

# Bachelor of Science in Mathematics

The Bachelor of Science in Mathematics degree explores advanced mathematical theory and analytical methods, while sharpening the student’s critical-thinking skills for solving complex science and technology problems. You will study advanced models for real-world data modeling projects and be taught how to analyze and effectively communicate mathematical theory. Our online math degree is designed for working professionals seeking to expand their knowledge in multiple areas including computer programming, finance, education, logistics, management, engineering, space studies, and more. This flexible degree is also ideal in preparing you for post-graduate education.

## Degree Program Objectives

In addition to the institutional and degree level learning objectives, graduates of this program are expected to achieve these learning outcomes:

- Demonstrate the ability to think critically and systemically through the application of mathematical reasoning.
- Construct mathematical models, solutions, and proofs that are clear, correct, and complete.
- Apply mathematics to solve complex, real-world problems and interpret the impact of those solutions in a global and societal context.
- Apply the awareness of ethical ramifications of the use of mathematical models and solutions to address real-world problems.
- Communicate with a wide range of audiences.
- Function effectively on teams with members from diverse disciplines and backgrounds.

## Degree at a Glance

Code	Title	Semester Hours
	General Education Requirements	30
	Major Required	48
	Select one of the following concentrations:	21
	Applied Mathematics (p. 2)	
	Data Science (p. 3)	
	Operations Research (p. 3)	
	Statistics (p. 4)	
	Final Program Requirements	3

Elective Requirements	18
Total Semester Hours	120

## Degree Program Requirements

### General Education Requirements (30 semester hours)

Code	Title	Semester Hours
<b>Arts and Humanities (6 semester hours)</b>		
STEM270	Thinking and Acting Ethically	3
Select 1 course from the following: <sup>1</sup>		3
ARAB100	Arabic I	
ARAB101	Arabic II	
ARTH200	Art Appreciation	
ARTH240	Survey of Photography	
ARTH241	Film and Literature	
DSIN141	Image Enhancement using Adobe Photoshop®	
FREN100	French I	
FREN101	French II	
GERM100	German I	
GERM101	German II	
JAPN100	Introduction to Japanese	
LITR215	Literature of American Encounters, Revolution, and Rebellion	
LITR218	From Abolition to #MeToo: Literature of the American Civil Rights Movement	
LITR222	Pivotal Figures in Early British Literature	
LITR225	British Literature from Wordsworth through the Wasteland	
LITR231	Leadership in World Literature: Antiquity to the Early Modern Period	
LITR233	Literature of the Newly Globalized World: The Individual’s Struggle to Adapt	
MUSI200	Music Appreciation	
MUSI212	Jazz and Rock	
MUSI250	World Music and Cultures	
PHIL101	Introduction to Philosophy	
PHIL110	Critical Thinking	
PHIL200	Introduction to Ethics	
PHIL202	Philosophy of Science	
PORT100	Introduction to Brazilian Portuguese	
RELS101	Introduction to the Study of Religion	
RELS201	Introduction to World Religions	
RUSS100	Russian I	

SPAN100	Spanish I	
SPAN101	Spanish II	
<b>Civics, Political and Social Sciences (6 semester hours)</b>		
STEM280	Exploring Society and Cultures via Science Fiction	3
Select 1 course from the following: <sup>1</sup>		3
ANTH100	Introduction to Anthropology	
ANTH202	Introduction to Cultural Anthropology	
CHFD220	Human Sexuality	
COMM211	Social Media and Society	
COMM240	Intercultural Communication	
ECON101	Microeconomics	
ECON102	Macroeconomics	
EDUC200	Humane Education: A Global Interdisciplinary Perspective	
GEOG101	Introduction to Geography	
HOSP110	Practical Food Safety and Awareness	
IRLS210	International Relations I	
LITR212	Forgotten America—Under Represented Cultures in American Literature	
POLS101	Introduction to Political Science	
POLS210	American Government I	
PSYC101	Introduction to Psychology	
RELS250	Death and Dying	
RELS260	Race & Religion	
RELS270	Hope and Resilience	
SOCI111	Introduction to Sociology	
SOCI212	Social Problems	
SOCI220	American Popular Culture	
<b>Communication: Writing, Oral, and Multimedia (9 semester hours)</b>		
COMM120	Information and Digital Literacy	3
ENGL110	Making Writing Relevant	3
ENGL115	Argumentation and Rhetoric	3
<b>History (3 semester hours)</b>		
STEM185	The History and Context of STEM	3
<b>Mathematics and Applied Reasoning (3 semester hours)</b>		
MATH110	College Algebra	3
<b>Natural Sciences (3 semester hours)</b>		
STEM100	Introduction to STEM Disciplines	3
Total Semester Hours		30

<sup>1</sup> All literature courses require successful completion of ENGL101 - Proficiency in Writing or ENGL110 - Making Writing Relevant.

## Major Required (48 semester hours)

Code	Title	Semester Hours
MATH111	College Trigonometry	3
MATH200	Analytic Geometry	3
MATH210	Discrete Mathematics	3
MATH225	Calculus	3
MATH220	Linear Algebra	3
MATH226	Calculus II	3
MATH227	Calculus III	3
MATH240	Differential Equations	3
ENGL221	Scientific Writing	3
MATH239	Data Analysis and Presentation	3
MATH302	Statistics	3
MATH328	Probability Theory with Applications	3
MATH320	Mathematical Modeling	3
MATH360	Mathematics History and Development	3
STEM380	Coevolution of Society, Culture, and Technology	3
Select 1 course from the following:		3
STEM470	Cybersecurity, Surveillance, Privacy and Ethics	
STEM471	Analytics, Algorithms, AI, and Humanity	
Total Semester Hours		48

Students must choose a concentration for this degree program and may select from a Concentration in Applied Mathematics, Concentration in Data Science, Concentration in Operations Research, or a Concentration in Statistics.

## Concentration in Applied Mathematics (21 semester hours)

Offers an overview of how to investigate and solve problems through advanced mathematical theory and analysis. Explores qualitative and quantitative methods of mathematical knowledge. Looks at communicating the theories, methods, and results of advanced analyses verbally or in writing.

In addition to the institutional, general education, and program level learning objectives, the Concentration in Applied Mathematics seeks the following specific learning outcomes of its graduates.

### Objectives

Upon successful completion of this concentration, the student will be able to:

- Apply advanced mathematical theory and analytical methods to investigate and solve problems.

- Use critical thinking skills in assessing and evaluating problems.
- Formulate advanced mathematical models.
- Implement advanced mathematical models to solve problems or provide insights into complex issues.
- Apply qualitative and quantitative methods from the mathematical domains.
- Synthesize mathematical knowledge to solve problems in science and technology.
- Communicate the theory, methods, and results of advanced mathematics analyses verbally and in writing.

### Concentration Requirements (21 semester hours)

Code	Title	Semester Hours
MATH305	Real Analysis	3
MATH330	Linear Optimization	3
MATH412	Graph Theory	3
MATH470	Measurement Theory	3
MATH418	Topology	3
MATH460	Principles of Applied Mathematics	3
Select 1 course from the following:		3
MATH325	Linear Regression I	
MATH335	Non Parametric Statistics	
MATH340	Multivariate Statistics	
MATH375	Inventory Models and Systems	
MATH419	Set Theory	
Total Semester Hours		21

### Concentration in Data Science (21 semester hours)

Provides the foundational building blocks for data science including analytical methods, functional methods and coding, exploratory data analysis, data visualization, and an exploration of the effect of new technologies such as analytics and AI on humanity. Teaches how to obtain data, how to perform data munging and pre-processing, and how to conduct data analyses on a wide variety of data across all disciplines and domains. Examples for data analyses are taken from business, finance, economics, healthcare, and the physical and social sciences.

#### Objectives

Upon successful completion of this concentration, the student will be able to:

- Obtain required data and pre-process it for use in data analyses.
- Understand and use a wide variety of specific data types within the broad classifications of both continuous and categorical data.
- Determine the best tools, techniques and/or methods to use in conducting a data analysis.
- Conduct data analyses using a wide variety of tools and methods, modifying those tools and methods as appropriate to achieve increased efficiency in processing and increased effectiveness of the results.
- Communicate information visually by “telling the story” in the data and in the results of the analyses.
- Understand the implications of designing, developing, and implementing new technologies such as analytics and AI.

### Concentration Requirements (21 semester hours)

Code	Title	Semester Hours
DATS200	Functional Methods and Coding	3
DATS201	Analytical Methods I	3
DATS211	Introduction to Data Science	3
DATS301	Analytical Methods II	3
DATS311	Intermediate Data Science	3
DATS331	Machine Learning I	3
DATS411	Advanced Data Science	3
Total Semester Hours		21

### Concentration in Operations Research (21 semester hours)

Examines how advanced analysis and operations research is used in the investigation and solution of scientific and technological problems. Covers why critical thinking, problem assessment and evaluation, and the formulation of operational models is essential for solving problems or gaining insights. Teaches how to communicate operations research.

In addition to the institutional, general education, and program level learning objectives, the Concentration in Operations Research seeks the following specific learning outcomes of its graduates.

#### Objectives

Upon successful completion of this concentration, the student will be able to:

- Apply advanced analytical and operations research methods to investigate and solve problems.
- Use critical thinking skills in assessing and evaluating problems.
- Formulate operational models.

- Implement operational models to solve problems or provide insights into complex issues.
- Apply qualitative and quantitative methods from the mathematical domains.
- Synthesize advanced mathematical knowledge to solve problems in science and technology.
- Communicate the theory, methods and results of operations research analyses verbally and in writing.

### Concentration Requirements (21 semester hours)

Code	Title	Semester Hours
BUSN312	Operations Research	3
MATH330	Linear Optimization	3
MATH340	Multivariate Statistics	3
MATH375	Inventory Models and Systems	3
MATH410	Design of Experiments	3
MATH415	Operational Simulation	3
MATH420	Game Theory and Decision Models	3
Total Semester Hours		21

### Concentration in Statistics (21 semester hours)

Explores the relationship of advanced statistics, analysis, and critical thinking to assessing, investigating, and solving problems in science and technology. Teaches how to formulate and implement mathematical and statistical models for either problem solving or providing insights into complicated issues. Examines the use of qualitative and quantitative mathematics, synthesis of mathematical knowledge, and communication of statistical analyses.

In addition to the institutional, general education, and program level learning objectives, the Concentration in Statistics seeks the following specific learning outcomes of its graduates.

#### Objectives

Upon successful completion of this concentration, the student will be able to:

- Apply advanced statistics and analytical methods to investigate and solve problems.
- Use critical thinking skills in assessing and evaluating problems.
- Formulate mathematical and statistical models.
- Implement mathematical and statistical models to solve problems or provide insights into complex issues.
- Apply qualitative and quantitative methods from the mathematical domains.

- Synthesize mathematical knowledge to solve problems in science and technology.
- Communicate the theory, methods and results of statistical analyses verbally and in writing.

### Concentration Requirements (21 semester hours)

Code	Title	Semester Hours
MATH325	Linear Regression I	3
MATH335	Non Parametric Statistics	3
MATH340	Multivariate Statistics	3
MATH410	Design of Experiments	3
MATH431	Linear Regression II	3
MATH440	Stochastic Processes	3
Select 1 course from the following:		3
MATH305	Real Analysis	
MATH330	Linear Optimization	
Total Semester Hours		21

### Final Program Requirements (3 semester hours)

Code	Title	Semester Hours
MATH499	Senior Seminar in Mathematics (to be taken as the last course before graduation) <sup>1</sup>	3
Total Semester Hours		3

<sup>1</sup> Prerequisite: Senior Standing and completion of all major courses prior to enrollment.

### Elective Requirements (18 semester hours)

Code	Title	Semester Hours
Select any courses not already taken to fulfill the requirements listed above. Credits applied toward a minor or certificate in an unrelated field may be used to fulfill elective credit for the major.		18
Total Semester Hours		18