ACTUARIAL SCIENCE, MATHEMATICS (BS)

Degree: Bachelor of Science
Major: Mathematics
Concentration: Actuarial Science
Program Code: 3438

About This Major...

The actuarial science concentration in mathematics prepares students for graduate work in actuarial science or to enter the job force. With some additional job-specific training, students entering the job market could function as actuaries in the insurance field or as applied statisticians working in areas such as risk management and marketing.

For more information on what you can do with this major, visit Career Services’ What to Do with a Major? resource.

All CMU baccalaureate graduates are expected to demonstrate proficiency in specialized knowledge/applied learning, quantitative fluency, communication fluency, critical thinking, personal and social responsibility, and information literacy. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Construct multi-step problem-solving strategies and communicate solutions effectively in written form. (Specialized Knowledge, Quantitative Fluency)
2. Use statistical software (including calculators) to aid in problem-solving and investigation, and understand its limitations. (Applied Learning)
3. Apply appropriate statistical procedures and justify chosen assumptions. (Applied Learning, Personal and Social Responsibility)
4. Investigate, discuss, and respond to ethical and social challenges in a mathematical context. (Communication Fluency, Personal and Social Responsibility, Information Literacy)
5. Draw statistical conclusions and evaluate the validity of others’ conclusions. (Critical Thinking, Information Literacy)
6. Communicate technical analyses to non-specialists. (Communication Fluency)

Requirements

Each section below contains details about the requirements for this program. Select a header to expand the information/requirements for that particular section of the program’s requirements.

To print or save an overview of this program’s information, including the program description, learning outcomes, requirements, suggested course sequencing (if applicable), and advising and graduation information, scroll to the bottom of the left-hand navigation menu and select “Print Options.” This will give you the options to either “Send Page to Printer” or “Download PDF of This Page.” The “Download PDF of This Page” option prepares a much more concise presentation of all program information. The PDF is also printable and may be preferable due to its brevity.

Institutional Degree Requirements

The following institutional degree requirements apply to all CMU baccalaureate degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 120 semester hours minimum.
- Students must complete a minimum of 30 of the last 60 hours of credit at CMU, with at least 15 semester hours in major discipline courses numbered 300 or higher.
- 40 upper-division credits (an alternative credit limit applies to the Bachelor of Applied Science degree).
- 2.00 cumulative GPA or higher in all CMU coursework.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 30 semester credit hours for a baccalaureate degree. A maximum of 15 of the 30 credits may be for cooperative education, internships, and practica.
- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.
- See “Requirements for Undergraduate Degrees and Certificates” in the catalog for a complete list of graduation requirements.

Essential Learning Requirements

(31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 111</td>
<td>English Composition I-GTCO1</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 112</td>
<td>English Composition II-GTCO2</td>
<td>3</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Calculus I-GT-MA1</td>
<td>3</td>
</tr>
</tbody>
</table>

History

Select one History course

Humanities

Select one Humanities course

Social and Behavioral Sciences

Select one Social and Behavioral Sciences course

Select one Social and Behavioral Sciences course

Fine Arts

Select one Fine Arts course

Natural Sciences

Select one Natural Sciences course with a lab

Calculus I-GT-MA1

1

2

3
Select one Natural Sciences course

Total Semester Credit Hours: 31

1 Must receive a grade of "C" or better and must be complete by the time the student has 60 semester hours.
2 This is a 5 credit course. 3 credits apply to the Essential Learning requirements and 2 credits apply to electives.
3 One course must include a lab.

Other Lower Division Requirements
(6 semester hours)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>KINE 100</td>
<td>Health and Wellness</td>
<td>1</td>
</tr>
<tr>
<td>KINA 1XX</td>
<td>Activity Course</td>
<td>1</td>
</tr>
</tbody>
</table>

Essential Learning Capstone

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSL 200</td>
<td>Essential Speech</td>
<td>1</td>
</tr>
<tr>
<td>ESSL 290</td>
<td>Maverick Milestone</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 6

1 Essential Learning Capstone must be taken after completion of the Essential Learning English and Mathematics requirements, and when a student has earned between 45 and 75 hours.

Foundation Courses
(8 semester hours)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 152</td>
<td>Calculus II</td>
<td>5</td>
</tr>
<tr>
<td>CISC 241</td>
<td>Introduction to Business Analysis</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 241</td>
<td>Introduction to Business Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 8

Program Specific Degree Requirements
(54-55 semester hours, must maintain a 2.50 cumulative GPA or higher in coursework in this area. At most one "D" may be used in completing major requirements.)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 150</td>
<td>Topics and Careers in Mathematics</td>
<td>1</td>
</tr>
<tr>
<td>MATH 225</td>
<td>Computational Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 253</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 492</td>
<td>Senior Capstone</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 110 &amp; 110L</td>
<td>Beginning Programming and Beginning Programming Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 111</td>
<td>CS1: Foundations of Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 130</td>
<td>Introduction to Engineering Computer Science</td>
<td>3</td>
</tr>
</tbody>
</table>

Required Concentration Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISC 341</td>
<td>Quantitative Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 260</td>
<td>Introduction to Database</td>
<td>3</td>
</tr>
<tr>
<td>ECON 201</td>
<td>Principles of Macroeconomics-GTSS1</td>
<td>3</td>
</tr>
<tr>
<td>ECON 415</td>
<td>Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>FINA 310</td>
<td>Risk Management</td>
<td>3</td>
</tr>
<tr>
<td>FINA 412</td>
<td>Life and Health Insurance Licensure and Financial Planning</td>
<td>3</td>
</tr>
<tr>
<td>STAT 301</td>
<td>Computational Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 312</td>
<td>Correlation and Regression</td>
<td>3</td>
</tr>
<tr>
<td>STAT 350</td>
<td>Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 351</td>
<td>Mathematical Statistics II</td>
<td>3</td>
</tr>
</tbody>
</table>

Concentration Electives: 9-10

Choose three courses from the groups below. At least two course must be from Group A and the third course may be from Group A or Group B.

Group A

<table>
<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>STAT 313</td>
<td>Sampling Techniques</td>
<td>3</td>
</tr>
<tr>
<td>STAT 425</td>
<td>Design and Analysis of Experiments</td>
<td>3</td>
</tr>
<tr>
<td>STAT 430</td>
<td>Categorical Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 435</td>
<td>Introduction to Time Series</td>
<td>3</td>
</tr>
</tbody>
</table>

Group B

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 240</td>
<td>Introduction to Advanced Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 361</td>
<td>Numerical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 362</td>
<td>Fourier Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 365</td>
<td>Mathematical Modeling</td>
<td>3</td>
</tr>
<tr>
<td>MATH 369</td>
<td>Discrete Structures I</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 54-55

General Electives
All college level courses appearing on your final transcript, not listed above, that will bring your total semester hours to 120 hours, including 40 upper-division credit hours. 20-21 semester hours; 3-7 hours of upper division may be needed.

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<tbody>
<tr>
<td>MATH 151</td>
<td>Calculus I-GT-MA1</td>
<td>2</td>
</tr>
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</table>

Select additional electives: 18-19

Total Semester Credit Hours: 20-21

Suggested Course Plan
While the sequencing below culminates in a total of 119-121 semester credit hours, students must complete a minimum of 120 semester credit hours as required for completion of this degree, including satisfactory completion of all required courses. Plan to complete requirements with varying hour options accordingly.

First Year
Fall Semester

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CSCI 111  CS1: Foundations of Computer Science
CSCI 130  Introduction to Engineering Computer Science
ENGL 111  English Composition I-GTCO1
Essential Learning - Social and Behavioral Sciences 3
MATH 151  Calculus I-GTMA1

Semester Credit Hours 15

Spring Semester
ENGL 112  English Composition II-GTCO2
Essential Learning - History 3
Essential Learning - Social and Behavioral Sciences 3
KINA Activity 1
MATH 150  Topics and Careers in Mathematics 1
MATH 152  Calculus II 5

Semester Credit Hours 16

Second Year
Fall Semester
CISB 241  Introduction to Business Analysis 3
or STAT 241  Introduction to Business Analysis 3
ECON 201  Principles of Macroeconomics-GTSS1 3
Essential Learning - Fine Arts 3
Essential Learning - Humanities 3
MATH 253  Calculus III 4

Semester Credit Hours 16

Spring Semester
CSCI 260  Introduction to Database 3
ESSL 200  Essential Speech 1
ESSL 290  Maverick Milestone 3
Essential Learning - Natural Science with Lab 4
KINE 100  Health and Wellness 1
MATH 225  Computational Linear Algebra 3

Semester Credit Hours 15

Third Year
Fall Semester
CISB 341  Quantitative Decision Making 3
FINA 310  Risk Management 3
General Elective 3
STAT 301  Computational Statistics 3
STAT 350  Mathematical Statistics I 3

Semester Credit Hours 15

Spring Semester
Concentration Elective from Group A or B 3
Essential Learning - Natural Science 3
General Elective 3
STAT 312  Correlation and Regression 3
STAT 351  Mathematical Statistics II 3

Semester Credit Hours 15

Fourth Year
Fall Semester
Concentration Elective from Group A or B 3-4
FINA 412  Life and Health Insurance Licensure and Financial Planning 3
General Electives 6
MATH 492  Senior Capstone 3

Semester Credit Hours 15-16

Spring Semester
Concentration Elective from Group A or B 3
ECON 415  Econometrics 3
General Electives 6-7

Semester Credit Hours 12-13

Total Semester Credit Hours 119-121

Actuarial Science, Mathematics (BS)

Advising and Graduation

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