Summer Undergraduate Research in Mathematics at UNI

UNI Mathematics has funding for two undergraduate students to work on research projects under the direction of a faculty member during the summer of 2015. Each student will receive a stipend of $3,000 and the research is to be conducted over an eight week period. Student researchers are required to present a poster on their work at the College of Natural Sciences poster session in August.

The program is open to all students with a declared major or minor in a program offered by the Math Department, and who will still be in residence (including student teaching) in the fall of 2015. Interested students must submit their application materials to the Math Department office in WRT 220 by 5 pm on March 6th, 2015.

A complete application consists of all of the following documents:

- Applicant Information Form, including names of references
- Unofficial transcript
- Letter of application

Your letter of application should be a short statement (one page or less) explaining why you are interested in doing research this summer and why the project(s) you listed appeal to you. You are also welcome to describe a project (other than one of those listed) that you would like to work on this summer with a faculty mentor in the Math Department.

A copy of the Applicant Information Form is available at

http://www.uni.edu/theron/SURP/index.html

For more information about the program, contact Prof. Theron Hitchman:
theron.hitchman@uni.edu

Possible Research Projects:

This is a partial listing of possible research projects available to students in the summer of 2015. For more information on a particular project, contact the faculty member listed.

Project #1: Graph Theory Course Development (Prof Shaw)

Abstract:

We will develop a 10-day Graph Theory course for the Michigan Math and Science Scholars High School Summer Program. http://www.math.lsa.umich.edu/mmss/

The graph theory course will consist of 40 hours of instruction and homework over 10 days. This project will involve learning some fascinating mathematics well enough to plan rich lessons, and must be completed by June 22. The opportunity will exist to travel to Ann Arbor, Michigan to be the teaching assistant for the course, but that is completely optional.

Project #2: Contexts in Textbook Problems on Fractions: Pizza or Brownies? (Prof Noh and Prof Gallivan)

Abstract:

Contexts are used frequently in mathematical tasks in order to make the mathematics more meaningful as well as to show the usefulness of specific ideas and skills being studied. Thus, contexts play a key role in forming the basis of a mathematical experience for students. Before using such a context, teachers would need to make judgments about its mathematical suitability, the interest or relevance to the students, the potential motivational impact, and the possibility of negative effects to exclude some students. In this project, we will examine elementary and middle school textbooks to study types of contexts used for teaching fractions with respect to the areas mentioned above.

Project #3: 3D Printing for Mathematics Visualization (Prof Hitchman and Prof Wood))

Abstract:

We see plenty of three-dimensional objects in courses like multivariable calculus, topology, and differential geometry that have interesting properties but are tough to visualize. We will explore how to use 3D printing technology to create accurate models of such objects. This work may lead to producing materials for courses at UNI or a workshop for the Rod Library's new maker space. Some experience in geometry and/or programming may be required.

Project #4: Routes to Reason: Proportion (Prof Steinthorsdottir & Prof Riehl)

Abstract:

How do middle school students reason about proportion problems? Do strategies change depending on the numbers involved? Are students more successful in some contexts than others? How do strategies change between 5th graders and 8th graders? Are students accurate in assessing their own work? We have data from about 400 middle school students on a 26 item instrument. Research with this data can take a variety of paths. Examining the student work and seeing the variety of strategies and errors is very educational for any future teacher. Much of the data has been coded and so a variety of research questions can be explored using the database. An interest in mathematics education (any level) and mathematics education research is needed.

Project #5: ***Choose your own adventure***

Have an idea for some summer research? Or a professor you would really like to work with? Suggest an idea for summer research and we can try to help you work out the details.

Contact Prof. Hitchman if you are unsure how to get started. theron.hitchman@uni.edu