

Department of Mathematical Sciences

Terrance Quinn, Chair
KOM 223D

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The purpose of the Department of Mathematical Sciences is to provide students education in the mathematical sciences necessary to function and succeed in an increasingly complex, technological world.

Courses offered by the department are designed to prepare students who plan to enter graduate schools or professional schools of medicine or engineering; to teach in elementary schools, secondary schools, or community colleges; to major in mathematics, in computer science, in the natural or physical sciences, or in other areas with mathematics requirements; or to enter careers in business, industry, or government. Courses also are provided to meet cultural and General Education requirements.

Programs in the department lead to the Bachelor of Science degree with a major in Mathematics. Students choose one of the following concentrations: Professional Mathematics, Mathematics Education, Applications of Mathematics, or Actuarial Science. Minors are offered in Mathematics; in Mathematics for Managerial, Social, and Life Sciences; and in Statistics.

The following specialized courses do not count toward a Mathematics major or minor: MATH 1010, 1410, 1420, 1530, 1630, 1710, 1720, 1730, 1810, 1820, 2090, 2130, and 4010. However, MATH 1530, 1630, 1710, 1720, 1730, 1810, 1820, and 2130 may count toward a minor in Mathematics for Managerial, Social, and Life Sciences.

Curricular listings include General Education requirements in Communication, History, Humanities and/or Fine Arts, Mathematics, Natural Sciences, and Social/Behavioral Sciences categories as outlined on pages 64–67.

Major in Mathematics

A major in Mathematics requires the mathematics core of 21 hours plus 15 hours of specified upper-level courses in the department and at least 12 hours of supporting coursework (either in or out of the department). The supporting coursework must complement the student's program and be approved by the mathematics advisor. A single minor outside the department is required.

Every Mathematics major is required to declare a concentration. Concentrations include Professional Mathematics, Mathematics Education, Applications of Mathematics, and Actuarial Science.

Every Mathematics major is required to complete the Seminar in Mathematics, MATH 4990. All courses in the Mathematics major or minor must be completed with a grade of C or better. All courses transferred from other institutions for credit in the Mathematics major or minor must carry a grade of C or better and be approved by the department chair.

Mathematics Core

Each student majoring in the department must complete the following core (21 hours):

MATH 1910 (Calculus I), 4 hours
 MATH 1920 (Calculus II), 4 hours
 MATH 3110 (Calculus III), 4 hours
 MATH 2010 (Elements of Linear Algebra), 3 hours
 MATH 3460 (Foundations of Higher Mathematics), 3 hours
 MATH 2050 (Probability and Statistics), 3 hours* OR
 STAT 3150 (Mathematical Statistics I), 3 hours

**Students in the Mathematics Education concentration must concurrently enroll in MATH 2110 (Data Analysis, 1 hour).*

Students with a concentration in Actuarial Science may substitute STAT 3150 for MATH 2010; and ACSI 4200 for MATH 3460.

Concentration: Professional Mathematics

Students opting to study the discipline of mathematics will choose between tracks in general mathematics and advanced mathematics. In addition to the mathematics core, they will take 9 additional upper-level courses in the department chosen with the approval of the mathematics advisor. A single minor outside of the department and CSCI 1170 are required.

Advanced Mathematics Track

Students interested in preparing for a graduate degree in mathematics should pursue this track. In addition to the mathematics core, they must take MATH 3120, 4250, 4510; two courses from MATH 3260, 4230, 4270, 4420, 4530, 4700; and 9 hours of approved supporting coursework chosen from among upper-level courses in the department. The program must include at least one sequence in either algebra (4420/4510), analysis (4230–4250), or differential equations (3120–3260). Six hours of a foreign language are recommended.

Students should consult their advisors each semester to plan their schedules.

Curriculum Requirements and Recommended Sequence for Professional Mathematics-Advanced

FRESHMAN		SOPHOMORE	
ENGL 1010, 1020 (Comm)	6	COMM 2200 (Comm)	3
MATH 1910 (Math)	4	MATH 2010, 3110, 3460	10
MATH 1920	4	MATH upper-division elective	3
MATH 2050	3	Natural Sciences	4
Natural Sciences	4	HIST 2010, 2020, or 2030	6
CSCI 1170	4	Minor	3
Minor	3		
Humanities and/or Fine Arts	3		29
	31		
JUNIOR		SENIOR	
MATH 3120, 4510	6	MATH 4250, 4990	6
Math electives	6	MATH electives	6
Minor	6	Minor	6
Social/Behavioral Sciences (2 prefixes)	6	Electives	12
Humanities and/or Fine Arts	3		30
ENGL 2020 or 2030 or HUM 2610 (Hum/FA)	3		
	30		

General Mathematics Track

Students desiring a broad general background in mathematics should pursue this track. In addition to the mathematics core, they must take MATH 3120, 4510; three additional courses from MATH 3260, 4230, 4250, 4270, 4310, 4320, 4420, 4530, 4700 and STAT 3150, 4190; and 9 hours of approved supporting coursework chosen from among upper-level courses in the department.

Students should consult their advisors each semester to plan their schedules.

Concentration: Mathematics Education

Students preparing to teach mathematics at the secondary level (grades 7-12) must complete the major in Mathematics with a concentration in Mathematics Education. In addition to the mathematics core, they must take as upper-division coursework MATH 3070, 4510, 4620, 4990, and one elective in the department. Supporting coursework consists of MATH 3320, 3330, 4540, and CSCI 1170. A minor in secondary education is required. (See Department of Educational Leadership for a complete description.) Students seeking state licensure must also pass all applicable portions of the Praxis Series Exams, developed and administered by the Educational Testing Service. For the latest information regarding these exams contact the Office of Testing Services (KUC 327, 898-2863). To complete their programs of study in a timely manner, students must consult their major and minor advisors each semester.

Curriculum Requirements and Recommended Sequence for Mathematics Education

FRESHMAN		SOPHOMORE	
MATH 1910 (Math)	4	MATH 2010, 3110, 3460, 3070	13
MATH 1920, 2050 or 3150, 2110	8	CSCI 1170	4
ENGL 1010, 1020 (Comm)	6	COMM 2200 (Comm)	3
Humanities and/or Fine Arts	3	HIST 2010, 2020, or 2030	6
Natural Sciences (2 prefixes)	8	ENGL 2020 or 2030 or	
FOED 1110\$	3	HUM 2610 (Hum/FA)	3
	32	FOED 2110\$	3
			32

JUNIOR		SENIOR	
MATH 3320, 3330, 4510, 4540	12	MATH 4620, 4990	6
MATH elective*	3	Secondary Education minor\$	15
Social/Behavioral Sciences (2 prefixes)	6	Humanities and/or Fine Arts	3
Secondary Education minor\$	9	Elective	2
	30		26

*Approved by advisor

\$See Department of Educational Leadership on page 166 for Secondary Education minor requirements.

Concentration: Applications of Mathematics

Students desiring to study applications of mathematics and statistics in business, government, and industry may choose between tracks in statistics, business, or industrial mathematics. All three tracks blend theory and practice to provide students with background for employment or graduate studies.

Statistics Track

The statistics track offers students a program of study in one of the broadest areas of applied mathematics. Statistical methods are used in many fields, including agriculture, business, communications, government, health, industry, public policy, sports, and science. Courses provide students the opportunity to learn data analysis and to develop skills in statistical methods of wide application. Emphasizing a blend of theory and practice, the program is designed to provide students with the necessary background for employment as statisticians in the public or private sector and to provide a solid foundation for those students interested in graduate studies.

In addition to the mathematics core, students pursuing this track must take STAT 3150 and 4190; MATH 4990; and two courses from STAT 4200, 4320, 4360, 4370, 4380. One minor outside the department is required. Students also complete supporting coursework of 20 hours that complement the student's program chosen with approval of the statistics advisor. These courses include computing, information systems, and other relevant courses.

Students should consult their advisors each semester to plan their schedules.

Curriculum Requirements and Recommended Sequence for Applied Mathematics–Statistics

FRESHMAN		SOPHOMORE	
ENGL 1010, 1020 (Comm)	6	COMM 2200 (Comm)	3
MATH 1910 (Math)	4	MATH 2010, 2050, 3110	10
MATH 1920	4	Minor	6
Natural Sciences	4	Natural Sciences	4
Support course*	6	HIST 2010, 2020, or 2030	6
Humanities and/or Fine Arts	3		29
Social/Behavioral Sciences	3		
	30		

JUNIOR		SENIOR	
MATH 3460	3	STAT elective**	3
STAT 3150, 4190	6	MATH 4990	3
STAT elective**	3	Support course*	8
Support course*	6	Minor	6
Minor	6	Humanities and/or Fine Arts	3
Social/Behavioral Sciences	3	Electives	8
ENGL 2020 or 2030 or			31
HUM 2610 (Hum/FA)	3		
	30		

*Approved by advisor

**STAT 4200, 4320, 4360, 4370, 4380

Business Track

This track is appropriate for students who seek a broad background from such diverse but mutually supportive areas as mathematics, statistics, computer science, and business. The program prepares students for the job market or for further study in the more specialized areas of actuarial science, operations research, statistics, computer science, or finance.

In addition to the mathematics core, students pursuing this track must take STAT 4190, ACSI 4200, and either STAT 4200 or 4360. The supporting coursework consists of 11 hours of computer science or information systems courses. The student must complete a minor in the Jennings A. Jones College of Business as well as ACTG 2110 and 2120 or 3000 and ECON 2410, 2420.

Students should consult their advisors each semester to plan their schedules.

Curriculum Requirements and Recommended Sequence for Applied Mathematics-Business

FRESHMAN		SOPHOMORE	
ENGL 1010, 1020 (Comm)	6	COMM 2200 (Comm)	3
MATH 1910 (Math)	4	MATH 2010, 3110, 3460	10
MATH 1920	4	ECON 2410 (Soc/Beh Sci)	3
Computing courses	6	ECON 2420	3
Natural Sciences	4	HIST 2010, 2020, or 2030	6
Humanities and/or Fine Arts	3	Natural Sciences	4
Social/Behavioral Sciences	3	Elective	3
	30		32

JUNIOR		SENIOR	
STAT 3150 or MATH 2050	3	STAT 4360 or 4200	3
STAT 4190	3	ACSI/STAT electives*	6
ACSI/MATH 4200	3	MATH 4990	3
Computing courses	5	Humanities and/or Fine Arts	3
ACTG 2110 and 2120 or ACTG 3000	3-6	Minor	12
Minor	6	Electives	2-5
ENGL 2020 or 2030 or			29-32
HUM 2610 (Hum/FA)	3		
	26-29		

*Choose from ACSI 4220, 4230, 4630, 4640 and STAT 4320, 4380

Industrial Mathematics Track

The industrial mathematics track offers students a program of study that incorporates the areas of mathematics that contribute to business and industry. Coursework is designed to produce graduates who have strong qualifications that make them competitive for positions in industry and provides a solid foundation for students interested in pursuing graduate study in the area. The minor must be chosen from Computer Science, Physics, Chemistry, Biology, Aerospace, or Engineering Technology.

In addition to the mathematics core, students pursuing this track must take MATH 3120, 3260, 4250, and 4310. Required supporting coursework includes CSCI 1170 and 2170. Nine additional hours of supporting coursework must be chosen with the approval of the mathematics advisor from MATH 4601, 4230, 4270, 4320, 4700 and STAT 4190.

Students should consult their advisors each semester to plan their schedules.

Curriculum Requirements and Recommended Sequence for Applied Mathematics–Industrial Mathematics

FRESHMAN		SOPHOMORE	
ENGL 1010, 1020 (Comm)	6	ENGL 2020 or 2030 or	
MATH 1910 (Math)	4	HUM 2610 (Hum/FA)	3
MATH 1920	4	MATH 3110, 3460	7
CSCI 1170, 2170	8	PHYS 2110/2111 (Nat Sci)	4
Natural Sciences	4	PHYS 2120/2121	4
COMM 2200 (Comm)	3	Social/Behavioral Sciences	3
HIST 2010, 2020, or 2030	3	Humanities and/or Fine Arts	3
	32	Minor	6
			30
JUNIOR		SENIOR	
MATH 2010, 4250	6	MATH 4310	3
STAT 3150 or MATH 2050	3	MATH 4990	3
MATH 3120, 3260	6	MATH/STAT electives	9
Social/Behavioral Sciences	3	Minor	6
Minor	6	Humanities and/or Fine Arts	3
MATH elective*	3	Electives	4
HIST 2010, 2020, or 2030	3		28
	30		

*Approved by advisor

Concentration: Actuarial Science

The Actuarial Science concentration is designed for students who have a strong mathematical ability with an interest in applying their mathematical knowledge to insurance, finance, risk management, investments, and other areas of business. The program is classified by the Society of Actuaries (SOA) as an Advanced Undergraduate Actuarial Science program and is in complete compliance with the requirements set forth by the Society of Actuaries and the Casualty Actuarial Society (CAS) in the Year 2000 Syllabus and beyond. Therefore, the student can choose coursework necessary to prepare for the SOA/CAS Course/Exams 1 through 4 and SOA Course 6.

Mathematics majors preparing for the actuarial examination series and an actuarial science career should complete this professional program in Actuarial Science. The program requires that the student complete the mathematics core;

upper-division actuarial science courses consisting of ACSI 4140, 4220, 4230, 4330, and two elective courses chosen from ACSI 4240, 4340, 4630, 4640 and STAT 4200; and supporting coursework consisting of STAT 4190 and 4320 and MATH 4990. The student is required to complete ACTG 3000, ECON 2410, 2420, and FIN 3610. A minor from the Jennings A. Jones College of Business is required. A minor in Insurance is strongly suggested. A Computer Science or Information Systems elective and CSCI 1170 are required.

Students should consult their advisors each semester to plan their schedules.

Curriculum Requirements and Recommended Sequence for Actuarial Science

FRESHMAN		SOPHOMORE	
ENGL 1010, 1020 (Comm)	6	COMM 2200 (Comm)	3
MATH 1910 (Math)	4	MATH 3110	4
MATH 1920	4	ENGL 2020 or 2030 or	
CSCI 1170	4	HUM 2610 (Hum/FA)	3
Natural Sciences (2 prefixes)	8	ECON 2410 (Soc/Beh Sci)	3
Social/Behavioral Sciences	3	ECON 2420	3
Humanities and/or Fine Arts	3	HIST 2010, 2020, or 2030	6
	32	ACTG 3000	3
		Elective	0-3
			25-28
JUNIOR		SENIOR	
STAT 3150 (or MATH 2010 and 2050)	3-6	ACSI 4330, 4230	6
STAT 4190, 4320	6	STAT/ACSI electives	6
ACSI 4140, 4220	6	MATH 4990	3
ACSI 4200	3	Minor	9
FIN 3610	3	Humanities and/or Fine Arts	3
Minor	6	Elective	3
CSCI/INFS elective*	3		30
	30-33		

*Approved by advisor

Minor in Mathematics

A minor in Mathematics consists of 18 semester hours including MATH 1910 and 1920. The remaining 10 hours of electives must be selected with the approval of the Mathematics minor advisor. All courses in the Mathematics minor must be completed with a grade of C or better. All courses transferred from other institutions for credit in the Mathematics minor must carry a grade of C or better and be approved by the department chair. Students must complete at least 3 semester hours at the upper-division level in the minor through MTSU.

Minor in Mathematics for Managerial, Social, and Life Sciences

A minor in Mathematics for Managerial, Social, and Life Sciences consists of 18 semester hours including MATH 1810 and 1820 with the remaining 12 hours as approved by the minor advisor. The remaining courses must be selected from a list of approved courses; see the minor advisor for details. Note that a student may count QM 2610 and 3620 as one 3-hour course and may count CSCI 1160 or 1170 as one 3-hour course.

Minor in Statistics

A minor in Statistics requires 18 semester hours and consists of STAT 3150, 4190, 4360, 4370, 4380 and one course to be selected from MATH 3190, 3120, 3260, 4310, 4320, or CSCI 3180. With advisor approval, MATH 2050 may be substituted for either STAT 4190, 4360, 4370, or 4380. Additionally, with advisor approval, one semester of calculus may be counted as the elective course. All courses in the Statistics minor must be completed with a grade of C or better. All courses transferred from other institutions for credit in the Statistics minor must carry a grade of C or better and be approved by the department chair. Students must complete at least 3 semester hours at the upper-division level in the minor through MTSU.

Courses in Actuarial Science [ACSI]

See back of catalog for course descriptions.

Courses in Mathematics [MATH]

See back of catalog for course descriptions.

Courses in Statistics [STAT]

See back of catalog for course descriptions.

Honors College

MATH 1730, 1910, and 1920 are offered regularly for students in the University Honors College. Upon request by the Honors College, MATH 1010 and 1710 are offered. MATH 4600 can also be offered as an Honors course.

Cooperative Education

MATH 2930, 2940, 3970, 3980. Cooperative Education Experience I, II, III, IV. One to three credits each. Experiences must be taken in sequence. Pass/Fail.

Graduate Study

The Master of Science and Master of Science in Teaching degrees are offered in mathematics. A minor in Mathematics is offered for the master's degree. Requirements for these degrees and a list of the courses offered for graduate credit are in the Graduate Catalog.