Department of Mathematics

(College of Humanities, Arts and Sciences)

www.uni.edu/math

The Department of Mathematics offers the following programs:

Undergraduate Majors (B.A.)

- Mathematics (p. 1)
- Mathematics-Statistics/Actuarial Science (p. 2)
- Mathematics-Teaching (p. 3)

Minors

- Data Science (p. 4) (also listed in Department of Computer Science and Department of Physics)
- Mathematics (p. 4)
- Mathematics-Teaching (p. 5)
- Mathematics (K-8)-Teaching (p. 5)
- Statistics and Actuarial Science (p. 5)

Graduate Majors (M.A.)

- Mathematics (p. 6):
  - Actuarial Science emphasis
  - Mathematics emphasis
  - Secondary Teaching emphasis
  - Community College Teaching emphasis
- Mathematics for the Elementary and Middle Grades (K-8) (p. 8)

Graduate Majors (P.S.M.)

- Industrial Mathematics (p. 8)

Program Certificate

- Statistical Computing (p. 9)

Notes:

1. A student majoring or minoring in mathematics, who has a grade point average of less than 2.25 in all departmental courses used for that major or minor may not apply a departmental course in which a grade of less than C- is earned to her/his major or minor.
2. Undergraduate students who have been admitted to the university provisionally because of non-satisfaction of the high school mathematics requirements may not enroll in any mathematics credit course before this requirement has been met.
3. Students who complete the requirements for more than one program (major or minor) within mathematics may have that noted on their transcripts. Required courses in the additional program may be satisfied by either required or elective courses in the primary program. Electives in the additional program may not be satisfied by any course taken to satisfy a requirement in the primary program. Interested students should work closely with an advisor.

Bachelor of Arts Degree Programs

Mathematics Major

The Mathematics major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours. Students are encouraged to discuss Undergraduate Research (MATH 4990) with their adviser.

Common core:		15
MATH 1420	Calculus I *	
MATH 1421	Calculus II	
MATH 2422	Calculus III	
MATH 2500	Linear Algebra for Applications	
Mathematics core:		16
MATH 2900	Discrete and Argumentative Mathematics	
MATH 4420/5420	Advanced Calculus I	
MATH 4421/5421	Advanced Calculus II	
MATH 4500/5500	Modern Algebra I	
MATH 4501/5501	Modern Algebra II	
MATH 4900	Senior Mathematics Seminar	
Probability/Statistics: select one of the following. MATH/STAT 3751 will not satisfy this requirement if a Mathematics student has credit for STAT 1772.		3-6
MATH/STAT 3751	Probability and Statistics	
STAT 1772	Introduction to Statistical Methods	
and		
MATH/STAT 3752	Introduction to Probability	
STAT 1772 & STAT 3771/5771	Introduction to Statistical Methods and Applied Statistical Methods for Research	
Electives: Select two of the following. MATH/STAT 3752/5752 cannot be used if used for the Probability/Statistics requirement. Other junior/senior level mathematics courses may be substituted with approval of advisor and Department Head.		6
MATH 3410/5410	Dynamical Systems: Chaos Theory and Fractals	
MATH 3425/5425	Differential Equations	
MATH 3440/5440	Numerical Analysis *	
MATH 3530/5530	Combinatorics	
MATH 3600/5600	Euclidean Geometry	
MATH 3610/5610	Modern Geometries	
MATH 3630/5630	Differential Geometry	
MATH 3640/5640	History of Mathematics	
MATH/STAT 3752	Introduction to Probability	

MATH/ACT SCI 3780	Mathematics of Finance	
MATH 4460/5460	Introduction to Complex Analysis	
MATH 4510/5510	Elementary Number Theory	
MATH 4641/5641	Topology I	
Total Hours		**40-43**

* These courses have additional prerequisites as follows: MATH 1420 has prerequisite of a satisfactory score on a mathematics placement exam, or subsequent remediation. MATH 3440/5440 has prerequisite of CS 1130, CS 1160, or CS 1510.

Mathematics Major-Statistics/Actuarial Science

The Mathematics-Statistics/Actuarial Science major requires a minimum of 120 total hours to graduate. This total includes UNIFI/ General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The major is available in two emphases, the Statistics emphasis and the Actuarial Science emphasis. Each emphasis requires completion of the common core, the seminar/research requirement, the core for the chosen emphasis (Statistics or Actuarial Science), and 6 hours of electives that do not duplicate course work chosen to meet the chosen emphasis (Statistics or Actuarial Science) core requirement.

Required		
Mathematics:		
Common core:		15
MATH 1420	Calculus I *	
MATH 1421	Calculus II	
MATH 2422	Calculus III	
MATH 2500	Linear Algebra for Applications	
Statistics/Actuarial Science core:		9
STAT 1772	Introduction to Statistical Methods	
or STAT 1774	Introductory Statistics for Life Sciences	
MATH/STAT 3752	Introduction to Probability	
STAT 3775/5775	Introduction to Mathematical Statistics	
Computer Programming:		3-4
Select one of the following:		
CS 1130	Visual BASIC Programming	
CS 1160	C/C++ Programming	
CS 1510	Introduction to Computing	
STAT 4772/5772	Statistical Computing I	
Seminar/research:		1-3
MATH 4900	Senior Mathematics Seminar	
or MATH 4990	Undergraduate Research in Mathematics	
Select and complete ONE of the following Emphasis Core:		9
Statistics Emphasis Core:		
Select three from the following:		
STAT 3771/5771	Applied Statistical Methods for Research	
STAT 3776/5776	Regression Analysis	
STAT 4773/5773	Design and Analysis of Experiments	
STAT 4779/5779	Applied Multivariate Statistical Analysis	
STAT 4782/5782	Statistical Computing II	
STAT 4784/5784	Introduction to Machine Learning	
STAT 4786/5786	Statistics for Risk Modeling	
Actuarial Science Emphasis Core:		
Select three from the following:		
ACT SCI/MATH 3780	Mathematics of Finance	
ACT SCI 4735/5735	Actuarial Mathematics	
ACT SCI 4739/5739	Topics in Actuarial Science	
STAT 4784/5784	Introduction to Machine Learning	
STAT 4786/5786	Statistics for Risk Modeling	
ACT SCI 4788/5788	Loss Models	
Electives		**6**
Select two electives from the following list. The same course cannot be used to satisfy both the emphasis core and elective requirement.		
STAT 3771/5771	Applied Statistical Methods for Research	
STAT 3776/5776	Regression Analysis	
STAT 3778/5778	Spatial Data Analysis	
STAT 4772/5772	Statistical Computing I	
STAT 4773/5773	Design and Analysis of Experiments	
STAT 4777/5777	Statistical Quality Assurance Methods	
STAT 4779/5779	Applied Multivariate Statistical Analysis	
STAT 4782/5782	Statistical Computing II	
STAT 4784/5784	Introduction to Machine Learning	
STAT 4786/5786	Statistics for Risk Modeling	
ACT SCI 3731	Actuarial Examination Preparation **	
ACT SCI 4735/5735	Actuarial Mathematics	
ACT SCI 4739/5739	Topics in Actuarial Science	
ACT SCI 4785/5785	Introduction to Financial Engineering	
ACT SCI 4788/5788	Loss Models	
MATH 3440/5440	Numerical Analysis	
MATH 3780/5780	Mathematics of Finance	
Total Hours		**43-46**

* MATH 1420 has prerequisite of satisfactory score on mathematics placement exam or subsequent remediation.

**ACT SCI 3731 may be repeated for credit for preparation for different exams, however only 3 hours will count toward the Statistics/Actuarial Science major.

Mathematics Major-Teaching

The Mathematics-Teaching major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements, the Professional Experiences requirements, Educator Essentials requirements, and the following specified major requirements, to complete the minimum of 120 hours.

This major leads to endorsement #143: 5-12 Mathematics.

Required		
Mathematics:		
Common core:		
MATH 1420	Calculus I *	4
MATH 1421	Calculus II	4
MATH 2422	Calculus III	4
MATH 2500	Linear Algebra for Applications	3
Teaching core:		
MATH 1310	Technology for Secondary Mathematics Teachers	3
MATH 2313	Topics in Secondary Mathematics	3
MATH 2900	Discrete and Argumentative Mathematics	3
MATH 3305	Connections: University Mathematics and the Secondary Curriculum	3
MATH 3600/5600	Euclidean Geometry	3
MATH 4500/5500	Modern Algebra I	3
Probability and Statistics:		3-6
Select one of the following.		
MATH/STAT 3751	Probability and Statistics	
STAT 1772 & MATH 3752/5752	Introduction to Statistical Methods and Introduction to Probability	
STAT 1772 & STAT 3771/5771	Introduction to Statistical Methods and Applied Statistical Methods for Research	
Electives:		
Select two of the following:		6
MATH 3530/5530	Combinatorics	
MATH 3610/5610	Modern Geometries	
MATH 4420/5420	Advanced Calculus I	
MATH 4501/5501	Modern Algebra II	
MATH 4510/5510	Elementary Number Theory	
MATH 4615/5615	Geometric Transformations	
Computer Science:		3-4
Select one of the following:		
CS 1120	Media Computation	
CS 1130	Visual BASIC Programming	
CS 1160	C/C++ Programming	
CS ED 1320	Fundamentals of Programming	
CS 1510	Introduction to Computing	
Total Hours		**45-49**

* MATH 1420 has a prerequisite of satisfactory score on mathematics placement exam or subsequent remediation.

Notes: For departmental approval to student teach, a student in the program must satisfy the University requirements to student teach and the following specific departmental requirements:

1) Must earn a C– or better in: MATH 1420, MATH 1421, MATH 2500, MATH 2900, MATH 3600/5600, MATH 4500/5500, and courses taken to satisfy the Probability and Statistics and Computer Science requirements.

2) Must complete all of the courses in the major with a major grade point average of 2.50 or higher.

Professional Experiences

Required:		
EDUC 2343	Teaching Methods l: Secondary Mathematics *	3
EDUC 2443	Teaching Internship l: Secondary Mathematics	3
EDUC 3543/5543	Teaching Methods ll: Secondary Mathematics *, **	3
EDUC 3643/5643	Teaching Internship ll: Secondary Mathematics	3
EDUC 4138	Secondary School Teaching	12
Total Hours		**24**

* A grade of C (2.00) or higher is required for all Methods courses.
**Mathematics Teaching majors can count EDUC 3543/5543 Teaching Methods ll: Secondary Mathematics for category 5 of Educator Essentials.

Educator Essentials

Required: *

Select one of the following in each category:		
Category 1: The Learner		**3**
EDPSYCH 1500	Reflections on Learning	
EDPSYCH 2068	Development and Learning in Sociocultural Contexts	
EDPSYCH 2100	Creativity and Higher Order Thinking in the Classroom	
SOCFOUND 2243	Rethinking the Learning Society: Education and Its Future(s)	
Category 2: Social Contexts of Learning		**3**
SOCFOUND 2119	Social & Cultural Foundations of Education	
SOCFOUND 2134	A Modern History of Education in the United States	
SOCFOUND 2334	Education Policy and Politics of Education	

TESOL 2015	Language Today	
Category 3: Education for All		**3**
KINES 4152	Adapted Physical Education	
SOCFOUND 3334	Education, Power, and Change	
SOCFOUND 3434	Social Movements and Education	
SPIE 3140	Interdisciplinary and Intersectional Study of Education for All	
SPIE 3150	Meeting the Needs of Diverse Learners in Classrooms	
TESOL 3710	Content Area Strategies for English Language Learners	
Category 4: The Classroom Environment		**3**
EDPSYCH 3200	Deeper Motivation and the Highly Engaged Classroom	
EDPSYCH 3300	Level Up: Gamified Learning Environments	
ELEMECML 4151	Early Childhood Curriculum Development and Organization	
RTNL 3360	Playful Learning and Project-Based Experiences: Techniques for Ed and Recreational Environments	
SOCFOUND 3219	Critical Perspectives on Technology and Education	
Category 5: Effective Pedagogy		**3**
ARTED 4600	Expressive Learning Assessment	
LRNTECH 3600	Technology, Pedagogy, and Learning in the Digital Age	
MEASRES 3510	Assessment for Learning	
TEACHING 3500	Effective Teaching through Differentiation, Technology and Assessment	
Category 6: The Professional Educator		**3**
ELEMECML 3149	Child, Family, School and Community Relationships	
SOCFOUND 3519	Teacher Leadership & Educational Change	
TEACHING 3177	Collaborative Partnerships for Educators	
Total Hours		**18**

* A grade of C (2.00) or higher is required in each Educator Essentials course.

Minors

Data Science Minor

The Data Science minor is an interdisciplinary program that integrates computer programming, machine learning, statistics, predictive modeling and visualization to provide students with broad based skills for extracting gainful information from data that originate from a variety of sources. A final project (ideally with corporate or non-profit partnerships) will ensure that students employ their skills to solve a real-world problem.

Statistics:		
STAT 1772	Introduction to Statistical Methods	3
STAT 4784/5784	Introduction to Machine Learning	3
Computer Science:		
CS 1510	Introduction to Computing	4
CS 2150	Computing for Data Science	3-7
or		
CS 1520 & CS 1800	Data Structures and Discrete Structures	
CS 3140/5140	Database Systems	3
Physics:		
PHYSICS 4160/5160	Data Visualization, Modeling and Simulation	3
Required Data Science Project		2-3
CS 4800	Undergraduate Research in Computer Science	
or MATH 4990	Undergraduate Research in Mathematics	
or PHYSICS 3000	Undergraduate Research in Physics	
Total Hours		**21-26**

Mathematics Minor

Required		
Mathematics:		11
MATH 1420	Calculus I *	
MATH 1421	Calculus II	
MATH 2500	Linear Algebra for Applications	
Electives		**12**
Mathematics:		
ACT SCI 4739/5739	Topics in Actuarial Science	
MATH 2422	Calculus III	
MATH 2900	Discrete and Argumentative Mathematics	
MATH 3410/5410	Dynamical Systems: Chaos Theory and Fractals	
MATH 3425/5425	Differential Equations	
MATH 3430/5430	Partial Differential Equations	
MATH 3440/5440	Numerical Analysis	
MATH 3530/5530	Combinatorics	
MATH 3600/5600	Euclidean Geometry	
MATH 3610/5610	Modern Geometries	
MATH 3630/5630	Differential Geometry	
MATH 3640/5640	History of Mathematics	
MATH 3751	Probability and Statistics	
MATH/STAT 3752	Introduction to Probability	
MATH 4420/5420	Advanced Calculus I	
MATH 4421/5421	Advanced Calculus II	
MATH 4460/5460	Introduction to Complex Analysis	

MATH 4500/5500	Modern Algebra I	
MATH 4501/5501	Modern Algebra II	
MATH 4510/5510	Elementary Number Theory	
MATH 4615/5615	Geometric Transformations	
MATH 4641/5641	Topology I	
STAT 3775/5775	Introduction to Mathematical Statistics	
STAT 3776/5776	Regression Analysis	
STAT 4777/5777	Statistical Quality Assurance Methods	
STAT 4779/5779	Applied Multivariate Statistical Analysis	
Total Hours		**23**

* MATH 1420 has prerequisite of satisfactory score on mathematics placement exam or subsequent remediation.

Mathematics Minor-Teaching

This minor leads to endorsement #143: 5-12 Mathematics.

Required		
Mathematics:		
MATH 1420	Calculus I *	4
MATH 1421	Calculus II	4
Select one of the following:		3
STAT 1772	Introduction to Statistical Methods	
STAT 1774	Introductory Statistics for Life Sciences	
MATH 3751	Probability and Statistics	
MATH 2500	Linear Algebra for Applications	3
MATH 2900	Discrete and Argumentative Mathematics	3
MATH 3600/5600	Euclidean Geometry	3
MATH 4500/5500	Modern Algebra I	3
Professional Experiences:		
EDUC 2343	Teaching Methods l: Secondary Mathematics	3
EDUC 3543/5543	Teaching Methods ll: Secondary Mathematics	3
EDUC 3643/5643	Teaching Internship ll: Secondary Mathematics	3
Computer Science:		
Select one of the following:		3-4
CS 1120	Media Computation	
CS 1130	Visual BASIC Programming	
CS 1160	C/C++ Programming	
CS ED 1320	Fundamentals of Programming	
CS 1510	Introduction to Computing	
Total Hours		**35-36**

* MATH 1420 has prerequisite of satisfactory score on mathematics placement exam or subsequent remediation.

Notes: For departmental approval to student teach, a student in the program must satisfy the University requirements to student teach and the following specific departmental requirements:

1) Must earn a C– or better in MATH 1420, MATH 1421, MATH 2500, MATH 2900, MATH 3600/5600, MATH 4500/5500, and STAT 1772 or STAT 1774 or MATH 3751.

2) Must complete all of the courses in the minor with a minor grade point average of 2.50 or higher

Mathematics Minor (K-8)-Teaching

This minor leads to endorsements #142: K-8 Mathematics and #1421 5-8 Algebra.

Required		
Mathematics:		
MATH 1204	Mathematical Reasoning	3
MATH 2204	Mathematical Reasoning for Elementary Teachers II	3
MATH 3204	Mathematical Reasoning for Elementary Teachers III	3
MATH 3211	Algebra	3
MATH 3212	Introduction to Geometry and Measurement for Elementary Teachers	3
MATH 3213	Topics in Mathematics for Grades K-8	3
MATH 3214	Problem Solving in Mathematics for Elementary Teachers	3
Computer Science:		
CS ED 1310	Programming Environments for Elementary Education	3
Total Hours		**24**

Statistics and Actuarial Science Minor

Complete one of the following emphases		
Actuarial Science emphasis:		**14**
MATH 1420	Calculus I *	4
MATH 1421	Calculus II	4
ACT SCI/MATH 3780	Mathematics of Finance	3
MATH/STAT 3752	Introduction to Probability	3
Statistics emphasis		**12**
STAT 1772	Introduction to Statistical Methods	3
STAT 3771/5771	Applied Statistical Methods for Research	3
STAT 4772/5772	Statistical Computing I	3
STAT 4782/5782	Statistical Computing II	3
Electives		**9-10**
Select three courses from the following or from the emphasis not chosen:		
ACT SCI 3731	Actuarial Examination Preparation	3

ACT SCI 4785/5785	Introduction to Financial Engineering	3
ACT SCI 4735/5735	Actuarial Mathematics	3
ACT SCI 4788/5788	Loss Models	3
MATH 2422	Calculus III	4
MATH 2500	Linear Algebra for Applications	3
STAT 3775/5775	Introduction to Mathematical Statistics	3
STAT 3776/5776	Regression Analysis	3
STAT 3778/5778	Spatial Data Analysis	3
STAT 4773/5773	Design and Analysis of Experiments	3
STAT 4777/5777	Statistical Quality Assurance Methods	3
STAT 4779/5779	Applied Multivariate Statistical Analysis	3
STAT 4784/5784	Introduction to Machine Learning	3
Total hours		**21-24**

* MATH 1420 has a prerequisite of satisfactory score on mathematics placement exam or subsequent remediation.

Master of Arts Degree Programs

Major in Mathematics

The major in Mathematics is available in four emphases: Mathematics, Secondary Teaching, Community College Teaching, and Actuarial Science.

Only graduate courses (course numbers 5000 or above) will apply to a graduate degree, even if the undergraduate course number (4999 or less) is listed. No exceptions will be made.

The Mathematics emphasis is available on the **thesis** and **non-thesis** options. A **minimum of 36 hours** is required for the **thesis** option, including 6 hours of MATH 6299 and a **minimum of 15 additional hours of 6000-level course work.** A **minimum of 33 hours** is required for the **non-thesis** option, including a minimum of 3 hours of MATH 6299 and a **minimum of 15 additional hours of 6000-level course work.**

The Secondary Teaching emphasis is offered on a **non-thesis** option only; a **minimum of 30 hours,** including a **minimum of 18 hours of 6000-level course work** is required.

The Community College Teaching emphasis is offered on a **non-thesis** option only; **a minimum of 30 hours**, including a **minimum of 15 hours of 6000-level course work** is required.

The Actuarial Science emphasis is offered on a **non-thesis** option only; a **minimum of 30 hours**, including a **minimum of 12 hours of 6000-level course work** is required.

Students interested in this program must submit a completed Application for Admission to Graduate Study and should refer to their MyUNIverse Student Center To-Do list or contact the Department of Mathematics for other application requirements. Graduate information and application for graduate admission can be found at https://admissions.uni.edu/application.

The Graduate Record Examination (General Test) **is not** required for admission to the program.

Courses taken to satisfy B.A. requirements may not be repeated to count toward the graduate program.

Successful completion of a final written comprehensive examination is required for the **non-thesis option on the Mathematics and Actuarial Science emphases only**.

Mathematics Emphasis

Required		
Mathematics:		
MATH 3630/5630	Differential Geometry	3
or MATH 4615/5615	Geometric Transformations	
MATH 6420	Mathematical Analysis I	3
MATH 6460	Complex Analysis I	3
MATH 6500	Abstract Algebra I	3
Select at least two of the following:		6
MATH 6421	Mathematical Analysis II	
MATH 6461	Complex Analysis II	
MATH 6501	Abstract Algebra II	
Research:		3 or 6
MATH 6299	Research	
Thesis option (6 hours)		
Non-thesis option (3 hours)		
Electives		**12**
Mathematics:		
Select 12 hours from any of the courses listed above that were not used for the requirements there or from among the following:		
ACT SCI 4739/5739	Topics in Actuarial Science	
MATH 3425/5425	Differential Equations	
MATH 3430/5430	Partial Differential Equations	
MATH 3440/5440	Numerical Analysis	
MATH 3530/5530	Combinatorics	
MATH 3640/5640	History of Mathematics	
MATH/STAT 3752	Introduction to Probability	
MATH 4421/5421	Advanced Calculus II	
MATH 4460/5460	Introduction to Complex Analysis	
MATH 4501/5501	Modern Algebra II	
MATH 4641/5641	Topology I	
MATH 6510	Theory of Numbers	
MATH 6640	Topics in the History of Mathematics	
MATH 6650	Topics in Mathematical Logic and Set Theory	
MATH 6779	Topics in Probability and Statistics	
STAT 3775/5775	Introduction to Mathematical Statistics	
STAT 3776/5776	Regression Analysis	

STAT 4777/5777	Statistical Quality Assurance Methods	
STAT 4779/5779	Applied Multivariate Statistical Analysis	
Total hours thesis option		36
Total hours non-thesis option		33

Secondary Teaching Emphasis

The Secondary Teaching emphasis is designed for secondary school mathematics teachers interested in developing a deeper background in mathematics and pedagogy to enhance teaching and increase student learning.

Required

Mathematics Education:		
MATH 6201	Foundations of Mathematics Education	3
MATH 6381	Current Research in Mathematics Education	3
MATH 6209	Mathematics Curriculum and Assessment	3
MATH 6225	Teaching and Learning Mathematics	3
MATH 6236	Equity and Mathematics Education	3
Mathematics:		
MATH 6371	Probability and Statistical Inference	3
MATH 6370	Applied Linear Statistical Methods	3
Select one course from the following:		
MATH 6212	Foundations of Algebraic Reasoning	3
or MATH 6504	Advanced Linear Algebra	
Select One Course from the Following:		
MATH 6215	Foundations of Geometric Reasoning	3
or MATH 6670	Non-Euclidean Geometry	
Select One Course from the Following:		
MATH 6410	Foundations of Calculus	3
or MATH 6205	Teaching Rational Numbers and Proportionality	
Total Hours		**30**

Community College Teaching Emphasis

The Community College Teaching emphasis is designed to serve those seeking to prepare for a career in community college teaching or working professionals in the field who are seeking career advancement.

Required:

Mathematics Education:		
MATH 6201	Foundations of Mathematics Education	3
MATH 6225	Teaching and Learning Mathematics	3
MATH 6236	Equity and Mathematics Education	3
MATH 6209	Mathematics Curriculum and Assessment	3
Mathematics:		
MATH 6504	Advanced Linear Algebra	3
MATH 6520	Complex Functions and Solving Polynomial Equations	3
MATH 6370	Applied Linear Statistical Methods	3
MATH 6371	Probability and Statistical Inference	3
MATH 6410	Foundations of Calculus	3
MATH 6670	Non-Euclidean Geometry	3
Total Hours		**30**

Actuarial Science Emphasis

Required

ACT SCI 5735	Actuarial Mathematics	3
ACT SCI 5788	Loss Models	3
ACT SCI 6784	Predictive Analytics in Insurance I	3
ACT SCI 6785	Predictive Analytics in Insurance II	3
STAT 5784	Introduction to Machine Learning	3
STAT 4786/5786	Statistics for Risk Modeling	3
Select One Course from the Following:		3
ACT SCI 6735	Advanced Actuarial Mathematics	
or ACT SCI 6788	Advanced Loss Models	
Electives		9

Select 9 hours, including one or more 6000-level courses not selected in the above required category, from among the following:

ACT SCI 5739	Topics in Actuarial Science
ACT SCI 5780	Mathematics of Finance
ACT SCI 5785	Introduction to Financial Engineering
STAT 5752	Introduction to Probability
STAT 5771	Applied Statistical Methods for Research
STAT 5772	Statistical Computing I
STAT 5775	Introduction to Mathematical Statistics
STAT 5779	Applied Multivariate Statistical Analysis
STAT 5782	Statistical Computing II
ACT SCI 6735	Advanced Actuarial Mathematics
ACT SCI 6788	Advanced Loss Models
STAT 6772	Advanced Statistical Methods

STAT 6779	Topics in Probability and Statistics	
Total Hours		**30**

Major in Mathematics for the Elementary and Middle Grades (K-8)

This major is intended for teachers interested in mathematics for the elementary and middle grades (K-8) and for mathematics specialists and supervisors. Teacher licensure is a prerequisite for completing the program approval process for this major. Normally, candidates will have at least 2 years teaching experience.

Students interested in this program must submit a completed Application for Admission to Graduate Study and should refer to their MyUNIverse Student Center To-Do list or contact the Department of Mathematics for other application requirements. Graduate information and application for graduate admission can be found at https://admissions.uni.edu/application.

The Graduate Record Examination (General Test) **is not** required for admission to the program.

Only graduate courses (course numbers 5000 or above) will apply to a graduate degree, even if the undergraduate course number (4999 or less) is listed. No exceptions will be made.

This major is available on the **non-thesis** option only; a **minimum of 30 hours** is required. **A minimum of 15 hours of 6000-level course work is required.**

Required

Mathematics Education:		
MATH 6201	Foundations of Mathematics Education	3
MATH 6205	Teaching Rational Numbers and Proportionality	3
MATH 6212	Foundations of Algebraic Reasoning	3
MATH 6215	Foundations of Geometric Reasoning	3
MATH 6381	Current Research in Mathematics Education	3
MATH 6227	Data Analysis, Probability, and Discrete Mathematical Reasoning	3
MATH 6225	Teaching and Learning Mathematics	3
MATH 6236	Equity and Mathematics Education	3
MATH 6216	Number and Operations	3
MATH 6209	Mathematics Curriculum and Assessment	3
Total Hours		**30**

Professional Science Master's Degree Program

Major in Industrial Mathematics

The Professional Science Master's Degree in Industrial Mathematics is designed to prepare students for a career in industry. The curriculum combines a business and experiential component with advanced course work.

Students interested in this program must submit a completed Application for Admission to Graduate Study and should refer to their MyUNIverse Student Center To-Do list or contact the Department of Mathematics for any other application requirements. Graduate information and application for graduate admission can be found at https://admissions.uni.edu/application.

The Graduate Record Examination (General Test) **is not** required for admission to the program.

Only graduate courses (course numbers 5000 or above) will apply to a graduate degree, even if the undergraduate course number (4999 or less) is listed. No exceptions will be made.

This major is a **non-thesis** program. A **minimum of 30 hours** is required. **A minimum of 12 hours of 6000-level course work is required.**

No comprehensive examination is required for this **non-thesis** option.

Requirements for admission to the program include the completion of a bachelor's degree with a GPA of 3.00 or higher and successful completion of the following university-level courses:

Prerequisite Courses:

MATH 1420	Calculus I	4
MATH 1421	Calculus II	4
MATH 2422	Calculus III	4
MATH 2500	Linear Algebra for Applications	3
STAT 1772	Introduction to Statistical Methods	3
One course in computer programming (or equivalent):		
CS 1130	Visual BASIC Programming	3
CS 1160	C/C++ Programming	3
CS 1510	Introduction to Computing	4

This major requires completion of 9 hours of the PSM Industrial Mathematics core, and 21 hours of electives.

Required Core:

MATH 6745	Deterministic Operations Research	3
MATH 6747	Discrete-Event System Simulation	3
MATH 6796	PSM Capstone Project	3
Electives from the following:		**21**
Marketing:		
MKTG 4170/5170	Marketing Strategy	
or MKTG 6170	Marketing Management	
Management:		

MGMT 6250	Business Strategy
MGMT 6262	Cross-Functional Operations
Finance:	
FIN 3130/5130	Corporate Finance
FIN 3160/5160	Principles of Investments
FIN 6266	Financial Management and Markets
Technology:	
TECH 3024/5024	Solid Modeling and Additive Manufacturing for Design
TECH 3147	Computer Aided Manufacturing
Mathematics:	
ACT SCI/MATH 3780	Mathematics of Finance
ACT SCI 4735/5735	Actuarial Mathematics
ACT SCI 4739/5739	Topics in Actuarial Science
ACT SCI 4785/5785	Introduction to Financial Engineering
ACT SCI 4788/5788	Loss Models
MATH 3425/5425	Differential Equations
MATH 3430/5430	Partial Differential Equations
MATH 3440/5440	Numerical Analysis
MATH 3530/5530	Combinatorics
MATH 3630/5630	Differential Geometry
MATH/STAT 3752	Introduction to Probability
MATH 4460/5460	Introduction to Complex Analysis
MATH 6746	Probabilistic Operations Research
MATH 6748	Modeling Industrial Systems Using Queueing Networks
MATH 6779	Topics in Probability and Statistics
STAT 3771/5771	Applied Statistical Methods for Research
STAT 3775/5775	Introduction to Mathematical Statistics
STAT 3776/5776	Regression Analysis
STAT 3778/5778	Spatial Data Analysis
STAT 4772/5772	Statistical Computing I
STAT 4773/5773	Design and Analysis of Experiments
STAT 4777/5777	Statistical Quality Assurance Methods
STAT 4779/5779	Applied Multivariate Statistical Analysis
STAT 4782/5782	Statistical Computing II
STAT 6772	Advanced Statistical Methods
Computer Science:	
CS 3470/5470	Networking
CS 6400	Computer Systems
Physics:	
PHYSICS 6100	Modeling and Simulation of Physical Systems
Total Hours	30

Program Certificates

The University of Northern Iowa makes available, in addition to traditional programs, the opportunity for students to earn program certificates. Program certificates provide an alternative to programs leading to a degree, a major, or a minor; they certify that an individual has completed a program approved by the university. For information on the following certificates, contact the Department of Mathematics or the Office of the Registrar, which serves as the centralized registry.

Statistical Computing Certificate

Required:		
STAT 3771/5771	Applied Statistical Methods for Research	3
STAT 4772/5772	Statistical Computing I	3
STAT 4782/5782	Statistical Computing II	3
Electives: 6 hours from the following		6
STAT 3776/5776	Regression Analysis	
STAT 3778/5778	Spatial Data Analysis	
STAT 4773/5773	Design and Analysis of Experiments	
STAT 4779/5779	Applied Multivariate Statistical Analysis	
STAT 4784/5784	Introduction to Machine Learning	
Any other courses with the consent of the mathematics department		
Total Hours		**15**