

MATHEMATICS

Pattern and form surround us – from the branching angles of our blood vessels and the complexity of computer algorithms to inventory scheduling and the four-dimensional geometry of our universe. As the pure expression of pattern and form, mathematics is the language of all science.

In the past 50 years, many disciplines – computer science, statistics, ecology, and management science, among others – have been virtually transformed by the infusion of mathematics. Alongside the traditional field of mathematical physics, one now finds new fields such as mathematical biology, mathematical economics, mathematical linguistics, and mathematical psychology.

A mathematics degree could lead to graduate study in any of these fields, as well as in areas in pure and applied mathematics. Moreover, students have found a major in mathematics, with its training in logic, analysis, and precise expression, to be excellent preparation for careers in law, business, or medicine.

CURRICULUM

To reflect the diversity of modern mathematics and its applications, the department, alone or in conjunction with computer science or economics, offers three separate majors: mathematics, mathematics-computer science, and mathematics-economics. Core courses provide you with a secure foundation for varied and challenging advanced course work, including possible student-designed tutorials and, in the senior year, a term of independent study and research.

The Mathematics Major

Generally, you will begin with the introductory calculus sequence, an intensively taught year of calculus differing from the usual high school versions in both tempo and emphasis on conceptual understanding through a careful theoretical development.

The second year of the major, beginning with a choice of problem-solving courses in the fall, features the two foundations courses; abstract algebra in the winter and classical analysis in the spring. The sophomore sequence is the bridge to upper-level work in mathematics. It is in these courses that you learn the standard mathematical techniques of

proof and develop the ability to write cogent mathematics.

The last two years of the major consist of electives selected from the spectrum of contemporary undergraduate mathematics. These courses generally feature challenging problem sets involving both theory and applications, and are, where appropriate, accompanied by projects or computer applications.

The Mathematics-Computer Science Major

You will take the core sequence of Calculus I, II, and III plus the introductory sequence in computer science, *Introduction to Computer Science*, *Intermediate Programming*, and *Introduction to Data Structures*.

Additionally, you will take four more upper-level mathematics courses and four more upper-level computer science courses. You will be able to choose these courses from a variety of offerings, including *Foundations of Algebra*, *Mathematical Logic*, *Graph Theory*, *Data Structures and Algorithm Analysis*, *Programming Languages*, and *Theory of Computation*.

The Mathematics-Economics Major

The core sequence of courses for this major includes three terms of calculus, *Introduction to Probability and Statistics*, *Foundations of Algebra*, *Foundations of Analysis*, *Microeconomic Theory*, *Macroeconomic Theory*, and *Econometrics*.

In addition to those nine courses, you will take three upper-level economics courses and two upper-level mathematics courses of your choosing. If you pursue this major, you will have a faculty advisor in both the mathematics and the economics departments.

ADVANCED WORK IN MATHEMATICS

When you reach the advanced level and have begun to develop specific interests, you'll have the opportunity to design tutorial courses, in which you will work one-on-one with a professor or in a very small group on topics beyond the regular offerings. In the past, students have studied such topics as fractals, robotics, population models in biology, the philosophy of mathematics, mathematical economics, mathematics in elementary schools, game theory, and tessellations of the plane.

In your senior year, you will be expected to conduct a significant independent study project under the supervision of a faculty member. The project, required for all three majors, must be accompanied by a paper and, often, an oral presentation.

UNDERGRADUATE OPPORTUNITIES

The department often employs several students during the summer who are paid a stipend to work on research projects in mathematics, applied mathematics, or computer science. In the past, these students have been able to report on their research at undergraduate research conferences.

There are also many opportunities outside Lawrence available to sophomores, juniors, and seniors. Lawrence students have participated in actuarial internships with insurance and consulting companies. Mark Smrecek '00 is now employed by the financial group with whom he did an internship in the summer of 1999. Natasha Pudova '02 and Lyndsay Hansen '01 took summer internships with Allstate Insurance. Sara Compass, '05, took a summer internship with Humana Insurance.

Several students have also participated in mathematical opportunities at different schools. For example, Megan Smith, '01, went to George Washington

University, Evan Morgan, '02, went to Auburn University, Kyle Hewitt, '05, went to Iowa State University, and Jennifer Biermann, '05, went to Oregon State University for summer undergraduate research programs. Several advanced undergraduates have spent a term in Hungary, having been accepted into the prestigious Budapest semester program in mathematics.

ON THE SOCIAL SIDE

Every week the mathematics department hosts a "Math Tea" where faculty and students gather to talk informally over tea and homemade cookies. A frequent feature at these informal gatherings are informal talks by students, faculty, and visitors covering topics such as summer research opportunities, admission to graduate school, and study abroad.

FACILITIES

Briggs Hall's mathematics and computer facilities feature a cluster of PCs in a lab dedicated to mathematics and computer science instruction. This lab features a full range of software for instruction and research, including Mathematical software for mathematics research.

The Statistics Lab, where the laboratory components of statistics courses are held and where students work on statistical applications, has video projection capability and twenty new PC's running the latest statistical software.

AFTER LAWRENCE

Students majoring in mathematics, mathematics-computer science, or mathematics-economics have gone on to pursue a wide variety of interests.

Kyle Hewitt, '05, and Nick Beyler, '05, are Ph. D. students in statistics at Iowa State University

Sara Compas, '05, is employed as an actuary at Humana Inc. in Green Bay, WI

Jennifer Biermann, '05, is a Ph. D. student in Mathematics at Cornell University

Wenjie Chen, '04, is a Ph. D. student in Economics at the University of Michigan

Beauclaire Leslie, '04, and Mark Smrecek, '00, are employed as actuaries at Watson Wyatt, a consulting firm in Chicago

Nabeeha Mohammed, '04, is a Masters student in Informational Science at the University of Michigan

Jon VanLaarhoven, '04, is a Ph. D. student in Applied Mathematics at the University of Iowa

Eric Seidel, '03, and John Gale, '03, are employed by Apple Computer

Evan Morgan, '02, is a Ph. D. student in Mathematics at LSU

Dimitrije Kostic, '01, is a Ph. D. student in Mathematics at Texas A&M University

FACULTY

Joseph N. Gregg, Jr., associate professor
Texas A & M University, B.S., M.S., Princeton University, Ph.D.
Interests: architecture of large software systems, software for math education, complex systems
Matthew Jackson, visiting assistant professor
University of Canterbury, B.Sc., Mus. B., M.A.;
Carnegie Mellon University, M.S.;
University of Pittsburgh, Ph. D.
Interests: logic, category theory, topos theory, measure theory, probability

Joy Jordan, associate professor
Indiana University, B.A.; University of Iowa, M. S., Ph.D.

Interests: statistics education, assessment
Recipient of the Lawrence University Young Teacher Award
Alan E. Parks, professor
University of Wisconsin, Madison, B.A., M.A., Ph.D.

Interests: application of mathematics, computer algorithms, dynamics
Recipient of the Lawrence University Young Teacher Award

Kurt Krebsbach, associate professor
Lawrence University, BA; University of Minnesota, MA, PhD
Interests: artificial intelligence, automated planning, multi-agent systems, functional programming, music, zymurgy

Bruce H. Pourciau, professor
Brown University, B.A.; University of California, San Diego, Ph.D.
Interests: analysis, optimization theory, philosophy of mathematics, Newton's *Principia*
Recipient of the Lawrence University Excellence in Teaching Award

Richard A. Sanerib, Jr., associate professor
St. Anselm College, B.A.; University of Colorado, M.A., Ph.D.
Interests: logic, algebra, topology, graph theory, minority education, and combinatorics
Recipient of the Lawrence University Young Teacher Award and the Excellence in Teaching Award