ACTUARIAL SCIENCE, BS/MS MATHEMATICS

The Mathematics and Actuarial Science faculty at Roosevelt offer an accelerated BS in Actuarial Science (http://catalog.roosevelt.edu/undergraduate/health-science/actuarial-science-bs/)/MS in Mathematics (http://catalog.roosevelt.edu/graduate/health-science/mathematics-ms/) program to eligible students. Students entering this program can earn both bachelor's and master's degrees in less time than earning these degrees separately would require.

Risk analysts and actuaries earn professional designation from either the Society of Actuaries (http://www.soa.org) (life and health insurance) or the Casualty Actuarial Society (http://www.casact.org) (property and casualty insurance). These societies administer a series of examinations that lead to the risk analyst designation or actuaries, first to the designation of associate and then to fellow. The initial exams are the same for both societies. The courses required for the major and the minor will aid the student in preparing for the first two of the professional societies' examinations. They will also satisfy their Validation by Educational Experience (VEE) (https://www.soa.org/education/exam-req/edu-vee.aspx) requirements in economics, corporate finance, and mathematical statistics.

Students apply to this accelerated program at the end of their sophomore years and are accepted into the degree program during their junior years (after having completed at least 60 credit hours), then begin enrolling in graduate courses in their junior and senior years (after completing at least 75 credit hours) and complete the requirements for the MS degree in their fifth years.

As undergraduates, eligible students may earn 9 credit hours (taking three graduate-level courses), which are applied toward both the undergraduate degree and the graduate degree. Graduate courses taken during the student's senior year will depend on the courses the student has remaining to complete in the undergraduate degree in actuarial science. Once the student completes the BS, the graduate-level courses taken as an undergraduate will be transferred to the student's MS transcript.

Admission

Applicants must have a desire to become professional actuaries and must be either:

1. Actuarial Science (http://catalog.roosevelt.edu/undergraduate/health-science/actuarial-science-bs/) majors at Roosevelt University, minoring in both Finance (http://catalog.roosevelt.edu/undergraduate/business/minor/finance-minor-non-business-majors/) and Computer Science (http://catalog.roosevelt.edu/undergraduate/health-science/minor/computer-science-minor/), having a 3.25 GPA (or better) in all actuarial science or mathematics courses taken at Roosevelt, with a minimum of three of these courses by the time of application, or other evidence of scholarly capability. Students should apply at the end of their sophomore years.
2. High school students accepted into the BS in Actuarial Science with a 3.5 GPA (or higher) and a 25 ACT (or higher), or other evidence of scholarly capability.
3. Transfer students who have completed Calculus 1-3 (equivalent to MATH 231 CALCULUS I, MATH 232 CALCULUS II, and MATH 233 CALCULUS III at Roosevelt) having a 3.25 GPA

(or better) in all actuarial science or mathematics courses taken at the college level. Students should contact the department chair at Roosevelt indicating their intent to apply. Many community colleges have specific articulation agreements with Roosevelt, and so students are encouraged to also discuss their degree plans with their transfer coordinator.

Accepted students must also agree to finish their MS program at Roosevelt and maintain good standing in master's- level courses.

Acceptance into the program will be decided by a departmental committee.

Degree awards

The BS is awarded when all undergraduate requirements are completed (with substitution of three graduate-level courses for three undergraduate courses). The MS is awarded when all graduate requirements are completed.

Application deadline: May 1

Students completing the accelerated BS in Actuarial Science and MS in mathematics will complete the BS in Actuarial Science with minors in both Finance and Computer Science in their first four years. In their fifth year they will complete the MS degree in Mathematics with their choice of concentration in either Statistics or Computer Science.

Requirements

- At least four courses in Actuarial Science must be completed at Roosevelt University.
- A student completing a Bachelor of Science degree in Actuarial Science must take at least one professional exam prior to graduation. Proof should be submitted to the department chair.
- All credit must be approved by the department to be applied toward the major.
- At least 60 semester hours must be in actuarial science, mathematics, computer science, natural sciences and/or psychology. (Note that typically fulfilling the standard general education requirements, the major requirements, and the computer science minor will result in at least 60 semester hours.)
- The BS degree with an accelerated MS requires both a minor in Finance (http://catalog.roosevelt.edu/undergraduate/business/minor/finance-minor-non-business-majors/) and an additional minor in Computer Science (http://catalog.roosevelt.edu/undergraduate/health-science/minor/computer-science-minor/) (computer science courses must be numbered above 115.)
- All courses presented for the undergraduate major must be completed with C- or higher grades with an overall GPA of 2.0 or higher in undergraduate coursework. A maximum of two grades of C- may be presented for the undergraduate major.
- At most two grades of C or C+ are allowed in graduate courses; all other graduate coursework must have a grade of B- or higher, with a graduate GPA of at least 3.0.
- The completed degree requires a total of 33 credit hours of graduate coursework (which includes the 9 credit hours of graduate courses taken as an undergraduate).

Recommendations

- Appropriate supporting courses in computer science, economics, and finance are recommended.
- Students should prepare to take an actuarial professional exam early in their degree plan, as this is often a requirement for actuarial internships. Both ACSC 367 FINANCIAL MATH and ACSC 347 PROBABILITY THEORY correspond to the content of the first two of these actuarial professional exams; the corresponding seminar courses ACSC 380FM ACTUARIAL SCIENCE SEMINAR:EXAM FM/2 and ACSC 380P ACTUARIAL SCIENCE SEMINAR: EXAM P/1 aid in exam preparation.
- Students are encouraged to take ACSC 390 INDUSTRIAL RESEARCH PROBLEMS as part of their experiential learning coursework.
- Students are encouraged to do an actuarial, computing, financial, or statistical internship prior to graduation.

Code	Title	Credit Hours
Core		
ACSC 101	ACTUARIAL CAREER	1
MATH 231	CALCULUS I	5
MATH 232	CALCULUS II	5
MATH 233	CALCULUS III	3
ACSC 246	LINEAR ALGEBRA	3
ACSC 309	DATA MINING (Will be graduate Math 409)	3
ACSC 347	PROBABILITY THEORY	3
ACSC 348	MATHEMATICAL STATISTICS	3
ACSC 349	REGRESSION & TIME SERIES (Will be graduate Math 449)	3
ACSC 367	FINANCIAL MATH	3
ACSC 380FM	ACTUARIAL SCIENCE SEMINAR:EXAM FM/2	3
or ACSC 380P	ACTUARIAL SCIENCE SEMINAR: EXAM P/1	
Select one of the following:		3
ACSC 323	COOPERATION AND COMPETITION -- GAME THEORY AND APPLICATIONS	
ACSC 328	LINEAR PROGRAMMING & OPTIMIZATION	
ACSC 366	ADVANCED EXCEL METHODS	
ACSC 369	MODELS FOR LIFE CONTINGENCIES	
ACSC 378	TOPICS IN ACTUARIAL MATH	
ACSC 390	INDUSTRIAL RESEARCH PROBLEMS	
ACSC 380FM	ACTUARIAL SCIENCE SEMINAR:EXAM FM/2	
or ACSC 380	ACTUARIAL SCIENCE SEMINAR: EXAM P/1	
VEE requirement (part of Finance minor)		
ECON 101	PRINCIPLES OF ECONOMICS I (fulfills a portion of the social science gen ed requirement)	3
ECON 102	PRINCIPLES OF ECONOMICS II (fulfills a portion of the social science gen ed requirement)	3
FIN 311	PRINCIPLES OF FINANCE	3
FIN 321	INVESTMENTS	3
Additional requirements for the Finance minor		
ACCT 210	INTRODUCTION TO FINANCIAL ACCOUNTING	3
FIN 301	MONEY AND BANKING	3
FIN 3XX	FINANCE ELECTIVE	3
Computer science minor		
CST 150	COMPUTER SCIENCE I	4
CST 250	COMPUTER SCIENCE II [Recommended]	4
CST 2XX	COMPUTER SCIENCE ELECTIVE	3
CST 333	DATABASE SYSTEMS [Recommended]	3
CST 3XX	COMPUTER SCIENCE ELECTIVE	3
General Education, University Writing Requirement, and Elective courses		44
Total Credit Hours		**120**

CORE Requirements (General Education)

Code	Title	Credit Hours
First Year Success Course or Transfer Success Course		
FYS 101	FIRST YEAR SUCCESS COURSE	1
or TRS 101	TRANSFER SUCCESS 101	
Communication Requirement		
ENG 101	COMPOSITION I: CRITICAL READING & WRITING	3
ENG 102	COMPOSITION II: INTRODUCTION TO ACADEMIC RESEARCH	3
COMM 101	PUBLIC SPEAKING (or program specific CORE communications course)	3
Ideas of Social Justice		
3 credits in coursework categorized as Ideas.		3
Humanities and Fine and Performing Arts [2, 3]		
9 credits from the following subject areas: African-American Studies, Art History, English (excluding ENG 101 and ENG 102), History, Languages, Music, Philosophy, Theatre, Communication and Women's and Gender Studies		9
Mathematics		
MATH 110	QUANTITATIVE LITERACY (or above) [1]	3
Science		
One biological science and one physical science required (one must include a one credit lab).		7-8
Social Sciences [2,3]		
9 credits from the following subject areas: African-American Studies, Criminal Justice, Economics, History, Journalism, Philosophy, Political Science, Psychology, Sociology and Women's and Gender Studies		9
Experiential Learning		
6 credits from coursework categorized as Experiential Learning.		6
Total Credit Hours		**47-48**

[1] Higher level of Math may be required by major
[2] Coursework must come from outside of students' major discipline
[3] A maximum of 9 credits can be applied from a single discipline towards humanities and social science requirements

These quantitative requirements also apply to degrees.

- Students must earn a minimum of 120 semester hours.
- Students may apply no more than 60 credit hours of 100-level courses toward the degree.
- Students must apply no fewer than 60 credit hours of 200- and 300-level courses toward the degree.
- Students must have at least 18 credit hours (of the 60 credit hours above) at the 300 level.
- Students may transfer in no more than 70 credit hours from community colleges.
- Students earning less than 60 total hours in residence must take their final 30 hours at Roosevelt University. Note that some majors have additional requirements for RU hours.
- Students must have a grade point average of 2.0 or higher to graduate. Note that some majors have additional GPA requirements.
- Students may apply no more than 51 hours in the major (BA) or 57 hours in the major (BS)

Requirements for MS

Students completing the MS in mathematics must choose a concentration in either computer science or statistics. Three of the graduate courses (MATH 448 PROBABILITY AND STATISTICS II, MATH 449 REGRESSION & TIME SERIES, and MATH 409 DATA MINING) must be taken during the senior year of undergraduate and will be used for graduate credit in the MS.

Computer Science Concentration

As computer technology evolves, so do the mathematical applications including probability and statistics, numerical analysis, data analytics, cryptography, neural networks, genetic algorithms, bioinformatics, and other fields of scientific computing. Students interested in working with computers while pursuing their MS in mathematics have the option of combining at least 18 credit hours of mathematics course work with up to 15 credit hours in computer science for a total of 33 credit hours. In this accelerated degree, nine of those credit hours are completed during the junior or senior year, and the remaining 24 are completed after the undergraduate degree is complete.

Requirements

The completed degree requires a total of 33 credit hours of graduate course work.

Code	Title	Credit Hours
Core [2]		
MATH 409	DATA MINING	3
MATH 430	NUMERICAL ANALYSIS [1]	3
Electives		
Select four to seven courses from among the following options: [2]		12-21
MATH 416	HISTORY OF MATHEMATICS	
MATH 418	NUMBER THEORY	
MATH 420	INTRODUCTION TO ABSTRACT ALGEBRA	
MATH 423	GAME THEORY AND APPLICATIONS	
MATH 432	OPERATIONS RESEARCH [1]	
MATH 446	STOCHASTIC PROCESSES [1]	
MATH 447	ADVANCED PROBABILITY [1]	
MATH 448	PROBABILITY AND STATISTICS II	
MATH 449	REGRESSION & TIME SERIES [1]	
MATH 457	ANOVA & EXPERIMENTAL DESIGN [1]	
MATH 478	TOPICS IN ACTUARIAL MATH [1]	
MATH 489	SPECIAL TOPICS	
MATH 491	INDUSTRIAL APP OF MATH	
Select the remaining courses (for an overall total of eleven courses) from among the following: [2]		15-6
CST 406	BIG DATA	
CST 408	ADVANCED ALGORITHMS	
CST 466	CRYPTOGRAPHY	
CST 468	INTERNET SECURITY	
CST 471	DISTRIBUTED DATABASES	
CST 472		
CST 480	SPECIAL TOPICS	
CST 481	INTELLIGENT SYSTEMS	
CST 482	COMPUTER GRAPHICS	
CST 486	INFORMATION RETRIEVAL [1]	
Total Credit Hours		**33**

[1] At least six courses must be listed exclusively at the graduate level.
[2] Substitutions may be made with advisor approval.

Statistics Concentration

The concentration in statistics prepares graduates for diverse and vital areas that may include medical research, drug testing, environmental risk assessment, quality assurance, economic forecasting, and the exploration of space. Students interested in applying statistics to other fields while pursuing their MS in mathematics have the option of combining at least 24 credit hours of mathematics course work with up to 9 credit hours in a cognate field (such as biology, chemistry, computer science, economics, education, finance, psychology, or sociology) for a total of 33 credit hours. In this accelerated degree, nine of those graduate credit hours are completed during the junior or senior year, and the remaining 24 are completed after the undergraduate degree is complete.

REQUIREMENTS

The completed degree requires a total of 33 hours of graduate course work.

Code	Title	Credit Hours
Core [2]		
MATH 430	NUMERICAL ANALYSIS [1]	3
MATH 446	STOCHASTIC PROCESSES [1]	3
MATH 447	ADVANCED PROBABILITY [1]	3
MATH 448	PROBABILITY AND STATISTICS II	3
MATH 449	REGRESSION & TIME SERIES [1]	3
MATH 457	ANOVA & EXPERIMENTAL DESIGN [1]	3
Electives		
Select two of the following: [2]		6
MATH 409	DATA MINING	
MATH 423	GAME THEORY AND APPLICATIONS	
MATH 428	LINEAR PROGRAMMING & OPTIM	

MATH 432	OPERATIONS RESEARCH [1]	
MATH 475	DERIVATIVES MARKETS [1]	
MATH 476	LOSS MODELS [1]	
MATH 478	TOPICS IN ACTUARIAL MATH	
MATH 489	SPECIAL TOPICS	
MATH 491	INDUSTRIAL APP OF MATH	
Three electives from mathematics or approved cognate fields		9
Total Credit Hours		**33**

[1] At least six courses must be listed exclusively at the graduate level.
[2] Substitutions may be made with advisor approval.

Your degree map is a general guide suggesting courses to complete each term on the academic pathway to your degree. It is based on the most current scheduling information from your academic program. Your program's degree map is reviewed annually and updated as schedules change (although you retain the same course requirements as long as you are continuously enrolled in your degree program).

Always work closely with your academic advisor to understand curriculum requirements and scheduling, as each student's academic plan can look slightly different.

Year 1

Fall	Credit Hours	Spring	Credit Hours
FYS 101	1	Ideas of Social Justice	3
ENG 101	3	ENG 102	3
ECON 101	3	ECON 102	3
Physical Science[6]	3	CST 150	4
MATH 121[7]	3	MATH 122	3
ACSC 101	1		
	14		**16**

Year 2

Fall	Credit Hours	Spring	Credit Hours
ACCT 210	3	FIN 301	3
MATH 231	5	MATH 232	5
Humanities #1	3	ACSC 246	3
COMM 101	3	BIOL 111 or 112[6]	4
Social Science #3 (ECON 234 recommended)	3		
	17		**15**

Year 3

Fall	Credit Hours	Spring	Credit Hours
MATH 233	3	ACSC 380FM or 380P[5]	3
FIN 311	3	MATH 448	3
CST 250	4	Experiential Learning #1[1]	3
Humanities #2	3	FIN 321	3
ACSC 347	3	CST 2XX	3
	16		**15**

Year 4

Fall	Credit Hours	Spring	Credit Hours
MATH 409	3	CST 333	3
MATH 449 (EXL #2)	3	Humanities #3	3
ACSC 367	3	CST 3XX	3
Actuarial Elective[3]	3	General Elective	3
FIN 3XX[2]	3	General Elective	3
	15		**15**

Year 5

Fall	Credit Hours	Spring	Credit Hours
MATH 446	3	MATH 457	3
MATH 430	3	MATH 4XX	3
Cognate Area[4]	3	Cognate Area[4]	3
Cognate Area[4]	3	MATH 4XX	3
	12		**12**

Total Credit Hours 147

[1] ACSC 390 INDUSTRIAL RESEARCH PROBLEMS recommended
[2] Any 300-level FIN course
[3] Or a general elective if the EXL course was ACSC 390 INDUSTRIAL RESEARCH PROBLEMS
[4] Or any 400-level Math course
[5] Students must take a professional exam, ideally in the end of their junior year.
[6] One Natural Science course must be a lab course.
[7] Students should begin taking the calculus sequence in order based on their placement. Students who place into MATH 122 TRIGONOMETRY AND PRECALCULUS, MATH 231 CALCULUS I, MATH 232 CALCULUS II, or MATH 233 CALCULUS III should begin in that course in their first semester, taking subsequent courses each following semester until this sequence is complete.