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Barry McQuarrie and Harrison Piehowski '19 Tackle Familiar Mathematical Models

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Their work will help biology-driven researchers identify limitations and errors within their own parameters, allowing for a deeper understanding of the underlying mathematical model.

MORRIS, Minnesota (July 20, 2016)—Barry McQuarrie, associate professor of mathematics, is one of 13 University of Minnesota, Morris professors collaborating with students in the Howard Hughes Medical Institute (HHMI) Undergraduate Summer Research Program. McQuarrie and student researcher Harrison Piehowski '19, Fridley, are experimenting with the parameters of data-set models by using concepts of mathematical theory.

Researchers often apply curves and functions to a series of numbers to account for experimental errors. Instead of fitting a curve to the data-set, McQuarrie and Piehowski are applying a system of differential equations. This adaptation of the typical mathematical model would help biology-driven researchers identify limitations and errors within their own parameters, allowing for a deeper understanding of the underlying mathematical model.

"This [project] was a neat way for me to take some of the concepts and things that I was teaching in my own classes and connect them to biological applications," says McQuarrie. "I see a lot of students in my classes that are in biology and chemistry. I wanted to learn more about how they view things and what would be useful from my classes for them."

Piehowski is a freshman at Morris who learned about this research opportunity through his advising sessions and coursework. After being accepted to his research position, he spent two weeks immersed in mathematical theory and concepts, beginning with texts suggested by McQuarrie and then branching off to his own applications of these concepts into computational code.

"I work with Mathematica to somehow implement [ideas I've read about]," says Piehowski. "I then work with LaTeX to typeset ideas to track each DBQ method that I use in order to track the pros and cons of each method."

This research extends concepts Piehowski has encountered in his coursework, which includes classes like Linear Algebra, Differential Equations, Numerical Methods. By pursuing summer research he is developing a deeper understanding of the course content beyond what his peers have encountered.

"It's a neat opportunity that I am able to do this so early in my educational career, and it's eye-opening to see that there's so much available to do," he says.

The Undergraduate Summer Research Program is supported in part by a grant to the University of Minnesota, Morris from the Howard Hughes Medical Institute through the Undergraduate and Graduate Programs. More information is available at morris.umn.edu/hhmi.

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