

# MATHEMATICS (BS)

## Bachelor of Science

The mathematics program is designed for students interested in entering careers in business and industry requiring strong analytical and problem-solving skills, or pursuing graduate degrees in mathematics or other disciplines requiring a robust background in the mathematical sciences. Three emphases are available if students wish to focus on a particular area of mathematics, which include statistics, pure, and applied mathematics. Career areas for which the mathematics major is appropriate preparation include actuarial science, computer science, operations research, and a variety of research and engineering applications. Students considering pursuing a mathematics degree should plan to begin the calculus sequence as early as possible in their college careers.

## Program Requirements

Code	Title	Credits
<b>Required Courses</b>		
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-3240	Probability and Statistics I	4
MTH-3250	Linear Algebra	4
MTH-4990	Senior Capstone in the Mathematical Sciences	4
<b>Computer Science Courses</b>		
CSC-1700	Introduction to Computer Programming	4
<b>Selected Courses</b>		
Select 12 semester hours of the following:		12
MTH-3100	Financial Engineering	
MTH-3270	Discrete Mathematics	
MTH-3300	Differential Equations and Numerical Analysis	
MTH-3320	Applied Geometry	
MTH-3505	Data Analytics I: Predictive Analytics and Data Analysis	
MTH-4240	Probability and Statistics II	
MTH-4300	Introduction to Real Analysis	
MTH-4450	Abstract Algebra	
MTH-4505	Data Analytics II: Modeling, Optimization and Statistical Programming	
<b>Total Credits</b>		<b>44</b>

## 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<sup>1</sup> 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<sup>1</sup> from the following category:*

- Discovery and Reflection

<sup>1</sup> 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

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. (Mathematical content and its application) [Communication, Critical Thinking]
  - Apply and adapt a variety of appropriate strategies to solve problems
  - Solve problems that arise in mathematics and those involving mathematics in other contexts
  - Build new mathematical knowledge through problem solving
  - Monitor and reflect on the process of mathematical problem solving
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. (Logic and reasoning) [Communication, Critical Thinking]
  - Recognize reasoning and proof as fundamental aspects of mathematics
  - Make and investigate mathematical conjectures
  - Develop and evaluate mathematical arguments and proofs
  - Select and use various types of reasoning and methods of proof
3. Knowledge of Mathematical Communication: Students will communicate mathematics clearly both in written and verbal forms. (Communication Skills) [Communication, Critical Thinking]
  - Communicate their mathematical thinking coherently and clearly to peers, faculty, and others
  - Use the language of mathematics to express ideas precisely
  - Organize mathematical thinking through communication
  - Analyze and evaluate the mathematical thinking and strategies of others
4. Knowledge of Mathematical Connections: Students will learn to draw connections among mathematical branches and related disciplines. (Interconnection between mathematical branches and related disciplines (science)) [Communication, Critical Thinking]
  - Recognize and use connections among mathematical ideas
  - Recognize and apply mathematics in contexts outside of mathematics
  - Demonstrate how mathematical ideas interconnect and build on one another to produce a coherent whole
5. Knowledge of Mathematical Representation: Students will learn to represent and utilize mathematical concepts in various ways. (Representation and utilization of mathematical concepts) [Communication, Critical Thinking]
  - Use representations to model and interpret physical, social, and mathematical phenomena
  - Create and use representations to organize, record, and communicate mathematical ideas
  - Select, apply, and translate among mathematical representations to solve problems
6. Knowledge of Technology: Students will use technology to deepen mathematical understanding and to enhance problem-solving skills. (Use of technology) [Communication, Critical Thinking]
  - 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.