer to solve a simple problem. The course is directed by a committee consisting of Mr. Zimmerman, Mr. Winn, and Mr. Zoller and Mr. Corell; lectures on various phases of engineering and related fields are also given by other engineering faculty members. Required of new freshmen engineering students, but it may be elected by freshmen majoring in mathematics or the physical sciences or by other freshmen who wish to learn more about the activities of engineers. 3 cr.

Zoology (70)

Paul A. Wright, Professor and Chairman; C. Floyd Jackson, Professor Emeritus; George M. Moore, Professor; Lorus J. Milne, Professor; Edythe T. Richardson, Professor; Wilbur L. Bullock, Professor; Emery F. Swan, Professor; Paul E. Schaefer, Associate Professor; Philip J. Sawyer, Associate Professor; Marcel E. Lavoie, Associate Professor; Arthur C. Borror, Assistant Professor; Burton C. Staugaard, Assistant Professor; Frank K. Hoornbeek, Assistant Professor

412. Principles of Zoology

Concepts of animal biology, including ecological relationships, anatomy, physiology, embryology, taxonomy, and evolution. Mr. Swan. Prereq.: Bot. 411. 3 lec.; 1 lab.; 4 cr. Not open to students who have credit for Biol. 402 and 404.

507-508. Mammalian Anatomy and Systemic Physiology

The anatomy and physiology of mammals with a strong emphasis on man’s morphological heritage and relationships. Mr. Lavoie. Prereq.: Biol. 402 or Zool. 412. 3 lec.; 1 lab.; 4 cr.

512. Ornithology

Birds, their identification, migration, life histories, and economic importance, with special reference to those of eastern North America. Mr. Borror. Prereq.: Biol. 402 or equivalent. 1 lec.; 2 lab. or field trips; 3 cr.

530. Zoological Techniques

A functional background of specialized technical procedures useful for research and study in zoological areas. Topics will include preservation, fixation, sectioning, staining, microscopy, photomicrography, and use of such instrumentation as is available and depending on the needs of the students enrolled. Mr. Staugaard. Prereq.: Biol. 402 or Zool. 412 and permission of instructor. 1 lec.; 2 lab.; 3 cr.
601. Kinesiology

Bodily movements. The relation of skeleton, muscles, and joints in movements. Designed primarily for Occupational Therapy majors and for students in the Physical Education curricula. Mrs. Richardson. Prereq.: Zool. 508. 2 lec.; 1 lab.; 3 cr.

606. Neurology

Practical study of morphology, physiology, and histology of the human nervous system. Mrs. Richardson. Prereq.: Biol. 402 and one year of Zoology. 3 lec.; 1 lab.; 4 cr.

610. Introduction to Pathology

Concepts of the effect of disease on the body, emphasizing variations in anatomy, physiology, and biochemistry. Consideration of inflammation, infection, mechanical injury, vascular disturbances, degenerations, congenital defects, neoplasms, endocrine, and functional disturbances. Dr. Allen W. Handy, M.D., and Dr. Paul C. Young, Jr., M.D. Prereq.: Zool. 508 concurrently. 1 lec.; 1 cr.

701, (701). Principles of Ecology

The interrelationships of plants and animals with both their living and non-living environments. Energy relationships, limiting factors, community organization, succession, and biogeography. Staff. Prereq.: Zool. 412 or equivalent. 3 cr.

704. Comparative Endocrinology

The various endocrine organs, vertebrate and invertebrate, with particular emphasis on endocrines which relate to physiology of reproduction. Mr. Wright. Prereq.: Permission. 3 cr.

(706), 706. Genetics

The physical basis of inheritance, expression, and interaction of the hereditary units, linkage, and variation. The application of Mendelian principles of plant and animal breeding. Mrs. Richardson. Prereq.: Zool. 412 or equivalent. 3 lec.; 1 lab.; 4 cr.

711, 712. Natural History and Taxonomy of the Vertebrates

The various classes of vertebrates; their habits, habitats, and life histories, with special reference to those occurring in eastern North America. Zoology 711 will include the fishes, amphibia, and reptiles. Zoology 712 will cover the mammals and birds. Mr. Sawyer. Prereq.: General Zoology and Zool. 508. 2 rec.; 2 lab.; 4 cr.

(715). Natural History of Marine Invertebrates

A field and laboratory course aimed at acquainting the student with the inshore marine invertebrate metazoan animals of northern New England. Emphasis will be on identification, classification, habitat preferences, and behavior of these animals. Field work (collections and observation) will constitute a major part of the course. Mr. Moore. Prereq.: General Zoology. 1 lec.; 3 labs.; 4 cr. (Offered in Summer Session; omitted during academic year, 1965-66.)

721. Parasitology

An introductory course on some of the more important parasites causing diseases of man and animals. Living materials will be used as far as possible. Mr. Bullock. Prereq.: One year of Zoology. 2 lec.; 2 lab.; 4 cr.
Zoology

725. General Physiology
The fundamental physiological properties of excitability, contractility, conductivity, metabolism, growth, and reproduction. Mr. Hoornbeek. Prereq.: One year of Zoology, and Organic Chemistry. 3 lec.; 1 lab.; 4 cr.

729. Vertebrate Morphogenesis
A comparative study of the organ systems of the vertebrate body and their embryonic development. Mr. Staugaard. Prereq.: Zool. 507-508 or equivalent or permission. 3 lec.; 2 lab.; 5 cr.

730. Elements of Histology
The microscopic anatomy of principal tissues and organs of vertebrates with an introduction to general histological techniques. Mr. Bullock. Prereq.: Zool. 508 or equivalent or permission. 2 lec.; 2 lab.; 4 cr.

736. Advanced Genetics
Genetic recombinations and mutations; gene action in terms of physiological effects during development and as adults. Mr. Hoornbeek. Prereq.: Zool. 706 or equivalent. 3 cr.

738. Advanced Genetics Laboratory
Problems and projects with small mammals and Drosophila, stressing physiological genetics. Student background and interest to determine content. Mr. Hoornbeek. Prereq.: Zool. 736 or equivalent, concurrently. 2 lab.; 2 cr.

795, 796. Special Problems in Zoology
### Summary of Registration

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* Includes Whittmore School.

** Pre-Semester 1, 1963-64. Beginning 9-63, GE students register as regular students.
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