# ACTUARIAL SCIENCE (BS)

## Bachelor of Science

The actuarial science major provides students with a strong analytical foundation with which to solve the problems encountered in the quantification of risk and the management of investments. To be a successful actuary, a strong business and finance background must be combined with the analytical skills developed in mathematics and economics courses. The courses will prepare students for successful careers in the field of actuarial science and prepare them for the first two actuarial examinations required by the Casualty Actuarial Society (CAS) and the Society of Actuaries (SOA). An internship experience is encouraged, which will give students the opportunity to take the skills and knowledge learned in the classroom, and apply them in a workplace environment.

A major in actuarial science will prepare students for a professional career that is consistently rated among the top professions in terms of employment outlook, salary, professional development, and job satisfaction.

## Program Requirements

| Code | Title | Credits |
|---|---|---|
| **Mathematics Courses** | | |
| MTH-2210 | Calculus and Analytic Geometry I | 4 |
| MTH-2220 | Calculus and Analytic Geometry II | 4 |
| MTH-2230 | Calculus and Analytic Geometry III | 4 |
| MTH-2500 | Problem Solving, Modeling, and Design | 4 |
| MTH-3100 | Financial Engineering | 4 |
| MTH-3240 | Probability and Statistics I | 4 |
| MTH-3250 | Linear Algebra | 4 |
| MTH-3505 | Data Analytics I: Predictive Analytics and Data Analysis | 4 |
| MTH-4240 | Probability and Statistics II | 4 |
| MTH-4505 | Data Analytics II: Modeling, Optimization and Statistical Programming | 4 |
| MTH-4990 | Senior Capstone in the Mathematical Sciences | 4 |
| **Computer Science Courses** | | |
| CSC-1700 | Introduction to Computer Programming | 4 |
| **Business Courses** | | |
| ACC-2010 | Principles of Financial Accounting | 4 |
| ACC-2020 | Principles of Managerial Accounting | 4 |
| ECN-2030 | Principles of Economics | 4 |
| FIN-3400 | Principles of Finance | 4 |
| FIN-4430 | Advanced Corporate Finance | 4 |
| **Total Credits** | | **68** |

## Undergraduate Degree Requirements

A student who graduates from Aurora University with a baccalaureate degree will have met the following requirements:

1. Completion of all requirements for an approved major (with no grades lower than "C").
2. Overall completion of at least 120 semester hours of coursework with a GPA of at least 2.0 on a 4.0 scale (a course may be utilized only once in application toward a degree requirement, unless otherwise noted in the academic regulations). The 120 semester hours of coursework must include:
   - At least 52 semester hours completed at a senior college.
   - Residency Requirement - At least 30 semester hours completed at Aurora University, including the last 24 semester hours in the degree, and including at least 18 semester hours in the major. (Portfolio assessment credit, life and vocational experience credit, off-campus experience credit, examination credit, participation credit, and block credit, shall not count toward the residency requirement).
   - Upper-Division Requirement - A minimum of 30 semester hours numbered 3000 or above. Of these 30 semester hours, 15 semester hours must lie within the major and 15 semester hours must be completed at Aurora University.
3. Completion of all General Education requirements (with no grades lower than "C"), as follows:
   - Quantitative and Formal Reasoning competency requirement (https://catalog.aurora.edu/regulations-policy-catalog/academic-regulations-procedures/general-education/#satisfy-quantitative-reasoning-requirement)
   - ENG-1000 Introduction to Academic Writing
   - IDS-1200 Discover What Matters or IDS-3040 Global Justice
   - IDS-1150 First Year Experience - *Not required for Transfer or AU Online students)*
   - Satisfactory participation in the junior-year mentoring and assessment process designed to guide students to successful completion of their degree and to encourage planning for next steps beyond graduation. (IDS-3500 Junior Mentoring Program I and IDS-3550 Junior Mentoring Program II - *Not required for ADC or AU Online students but may be designated electives for AU Online students admitted with fewer than 15 hours of transfer credit.)*
   - Distribution Requirements
     *Students will complete one approved course[1] from each of the following categories:*
     - Artistic Literacy
     - Cultural Literacy
     - Human Inquiry
     - Scientific Inquiry

   *In addition to the above, ADC and Online students will also complete one approved course[1] from the following category:*

     - Discovery and Reflection

[1] Only courses that are approved to meet the distribution requirement can be used toward this requirement. See the list of approved courses (https://catalog.aurora.edu/regulations-policy-catalog/academic-regulations-procedures/general-education/#approved-courses-gen-ed-distribution) for available options. Courses taken to meet distribution requirements are 4 semester hours apiece, with the following exceptions:
- An approved transfer course of at least 2.50 semester hours can be used to satisfy a distribution requirement.
- Courses with co-requisite laboratory components may be used to satisfy a distribution requirement, provided that the student

successfully complete both the three-credit-hour course and the single-credit-hour lab component.

# Learning Outcomes

**OUTCOME 1**
Knowledge of Mathematical Problem Solving: Students will be able to solve correctly a wide variety of problems using both basic mathematics skills and advanced mathematical techniques and to apply these techniques to other disciplines.

1.1 Apply and adapt a variety of appropriate strategies to solve problems.
1.2 Solve problems that arise in mathematics and those involving mathematics in other contexts.
1.3 Build new mathematical knowledge through problem solving.
1.4 Monitor and reflect on the process of mathematical problem solving.

**OUTCOME 2**
Knowledge of Reasoning and Proof: Students will learn to reason and think in abstract terms, construct correct and coherent proofs, and recognize valid mathematical arguments.

2.1 Recognize reasoning and proof as fundamental aspects of mathematics.
2.2 Make and investigate mathematical conjectures.
2.3 Develop and evaluate mathematical arguments and proofs.
2.4 Select and use various types of reasoning and methods of proof.

**OUTCOME 3**
Knowledge of Mathematical Communication: Students will communicate mathematics clearly both in written and verbal forms.

3.1 Communicate their mathematical thinking coherently and clearly to peers, faculty, and others.
3.2 Use the language of mathematics to express ideas precisely.
3.3 Organize mathematical thinking through communication.
3.4 Analyze and evaluate the mathematical thinking and strategies of others.

**OUTCOME 4**
Knowledge of Mathematical Connections: Students will learn to draw connections among mathematical branches and related disciplines.

4.1 Recognize and use connections among mathematical ideas
4.2 Recognize and apply mathematics in contexts outside of mathematics
4.3 Demonstrate how mathematical ideas interconnect and build on one another to produce a coherent whole.

**OUTCOME 5**
Knowledge of Mathematical Representation: Students will learn to represent and utilize mathematical concepts in various ways.

5.1 Use representations to model and interpret physical, social, and mathematical phenomena.
5.2 Create and use representations to organize, record, and communicate mathematical ideas.
5.3 Select, apply, and translate among mathematical representations to solve problems.

**OUTCOME 6**
Knowledge of Technology: Students will use technology to deepen mathematical understanding and to enhance problem-solving skills.

6.1 Use knowledge of mathematics to select and use appropriate technological tools, such as but not limited to, spreadsheets, dynamic graphing tools, computer algebra systems, dynamic statistical packages, graphing calculators, data-collection devices, and presentation software.

**OUTCOME 7**
Knowledge of Financial Mathematics: Students are able to solve problems in Financial Mathematics covering time value of money, annuities, cash flows, loans and bonds, immunizations, swaps, and determinants of interest rates. Students can relate this knowledge this to other disciplines and effectively use multiple ways to represent it.

7.1 Students demonstrate knowledge and understanding of the Time Value of Money.
7.2 Students demonstrate knowledge and understanding of Annuities.
7.3 Students demonstrate knowledge and understanding of Cash Flow.
7.4 Students demonstrate knowledge and understanding of Loans and Bonds.
7.5 Students demonstrate knowledge and understanding of Immunizations.
7.6 Students demonstrate knowledge and understanding of Swaps.
7.7 Students demonstrate knowledge and understanding of Determinants of Interest Rates.
7.8 Students can relate this knowledge to other disciplines and effectively use multiple ways to represent it.

**OUTCOME 8**
Knowledge of Probability and Statistics: Students will be able to solve problems in probability and statistics covering distributions, analysis and results of the data, summarizing/displaying data, interpreting data, relationships among variables, characterizing distributions, performing statistical inferences, and proper use of computer software

8.1 Students demonstrate knowledge and understanding of Probability Distributions and Problem Solving.
8.2 Students demonstrate knowledge and understanding of Analysis and Results of Data.
8.3 Students demonstrate knowledge and understanding of Summarizing/Displaying Data.
8.4 Students demonstrate knowledge and understanding of Interpreting Data.
8.5 Students demonstrate knowledge and understanding of Relationships Among Variables.
8.6 Students demonstrate knowledge and understanding of Characterizing Distributions.
8.7 Students demonstrate knowledge and understanding of Performing Statistical Inferences.
8.8 Students can use statistical software effectively.