Mathematics
Division of Science and Mathematics

- **BA, General Track: 47 credit hours**
- **BS, General Track: 53-55 credit hours**
- **BA, Secondary Education Track: 30 credit hours**
- **BS, Secondary Education Track: 36-38 credit hours**
- **BS, Financial and Actuarial Sciences Track: 56 credit hours**
- **Minor: 18 credit hours**
- **Major/Minor GPA required for graduation: 2.25**
- **All courses for the major/minor must be completed with a grade of a D or better**

PROGRAM REQUIREMENTS:
- **Complete mathematics core requirements**
- **Capstone: Seminar in Mathematics (MTH 490)**

Description of Major: Mathematics is the science of quantity, change, structure, and space. While solving problems culled from a broad body of knowledge, mathematics majors will develop rigorous analytical abilities and sharpen their oral and written communication skills.

Student Learning Outcomes
Students will:
- Use standard mathematical techniques to solve problems.
- Apply standard proof techniques in the verification of mathematical truth.
- Gain proficiency in using analytical software.
- Effectively communicate mathematics in both oral and written forms.

Preparation: The mathematics degree prepares students for a wide variety of careers, including careers in teaching, private industry, government agencies, actuarial science, and law. Students interested in attending graduate school in mathematics or statistics should seek advice from the full-time mathematicians. In addition, upon finishing the financial and actuarial sciences track, a graduate should be prepared to immediately seek employment with a variety of companies and/or to take the first two actuarial exams.

To major in mathematics, students must complete the core requirements, plus additional requirements listed under one of the following tracks: general, secondary education, financial and actuarial sciences.

MATHEMATICS MAJOR CORE REQUIREMENTS		24 crs.
MTH 210	CALCULUS I	4
MTH 211	CALCULUS II	4
MTH 212	CALCULUS III	4
MTH 300	TRANSITION TO ADVANCED MATHEMATICS	3
MTH 340	PROBABILITY	3
MTH 360	LINEAR ALGEBRA	3
MTH 490	SEMINAR IN MATHEMATICS	3

BACHELOR OF ARTS: GENERAL TRACK		47 crs.
Complete the core requirements, plus the following:		
MTH 320	FINANCIAL MATHEMATICS	3
MTH 341	APPLIED STATISTICS	4
MTH 370	DIFFERENTIAL EQUATIONS AND MODELING	3
MTH 392	INTRODUCTION TO ANALYSIS	3
MTH 393	INTRODUCTION TO MODERN ALGEBRA	3
BUS/ MTH 101	EXCEL I	1
BUS/ MTH 102	EXCEL II	1
CSI 131	COMPUTATIONAL THINKING	2
CSI 132	INTRODUCTION TO PROGRAMMING	3

RECOMMENDED ELECTIVES

ENG 360	INTERDISCIPLINARY PROFESSIONAL AND TECHNICAL WRITING (W)	3
*PHI 204	LOGIC	3

* PHI 204 satisfies the philosophy/religion general education requirement.

BACHELOR OF SCIENCE: GENERAL TRACK — 53-55 crs.

Same as above for Bachelor of Arts in addition to one of the following two options:

1. Four science courses.
2. Four business courses (except BUS 310).

BACHELOR OF ARTS: SECONDARY EDUCATION TRACK — 30 crs.

Complete the core requirements, plus the following:

MTH 392	INTRODUCTION TO ANALYSIS	3
MTH 393	INTRODUCTION TO MODERN ALGEBRA	3

BACHELOR OF SCIENCE: SECONDARY EDUCATION TRACK — 36-38 crs.

Same as above for Bachelor of Arts in addition to one of the following two options:

1. Four science courses.
2. Four business courses (except BUS 310).

For a list of professional education program requirements, see the secondary education section under "School of Education."

BACHELOR OF SCIENCE: FINANCIAL AND ACTUARIAL SCIENCES TRACK — 56 crs.

Complete the core requirements, plus the following:

MTH 320	FINANCIAL MATHEMATICS	3
MTH 341	APPLIED STATISTICS	4
BUS/ MTH 101	EXCEL I	1
BUS/ MTH 102	EXCEL II	1
CSI 131	COMPUTATIONAL THINKING	2
CSI 132	INTRODUCTION TO PROGRAMMING	3
ACC 205	PRINCIPLES OF FINANCIAL ACCOUNTING	3
ECO 211	PRINCIPLES OF MICROECONOMICS	3
ECO 212	PRINCIPLES OF MACROECONOMICS	3
FIN 308	PRINCIPLES OF BUSINESS FINANCE	3
MGT 204	PRINCIPLES OF MANAGEMENT	3

RECOMMENDED ELECTIVES

*BUS 324	BUSINESS ETHICS AND CORPORATE SOCIAL RESPONSIBILITY (W)	3
ENG 360	INTERDISCIPLINARY PROFESSIONAL AND TECHNICAL WRITING (W)	3
MTH 470	INTERNSHIP IN MATHEMATICS	3
**PHI 204	LOGIC	3

* BUS 324 satisfies the ethics general education requirement.

** PHI 204 satisfies the philosophy/religion general education requirement.

MATHEMATICS MINOR REQUIREMENTS — 18 crs.

MTH 210	CALCULUS I	4
MTH 211	CALCULUS II	4
MTH 212	CALCULUS III	4
TWO ADDITIONAL UPPER-LEVEL MATHEMATICS COURSES		6

Mathematics (MTH)

MTH 101   **1**
EXCEL I
An introductory course in Excel. Topics covered: cells and data input, formatting, Excel mathematics, functions, graphs, and filters. Each semester. Same as BUS 101.

MTH 102   **1**
EXCEL II
An advanced course in Excel. Topics covered: intermediate and advanced level functions, names and comments, pivot tables, advanced conditional formatting filters, and matrix functions. Each semester. Same as BUS 102.

MTH 105   **3**
INTERMEDIATE ALGEBRA
This course is for students who have had no more than one year of high school algebra or who have not had mathematics for some time. The course consists of a review of elementary algebra and additional work in linear and quadratic equations, factoring, exponents, polynomials, graphing, and linear systems.

MTH 133   **3**
PRECALCULUS
The study of linear, quadratic, exponential, logarithmic, trigonometric, and inverse trigonometric functions and applications of such functions. These functions will be studied from a numerical, graphical, and analytical approach. A brief general study of functions will also be included. Prerequisite: MTH 105 or equivalent.

MTH 150   **3**
QUANTITATIVE LITERACY
In this course, students are introduced to problem solving and analysis. Topics include representing and analyzing data, using logic and logical statements in arguments, estimating and approximating to judge the reasonableness of an answer, and appropriate tools and approaches to real-world problems in areas such as business and finance.

MTH 170   **3**
STATISTICS
This is an introductory course in descriptive and inferential statistics, approached through intuition, algebra, and problem solving. Understanding of central concepts and methods is stressed. Practical applications in the fields of social and physical sciences are studied. Real-world problems are solved through use of statistical computer packages such as SPSS, SAS, or MINITAB. Prerequisites: MTH 105 and computer literacy.

MTH 210   **4**
CALCULUS I
The calculus of single-variable algebraic, exponential, logarithmic, and trigonometric functions culminating in the Fundamental Theorem of Calculus. Prerequisite: MTH 133, high school precalculus with a C or better, or instructor consent.

MTH 211   **4**
CALCULUS II
Techniques of integration, applications of integration, parametric equations, polar coordinates, and infinite sequences and series. Prerequisite: MTH 210.

MTH 212   **4**
CALCULUS III
The calculus of vector functions and functions of several variables. Prerequisite: MTH 211.

MTH 280-289   **1-3**
SPECIAL TOPICS IN MATHEMATICS

MTH 300   **3**
TRANSITION TO ADVANCED MATHEMATICS
Introduction to the methods of proof through the study of sets, logic, relations, mappings, cardinality, and elementary structures. Prerequisite: MTH 210 or instructor consent.

MTH 320   **3**
FINANCIAL MATHEMATICS
Interest rate measurement, annuities, loan repayment, bond valuation, measuring rate of return of investment, term structure of interest rates, cash flow duration and immunization, and other topics as found on Actuarial Exam FM/2. Prerequisite: MTH 211.

MTH 340   **3**
PROBABILITY
Probability axioms, random variables, commonly used discrete and continuous distributions, expectation, moment generating functions, transformations, and multivariate distributions. Prerequisite: MTH 211 or instructor consent.

MTH 341   **4**
APPLIED STATISTICS
The concepts of sampling distributions with random sampling and statistical inference. The main methods of estimation and the properties of estimators: matching moments, percentile matching, and maximum likelihood. The construction of confidence intervals for the mean, differences of two means, variances, and proportions. Hypothesis testing for the mean, variance, contingency tables, goodness of fit, and regression models. Prerequisite: MTH 211 or instructor consent.

MTH 344   **4**
STATISTICAL LEARNING
Multiple regression, classification and resampling methods. Linear model selection, tree-based methods, and unsupervised learning. Prerequisite: MTH 341 or instructor consent.

MTH 360   **3**
LINEAR ALGEBRA
An introduction to the techniques of linear algebra. Topics include vector spaces, linear independence, basis, dimension, linear transformations, eigenvalues, and eigenvectors. Prerequisite MTH 300 or instructor consent.

Mathematics (MTH)

MTH 366   **3**
NUMERICAL ANALYSIS
An introductory course in numerical methods, including computational techniques for locating roots of equations, interpolation, differentiation, integration, approximation, and systems of linear equations; to include detection, prediction, and control of computational errors. Problem solving using mathematical computer programs and computer programming of algorithms is stressed. Prerequisite: MTH 212 and CSI 230. Same as CSI 366.

MTH 370   **3**
DIFFERENTIAL EQUATIONS AND MODELING
An introductory course in the solutions of elementary differential equations and their applications in a variety of real-world contexts. A general study of mathematical modeling is included. Prerequisite: MTH 211 or instructor consent.

MTH 376   **3**
GRAPH THEORY
Introductory concepts and definitions, trees, planar graphs, chromatic numbers, matchings, and Ramsey theory. Prerequisite: MTH 211.

MTH 380-389   **1-3**
SPECIAL TOPICS IN MATHEMATICS

MTH 392   **3**
INTRODUCTION TO ANALYSIS
Introduction to analysis on the real line with emphasis on careful development of limits, continuity, and differentiation. Prerequisites: MTH 211, 300.

MTH 393   **3**
INTRODUCTION TO MODERN ALGEBRA
An introduction to the basic notions of modern algebra. Topics covered include the integers, groups, rings, fields, homomorphisms, and related notions. Prerequisite: MTH 300.

MTH 470   **3-8**
INTERNSHIP IN MATHEMATICS

MTH 480   **1-4**
INDEPENDENT STUDY IN MATHEMATICS

MTH 485   **3**
DATA ANALYTICS CAPSTONE
Topics drawn from a variety of advanced topics in data analytics. Prerequisite: MTH 344 or instructor consent.

MTH 490   **3**
SEMINAR IN MATHEMATICS
Topics drawn from a variety of advanced topics in mathematics. Prerequisite: Instructor consent.