Opportunities in Mathematical Studies AT SIUE:

APPLIED MATH

Career Outlook

Throughout history, mathematics has played a vital role in efforts to understand the world and control the environment. Not only the natural sciences, but also economics, political science, sociology, psychology and other social sciences rely on mathematics to understand, control and predict phenomena. Consequently, mathematics majors have many career opportunities open to them. Also, career opportunities of students who major in other subjects are enhanced by supporting courses in mathematics.

The mathematician in industry is hired because he or she can contribute to some ongoing problem. Rarely does the mathematician work alone in industry, more often working as part of a team. Thus a fundamental requirement is the ability to communicate about and solve problems. Four broad categories of industrial mathematicians are associated with four general classes of problems:

Applied Mathematicians deal with industrial problems involving questions of chemistry or physics, problems in structure stability, wave propagation, etc.

Operations Researchers build simple mathematical models of complex economic and business structures to help people plan a course of action.

Statisticians design experiments, plan data collection, and analyze data to forecast trends, reliability, etc. They also deal extensively with quality control issues.

The mathematician in government typically is solving algebraic or differential equations or analyzing statistical data. With some experience, the mathematician generally becomes a department-wide consultant. Many data-analysis problems involve matching data with imperfect mathematical models of physical, economic or sociological systems. The mathematician combines what can be observed, what can be modeled mathematically, and what can be solved mathematically in finite terms with finite resources to produce results upon which decisions are based.

The mathematician in teaching has an extremely important job. Approximately 1/5 of all bachelor's-level mathematicians work in education, but there is now a shortage of high school mathematics teachers. The most effective teachers have breadth in mathematics (a major) and understand how to pose and solve problems in mathematics applications. An internship (observing and teaching) and teacher certification are required for teaching in public schools.

Educational Preparation

A student planning for a career in mathematics should take college-preparatory courses in high school, including four years of English, four year of mathematics, and three years of science. A student who has not taken the recommended math courses in high school may take them in college but must expect a loss of time.

A student may declare a major in mathematics provided he or she has either:

- Completed MATH 120 and MATH 125 or mathematics courses having these courses as prerequisites (or equivalent courses at another accredited institution of higher education), has GPA of 2.0 or higher in all college mathematics, and has a GPA of 2.0 or higher in all college courses taken.

or

- Completed, in high school, seven semesters of college preparatory courses in mathematics, including a course in trigonometry, and has no semester grade lower than C in these courses.

Typical Program of Study

Applied Mathematics Option

Freshman Year **Semester Hours**

MATH 150 – Calculus I ……...…...5
General Education ……...……9
14

MATH 152 – Calculus II ……...…….5
CS 140 – Introduction to Computing I…….3
General Education ……...……9
17

Sophomore Year

MATH 250 – Calculus III ……...……4
PHYS 211a – University Physics …..……4
PHYS 212a – University Physics Lab I …….……1
MATH 223 – Logic & Math. Reasoning…….……3
General Education …...……..……4
16

PHYS 211b – University Physics ……..…....4
PHYS 212b – University Physics Lab II……..……1
MATH 305 – Differential Equations ……...…3
MATH 321 – Linear Algebra I ……....3
MATH 350 – Introduction to Analysis ……..….3
General Education ……..…….3
17

Junior Year

MATH 450 – Real Analysis I...……...3
MATH, STAT or OR elective ……...……..3
Science or engineering elective*…….…3
General Education ……..….6
15

MATH 451 – Introduction to Complex Analysis....3
MATH 464 – Int. to Partial Diff. Eq…...…….3
Science or engineering elective.....……..3
General Education……...….3
MATH, STAT or OR elective……..3
15

Senior Year

MATH 465 – Numerical Analysis……...3
MATH 498 – Senior Seminar……..2
MATH, STAT or OR elective…….3
General Education……3
Electives……...…4
15

MATH 466 – Numerical Linear Alg. with App…...3
MATH 499 – Senior Project..……..2
General Education……3
Electives ……..7
15

Total hours for graduation ……124

* Refer to the SIUE undergraduate catalog for a list of approved elective courses.

Students who have not completed a course that thoroughly covered trigonometry will need to start with MATH 125 – Precalculus; or with MATH 120 – College Algebra.

Faculty

All 18 full-time faculty members in the Department of Mathematics and Statistics hold doctorates. Some have practical experience in industry and government. Our faculty members are scholarly active publishing their work in professional journals and presenting results at numerous international and national conferences. For their activities they received both external and internal research grants and scholarship awards. Several of the faculty members hold leadership positions in professional organizations and editorial boards. Four faculty members have received Teaching Excellence Awards or Teaching Recognition Awards.

Scholarships and Awards

The Office of Student Work and Financial Assistance administers several federal, state, and institutional financial aid programs, including scholarships, grants and loans. Early application is advised.

Facilities

Modern computer facilities are extremely important to most mathematical scientists and probably will be more important in the future. In recognition of this fact, all mathematics majors must learn a computer programming language and are encouraged to use computers. Math students have access to more than 500 state-of-the art PCs in over a dozen computer labs on campus. SIUE has site licenses for several popular mathematical software packages, including Mathematica, MATLAB, SAS, and Minitab. The University's Lovejoy Library included extensive collections of periodicals and books about mathematics and statistics.

Graduate Study

Undergraduate majors in the Department of Mathematics and Statistics are encouraged to prepare for a graduate study at SIUE or elsewhere. Students may earn a master's degree in mathematics with a specialization in one of several areas of interest at SIUE.

To Learn More …

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