University of New Hampshire

UNH TODAY

Six Students, Alumni Receive NSF Graduate Research Fellowships

A record year for the prestigious award

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Three UNH students and three recent alumni have received prestigious National Science Foundation Graduate Research Fellowships (GRFP), given to students pursuing master's and doctoral degrees in science, technology, engineering and mathematics. This is the largest "class" of Fellows ever at UNH. Considered one of the foremost awards in the STEM fields, the five-year fellowship includes three years of financial support, with an annual stipend and tuition allowance. Current student recipients are Luke Botticelli, Sam Mercer and Eli Duggan, all class of 2023. Alumni recipients Tan Dao '21, currently a Ph.D. student at Harvard University; Mackenzie Meier '19, pursuing a master's degree at the University of Bristol in England; and Kelsey Mercurio '21, who is going to Pennsylvania State University for a Ph.D., prepared to apply for the GRFP while UNH students.

Luke Botticelli

Luke Botticelli ’23 will be receiving his bachelor’s degree in biochemistry, molecular and cellular biology this spring and will be pursuing a doctoral degree in biochemistry at UNH in the fall. He will be working under professor Feixia Chu, studying protein complexes in stem cells, specifically a group of complexes called the epichaperome, which was recently found in cancer, Alzhiemer’s and Parkinson’s disease. He hopes to use his research to inform novel disease treatments that target the epichaperome as well as develop synthetic model organs using stem cells and tissue engineering.

Botticelli’s current work focuses on complexomics, which is the study of protein complexes — the association of two or more proteins that combine to form a function different from the function of each individual protein — within a cell using mass spectrometry.

“With proteins, structure dictates function — at a level of an individual protein and at the level of a protein complex,” he says. “Once we know a protein complex’s structure, we can try to develop treatments to stabilize certain complexes, disassociate certain complexes, or promote the assembly of certain

complexes.”

Botticelli first became involved in research at UNH the summer before his freshman year, studying slime mold species in the lab of professor Serita Frey after spending time culturing and isolating species of soil fungi while in high school, and continued working in her lab until sophomore year. He joined Chu’s lab the summer before his junior year and there fell in love with studying stem cells.

Eli Duggan ’23, a University Honors student, will be receiving his bachelor’s degree in bioengineering and will utilize his NSF GRFP to pursue his doctorate in chemical engineering at the University of Michigan in the fall of 2024.

ELI DUGGAN

Prior to attending Michigan, Duggan will use his Fulbright to complete a master’s degree in sustainable engineering at the University of Strathclyde in Glasgow, Scotland. He is also a Goldwater Scholarship recipient.

Duggan began his research journey through the Innovation Scholars program, a research seminar for first-year students, and later participated in the Hamel Center-funded Research Experience and Apprenticeship Program (REAP). He also conducted research at the University of Kansas through the NSF Research Experience for Undergraduates (REU) program and was selected to the 2022 MIT Summer Research Program.

“Broadly, I want to develop low-cost energy storage solutions to

enable decarbonization of our energy system," says Duggan. "This entails improving system efficiency, discovering and using alternative materials and developing novel designs."

Duggan hopes his research will assist in making long-duration energy storage cheaper, enabling renewables-plus-storage systems to economically compete with fossil fuels.

SAM MERCER

Sam Mercer '23, a University Honors student, will be receiving his bachelor's degree in chemical engineering this spring and will be pursuing a doctoral degree in chemical engineering at the University of Texas this fall with a focus on computation and optimization of catalytic systems for energy applications.

Prior to that, Mercer will work this summer in the Materials Science Division of the National Renewable Energy Laboratory in Golden, Colorado, through the United States Department of Energy's Summer Undergraduate Laboratory Internship program. Mercer also received a Fulbright but declined it to accept the NSF GRFP.

As a UNH student, Mercer began his research as an Innovation Scholar during his first year and then continued to excel in the research world through a REAP fellowship in 2020 and a Summer Undergraduate Research Fellowship (SURF) in 2021. His computational work was supported by an NSF REU at the University of Florida in 2022.

"I like to describe my research in catalysis as a mixture of organic

chemistry, physical chemistry, applied mathematics and reaction engineering," says Mercer. "I have designed catalysts that find new ways to utilize natural gas without emitting massive quantities of greenhouse gases using a combination of experiment and computation. I have also proposed alternative carbon sources to produce petroleum products using biomass derived from plants and organic wastes rather than crude oil."

Mercer hopes his work contributes to a wider transition to clean energy sources by engineering market-competitive materials and technologies.

In addition to these six GRFP recipients, UNH Ph.D. student Cheristy Jones and alumna Sawyer Cawthern '21, now at Massachusetts Institute of Technology, received honorable mentions.

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