BACHELOR OF ARTS (BA) DEGREE WITH A MAJOR IN COMPUTATIONAL AND APPLIED MATHEMATICS

Program Learning Outcomes for the BA Degree with a Major in Computational and Applied Mathematics

Upon completing the BA degree with a major in Computational and Applied Mathematics, students will be able to:

1. Use modern numerical methods to analyze and solve typical problems in linear systems.
2. Design and test a mathematical model, following a multi-stage process.

Requirements for the BA Degree with a Major in Computational and Applied Mathematics

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BA degree with a major in Computational and Applied Mathematics must complete:

- A minimum of 17-18 courses (49-52 credit hours), depending on course selection, to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 60 credit hours outside of major requirements.
- A minimum of 13 courses (37 credit hours) taken at the 300-level or above.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major's academic advisor, or where applicable, the department's Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major's Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Computational and Applied Mathematics</td>
<td>49-52</td>
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<tr>
<td></td>
<td>Total Credit Hours Required for the BA Degree with a Major in Computational and Applied Mathematics</td>
<td>120</td>
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Degree Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Core Requirements</td>
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<tr>
<td></td>
<td>Introductory Courses ¹</td>
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</table>

Core Requirements

Introductory Courses ¹

CAAM 210  INTRODUCTION TO ENGINEERING COMPUTATION
CAAM 335  MATRIX ANALYSIS² or CAAM 334  MATRIX ANALYSIS FOR DATA SCIENCE
MATH 101  SINGLE VARIABLE CALCULUS I³
or MATH 105  AP/OTH CREDIT IN CALCULUS I
MATH 102  SINGLE VARIABLE CALCULUS II
or MATH 106  AP/OTH CREDIT IN CALCULUS II
Select 1 from the following: ³-6

MATH 212  MULTIVARIABLE CALCULUS
MATH 221  HONORS CALCULUS III
& MATH 222  and HONORS CALCULUS IV

Intermediate Courses ⁴

CAAM 336  DIFFERENTIAL EQUATIONS IN SCIENCE AND ENGINEERING
CAAM 378  INTRODUCTION TO OPERATIONS RESEARCH AND OPTIMIZATION
MATH 302  ELEMENTS OF ANALYSIS⁵
or MATH 321  INTRODUCTION TO ANALYSIS I
or MATH 322  INTRODUCTION TO ANALYSIS II
or MATH 331  HONORS ANALYSIS

STAT 310 / ECON 307  PROBABILITY AND STATISTICS
or STAT 418  PROBABILITY

Advanced Courses ⁶

CAAM 453  NUMERICAL ANALYSIS I
CAAM 454  NUMERICAL ANALYSIS II
or CAAM 471  LINEAR AND INTEGER PROGRAMMING

Design Project ⁷

CAAM 495  SENIOR DESIGN PROJECT I
CAAM 496  SENIOR DESIGN PROJECT II

Elective Requirements ⁸

Select 2 elective courses at the 300-level or above
Select 2 elective courses at the 400-level or above

Total Credit Hours Required for the Major in Computational and Applied Mathematics ⁴⁹-⁵²

Additional Credit Hours to Complete BA Degree Requirements ⁶⁻¹¹

University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) ⁶⁰

Total Credit Hours ¹²⁰

Footnotes and Additional Information

¹ Includes coursework completed as distribution credit, FWIS, LPAP, upper-level, residency (hours taken at Rice), 60 hours outside of the major (if applicable), and any additional academic program requirements. The “hours outside of the major” requirement may include all of the above university requirements.
² The Introductory Courses requirement is typically fulfilled during the student's first two years.
³ Students may petition the Director of Undergraduate Studies to substitute MATH 354 for CAAM 335.
Highly Recommended Electives

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CAAM 415 /</td>
<td>THEORETICAL NEUROSCIENCE: FROM CELLS TO LEARNING SYSTEMS</td>
<td>3</td>
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<tr>
<td>ELEC 488 /</td>
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<tr>
<td>NEUR 415</td>
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</tr>
<tr>
<td>CAAM 423 /</td>
<td>PARTIAL DIFFERENTIAL EQUATIONS I</td>
<td>3</td>
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<tr>
<td>MATH 423</td>
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<td></td>
</tr>
<tr>
<td>CAAM 435 /</td>
<td>DYNAMICAL SYSTEMS</td>
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<td>MATH 435</td>
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<tr>
<td>CAAM 436</td>
<td>MODELING MATHEMATICAL PHYSICS</td>
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<tr>
<td>CAAM 454</td>
<td>NUMERICAL ANALYSIS II</td>
<td>3</td>
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<tr>
<td>or CAAM 471</td>
<td>LINEAR AND INTEGER PROGRAMMING</td>
<td></td>
</tr>
<tr>
<td>CAAM 519</td>
<td>COMPUTATIONAL SCIENCE I</td>
<td>3</td>
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<tr>
<td>CAAM 551</td>
<td>NUMERICAL LINEAR ALGEBRA</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 552</td>
<td>FOUNDATIONS OF FINITE ELEMENT METHODS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 560</td>
<td>OPTIMIZATION THEORY</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 564</td>
<td>NUMERICAL OPTIMIZATION</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 565</td>
<td>CONVEX OPTIMIZATION</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 570</td>
<td>GRAPH THEORY</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 574</td>
<td>COMBINATORIAL OPTIMIZATION</td>
<td>3</td>
</tr>
<tr>
<td>MATH 322</td>
<td>INTRODUCTION TO ANALYSIS II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 425</td>
<td>INTEGRATION THEORY</td>
<td>3</td>
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<tr>
<td>MATH 427</td>
<td>COMPLEX ANALYSIS</td>
<td>3</td>
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Policies for the BA Degree with a Major in Computational and Applied Mathematics

Transfer Credit

For Rice University’s policy regarding transfer credit, see Transfer Credit [https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/]. Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the major in Computational and Applied Mathematics should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program’s official transfer credit advisor) on an individual case-by-case basis.

Additional Information

For additional information, please see the Computational and Applied Mathematics website: [https://www.caam.rice.edu/](https://www.caam.rice.edu/).

Opportunities for the BA Degree with a Major in Computational and Applied Mathematics

Academic Honors

The university recognizes academic excellence achieved over an undergraduate’s academic history at Rice. For information on university honors, please see Latin Honors [https://ga.rice.edu/undergraduate-students/honors-distinctions/university/] (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work [https://ga.rice.edu/undergraduate-students/honors-distinctions/university/]. Some departments have department-specific Honors awards or designations.

Fifth-Year Master’s Degree Option for Rice Undergraduate Students

Rice students have an option to pursue the Master of Computational and Applied Mathematics (MCAAM) degree by adding an additional fifth year to their four undergraduate years of science and engineering studies.

Advanced Rice undergraduate students in good academic standing may apply to the MCAAM degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master’s degree program. A plan of study will need to be approved by the student’s undergraduate advisor and the MCAAM program director.

As part of this option and opportunity, Rice undergraduate students:

- must complete the requirements for a bachelor’s degree and the master’s degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).
- should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).
more information on this Undergraduate - Graduate Concurrent Enrollment opportunity, including specific information on the registration process can be found here (https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/).

**Additional Information**

For additional information, please see the Computational and Applied Mathematics website: https://www.caam.rice.edu/.