Mathematics and Computer Science

Mike May, S.J., Ph.D., Chair
http://mathcs.slu.edu

Faculty:
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Bryan Clair, Ph.D.
Bradley Currey, III, Ph.D.
Kimberly Druschel, Ph.D.
Charles Ford, Ph.D.
Raymond Freese, Ph.D., Professor Emeritus
Michael French, S.J., M.A.
Jason Fritts, Ph.D.
Michael Goldwasser, Ph.D.
Steven Harris, Ph.D.
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David Jackson, Ph.D.
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Michael May, S.J., Ph.D.
Greg Marks, Ph.D.
Julianne Rainbolt, Ph.D.
Nirina Randrianarivony, Ph.D.
James Riles, Ph.D., Professor Emeritus
Kevin Scannell, Ph.D.
Darrin Speegle, Ph.D.
Ashish Srivastava, Ph.D.
T. Christine Stevens, Ph.D.
Jacob Sukhodolsky, Ph.D.
Michael Tsau, Ph.D.
Dennis Wacker, D.Sc.

Mathematics and Computer Science courses meet the needs of students with a wide variety of interests. We offer several introductory courses to satisfy the core curriculum requirements, as well as courses that provide students in other disciplines with the mathematical and computational background that they need for their chosen fields of study. Students who major in Mathematics and Computer Science are prepared for careers in business, industry, government, and education, or for further study at the graduate level. With their emphasis on careful reasoning and the analysis and solution of problems, Mathematics and Computer Science are also appropriate majors for students planning careers in law or medicine. In addition to programs for majors, the Department also offers minors in Mathematics, Engineering Mathematics, and Computer Science.

Programs
The department offers a Bachelor of Arts (B.A.), as well as an M.A. and Ph.D. in Mathematics, as well as a minor in mathematics and a minor in engineering mathematics. The department offers a Bachelor of Arts (B.A.) and a Bachelor of Science (B.S.) degree in computer science as well as a minor in computer science.

Mathematics (BA)

Required Courses
MATH 142 Calculus I 4
MATH 143 Calculus II 4
MATH 244 Calculus III‡ 4
MATH 266 Principles of Mathematics 3
MATH 315 Introduction to Linear Algebra 3

‡ Calculus III Must be taken at Saint Louis University with minimum grade of “C-”

Students then choose one of the following three options. A 2.00 or “C” GPA is required in upper division mathematics courses counting toward the major.

Pure Mathematics
MATH 411 Introduction to Abstract Algebra 3
MATH 412 Linear Algebra 3
MATH 421 Introduction to Analysis 3
MATH 422 Metric Spaces 3
One additional upper division MATH course

Applied Mathematics
Any two of the year-long (2, 3 credit courses) sequences
1. MATH 355 Differential equations I 3 and
   MATH 455 Nonlinear Dynamics & Chaos 3 or
   MATH 457 Partial Differential Equations 3
2. MATH 401 Elem Theory of Probability 3 and
   MATH 402 Intro Mathematical Statistics 3
3. MATH 411 Intro Abstract Algebra 3 and
   MATH 412 Linear Algebra 3 or
   MATH 415 Number Theory 3
4. MATH 421 Intro to Analysis 3 and
   MATH 422 Metric Spaces 3 or
   MATH 423 Multivariable Analysis 3
5. MATH 451 Intro to Complex Variables 3 and
   MATH 452 Complex Variables II 3 or
   MATH 453 Geometric Topology 3
One additional upper division MATH course
**Teachers Option**

- MATH 401 Elementary Theory of Probability 3
- MATH 405 History of Mathematics 3
- MATH 411 Introduction to Abstract Algebra 3
- MATH 441 Foundations of Geometry 3

One additional course chosen from the following:
- MATH 355 Differential Equations 3
- MATH 402 Introductory Mathematical Statistics 3
- MATH 425 Theory of Numbers 3
- MATH 447 Non-Euclidean Geometry 3

(An appropriate upper-division mathematics elective may be substituted, with the approval of the student’s mathematics advisor.)

**Mathematics Minor**

- MATH 142 Calculus I 4
- MATH 143 Calculus II 4
- MATH 244 Calculus III 4
- MATH 266 Principles of Mathematics 3
- MATH 315 Introduction to Linear Algebra 3

One further course in upper division mathematics, chosen with attention to prerequisites

**Engineering Mathematics Minor**

Students seeking a Minor in Engineering Mathematics must complete four upper-division courses in subjects traditionally of importance to engineers:

- Linear Algebra
  - MATH 311 Linear Algebra for Engineers 3
  - MATH 315 Introduction to Linear Algebra 3
- Differential Equations
  - MATH 355 Differential Equations 3
  - MATH 455 Nonlinear Dynamics and Chaos 3
  - MATH 457 Partial Differential Equations 3
- Probability and Statistics
  - MATH 401 Elementary Theory of Probability 3
  - MATH 402 Intro Mathematical Statistics 3
  - MATH 403 Probability & Statistics for Engineers 3
- Complex Variables
  - MATH 451 Intro to Complex Variables 3
  - MATH 452 Complex Variables II 3

or additional courses that may be designated by the Department of Mathematics and Computer Science.

*Note:* prerequisites for these courses must also be met

Students may not earn both the minor in mathematics and the minor in engineering mathematics.

**Computer Science (B.A.)**

Students following the Computer Science Bachelor of Science curriculum obtain a more technical, equally rigorous and comprehensive degree. They take two more mathematics and two more specific computer science courses than they would with the BA. Additionally the CS theory course requirement for the BA is a specific course for the BS. Also, twelve hours of science, including one sequence of two lab courses, is required. The curriculum is based on the requirements for accreditation by the ABET Computing Accreditation Commission. Graduates obtain interesting jobs in the field as well as earn advanced degrees.

The two curricula follow very similar paths the first two years so that students can choose between the two degrees some time in their sophomore year.

**Required courses:**

- CSCI 140 Introduction to Computer Science 3
- CSCI 150 Intro to Object Oriented Programming* 4
- CSCI 180 Data Structures 4
- CSCI 224 Computer Architecture 3
- CSCI 290 Object Oriented Software Design 3
- CSCI 324 Operating Systems 3

1 Course chosen from Applications Courses list
1 Course chosen from Theory Courses list
2 additional 300-400 level CSCI electives (or courses from a closely related discipline, such as ECE or ITM, with departmental permission)

- CSCI 491 Capstone Course 3

**Applications Courses**

- CSCI 334 Network Programming I 3
- CSCI 371 Databases 3
- CSCI 425 Advanced Operating Systems 3
- CSCI 434 Network Programming II 3

**Theory Courses**

- CSCI 314 Algorithms 3
- CSCI 327 Compilers 3
- CSCI 344 Programming Languages 3
- CSCI 413 Automata 3
Required related courses in mathematics:
MATH 135  Discrete Mathematics† 4
MATH 142  Calculus I 4
MATH 143  Calculus II 4
One additional mathematics courses at the 200 level or above or MATH 160

* CSCI may be substituted with the following 2 courses
CSCI 145  Scientific Programming 3
CSCI 146  Object Oriented Practicum 1

† MATH 135 may be substituted with MATH 266

Computer Science (B.S.)

Required courses:
CSCI 140  Introduction to Computer Science 3
CSCI 150  Intro to Object Oriented Programming* 4
CSCI 180  Data Structures 4
CSCI 224  Computer Architecture 3
CSCI 290  Object Oriented Software Design 3
CSCI 314  Algorithms 3
CSCI 324  Operating Systems 3
CSCI 344  Programming Languages 3
CSCI 390  Software Engineering 3
1 Course chosen from Applications Courses list above
2 additional 300-400 level CSCI elective courses
CSCI 491  Capstone Course 3

Required related courses in Mathematics:
MATH 135  Discrete Mathematics† 4
MATH 142  Calculus I 4
MATH 143  Calculus II 4
A Probability and Statistics course or course sequence
MATH 160  Computer Probability & Statistics 3
or
MATH 403  Probability & Statistics for Engineers 3
or
MATH 401  Elem Theory of Probability 3
MATH 402  Intro Mathematical Statistics 3
2 additional MATH courses at the 200 level or above

* CSCI may be substituted with the following 2 courses
CSCI 145  Scientific Programming 3
CSCI 146  Object Oriented Practicum 1

† MATH 135 may be substituted with MATH 266

Science Requirements: One sequence of science courses with labs, additional four hours of science.