

# MAJOR IN MATHEMATICS, ACTUARIAL SCIENCE CONCENTRATION

The Actuarial Science concentration trains students how to use mathematics, statistics, business, and economics to analyze and plan for future situations involving financial uncertainties and risks. This concentration is designed to qualify students to take the first

two examinations administered by the Society of Actuaries (<https://www.soa.org/member/>) and provides the foundation for the remaining examinations.

## Requirements Effective Fall 2022

**A minimum grade of C (3.000) is required in all mathematics, statistics, and computer science courses that are required for graduation.**

### Freshman

		AUCC	Credits
CO 150	College Composition (GT-CO2)	1A	3
ECON 202	Principles of Microeconomics (GT-SS1)	3C	3
ECON 204	Principles of Macroeconomics (GT-SS1)	3C	3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	4
MATH 192	First Year Seminar in Mathematical Sciences		1
Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )		3B	3
Biological and Physical Sciences ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences</a> ) <sup>1</sup>		3A	5
Diversity, Equity, and Inclusion ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion</a> )		1C	3
Elective			1
<b>Total Credits</b>			<b>30</b>

### Sophomore

ACT 210	Introduction to Financial Accounting		3
FIN 310	Financial Markets and Institutions		3
Select one course from the following:			2-4
CS 220	Discrete Structures and their Applications		
MATH 235	Introduction to Mathematical Reasoning		
MATH 261	Calculus for Physical Scientists III		4
MATH 369	Linear Algebra I	4A	3
STAT 315	Intro to Theory and Practice of Statistics		3
Select four credits from the following:			4
CS 150A	Culture and Coding: Java (GT-AH3)	3B	
CS 150B	Culture and Coding: Python (GT-AH3)	3B	
CS 152	Python for STEM		
CS 158/MATH 158	Mathematical Algorithms in C		
CS 163	CS1—No Prior Programming Experience		
CS 164	CS1—Computational Thinking with Java		
MATH 151	Mathematical Algorithms in Matlab I		
MATH 152	Mathematical Algorithms in Maple		
STAT 158	Introduction to R Programming		
Biological and Physical Sciences ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences</a> ) <sup>1</sup>		3A	5
Historical Perspectives ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )		3D	3
<b>Total Credits</b>			<b>30-32</b>

**Junior**

FIN 300 <sup>2</sup>	Principles of Finance		3
ECON 335/AREC 335	Introduction to Econometrics		3
JTC 300	Strategic Writing and Communication (GT-CO3)	2	3
MATH 317	Advanced Calculus of One Variable	4B	3
STAT 420	Probability and Mathematical Statistics I		3
STAT 421	Introduction to Stochastic Processes		3
STAT 430	Probability and Mathematical Statistics II		3
Select one course from the following:			4
MATH 340	Intro to Ordinary Differential Equations		
MATH 345	Differential Equations		
Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )			3B
Elective			2
<b>Total Credits</b>			<b>30</b>

**Senior**

BUS 205	Legal and Ethical Issues in Business		3
FIN 342	Risk Management and Insurance		3
FIN 370	Financial Management-Theory and Application		3
MATH 495 <sup>3</sup>	Independent Study		1
Select one course from the following:			3
MATH 417	Advanced Calculus I	4C	
MATH 435	Projects in Applied Mathematics	4C	
Electives <sup>4</sup>			15-17
<b>Total Credits</b>			<b>28-30</b>
<b>Program Total Credits:</b>			<b>120</b>

<sup>1</sup> Students in this concentration must take a total of 10 credits in category 3A, and at least one course must have a laboratory component.  
<sup>2</sup> Students in this concentration may need to obtain a prerequisite override from the appropriate department to enroll in this class.  
<sup>3</sup> Preparation for Exam I administered by the Society of Actuaries.  
<sup>4</sup> Select enough elective credits to bring program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

## Major Completion Map

**Distinctive Requirements for Degree Program:**

TO PREPARE FOR FIRST SEMESTER: The curriculum for the Major in Mathematics, Actuarial Sciences Concentration assumes students enter college prepared to take calculus. Entering students who are not prepared to take calculus will need to fulfill pre-calculus requirements in the first semester: MATH 117, MATH 118, MATH 124, MATH 125, MATH 126. A minimum grade of C (3.000) is required in all mathematics, statistics, and computer science courses that are required for graduation.

**Freshman**

Semester 1		Critical	Recommended	AUCC	Credits
CO 150	College Composition (GT-CO2)			1A	3
ECON 202	Principles of Microeconomics (GT-SS1)	X		3C	3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
MATH 192	First Year Seminar in Mathematical Sciences				1
Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )				3B	3
Pre-Calculus Requirements must be completed by the end of Semester 1, if needed (MATH 117, MATH 118, MATH 124, MATH 125, MATH 126).				X	
<b>Total Credits</b>					<b>14</b>
Semester 2		Critical	Recommended	AUCC	Credits
ECON 204	Principles of Macroeconomics (GT-SS1)		X	3C	3

MATH 161	Calculus for Physical Scientists II (GT-MA1)		X	1B	4
	Biological and Physical Sciences ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences</a> )			3A	5
	Diversity, Equity, and Inclusion ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion</a> )			1C	3

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**Total Credits** **15**

**Sophomore**

<b>Semester 3</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
ACT 210	Introduction to Financial Accounting		X		3
MATH 261	Calculus for Physical Scientists III		X		4
	Biological and Physical Sciences ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#biological-physical-sciences</a> )			3A	5
	Historical Perspectives ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )			3D	3
ECON 204, MATH 161 must be completed by the end of Semester 3.		X			

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**Total Credits** **15**

<b>Semester 4</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
FIN 310	Financial Markets and Institutions				3
Select one course from the following:					2-4
CS 220	Discrete Structures and their Applications				
MATH 235	Introduction to Mathematical Reasoning				
MATH 369	Linear Algebra I	X		4A	3
STAT 315	Intro to Theory and Practice of Statistics				3
Select four credits from the following:					4
CS 150A	Culture and Coding: Java (GT-AH3)			3B	
CS 150B	Culture and Coding: Python (GT-AH3)			3B	
CS 152	Python for STEM				
CS 158/ MATH 158	Mathematical Algorithms in C				
CS 163	CS1—No Prior Programming Experience				
CS 164	CS1—Computational Thinking with Java				
MATH 151	Mathematical Algorithms in Matlab I				
MATH 152	Mathematical Algorithms in Maple				
STAT 158	Introduction to R Programming				
ACT 210, MATH 261 must be completed by the end of Semester 4.		X			

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**Total Credits** **15-17**

**Junior**

<b>Semester 5</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
FIN 300	Principles of Finance		X		3
JTC 300	Strategic Writing and Communication (GT-CO3)		X	2	3
STAT 420	Probability and Mathematical Statistics I		X		3
Select one course from the following:					4
MATH 340	Intro to Ordinary Differential Equations				
MATH 345	Differential Equations				
Elective					2

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**Total Credits** **15**

<b>Semester 6</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
ECON 335/ AREC 335	Introduction to Econometrics				3
MATH 317	Advanced Calculus of One Variable	X		4B	3
STAT 421	Introduction to Stochastic Processes				3
STAT 430	Probability and Mathematical Statistics II		X		3

Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )			3B	3	
MATH 317 and FIN 300 must be completed by the end of Semester 6.		X			
<b>Total Credits</b>				<b>15</b>	
<b>Senior</b>					
<b>Semester 7</b>					
		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
FIN 342	Risk Management and Insurance	X			3
FIN 370	Financial Management-Theory and Application		X		3
Select one course from the following:				3	
Must take either MATH 417 (Fall) or MATH 435 (Spring) as a capstone.					
MATH 417	Advanced Calculus I			4C	
Elective					
Electives				6	
STAT 420 must be completed by the end of Semester 7.		X			
<b>Total Credits</b>				<b>15</b>	
<b>Semester 8</b>					
		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
BUS 205	Legal and Ethical Issues in Business	X			3
MATH 495	Independent Study	X			1
Select one course from the following:				3	
Must take either MATH 417 (Fall) or MATH 435 (Spring) as a capstone.					
MATH 435	Projects in Applied Mathematics			4C	
Elective					
Electives				6-8	
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
<b>Total Credits</b>				<b>13-15</b>	
<b>Program Total Credits:</b>				<b>120</b>	