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. Apply fundamental mathematics to perform critical analysis of an abstracted version of a real world problem and to build a model that captures the problem's salient characteristics.
2. Design, implement, and debug a computer program to solve a computational problem.
3. Critically analyze a mathematical or computational problem, explore techniques to model and solve the problem, and use mathematical or computational methods to produce one or more solutions.
4. Interpret a model and its results and communicate the results effectively to non-experts both orally and in writing.

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 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>
</tr>
</thead>
<tbody>
<tr>
<td>2020-2021 General Announcements PDF Generated 01/12/21</td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>
Footnotes and Additional Information

*Note: University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying major requirements may additionally meet distribution requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

1 The Introductory Courses requirement is typically fulfilled during the student’s first two years.
2 Students may petition the Director of Undergraduate Studies to substitute MATH 354 for CAAM 335.
3 Students with prior experience with calculus may replace MATH 101 or MATH 105 with a 3-credit quantitative elective at the 200-level or above, as approved by a CAAM undergraduate advisor (this quantitative elective is in addition to the four electives required below). Entering students should enroll in the most advanced course commensurate with their background; advice is available from the CAAM department during Orientation Week.
4 The Intermediate Courses requirement is typically fulfilled by the end of the student’s third year.
5 Students who plan to pursue graduate studies in Computational and Applied Mathematics should take MATH 302 and MATH 321.
6 The Advanced Courses requirement is typically completed by the end of the student’s fourth year.
7 The Design Project requirement is typically completed during the student’s fourth year.
8 To fulfill the remaining Computational and Applied Mathematics major requirements, students must complete 4 additional courses (12 credit hours) at the 300-level or above. At least 2 elective courses (6 credit hours) must be from the departmental (CAAM) course offerings and may not include CAAM 480 or independent study courses (such as CAAM 490 or CAAM 491). Elective courses from other programs must be chosen from a list approved by the CAAM Undergraduate Committee. At least 2 elective courses (6 credit hours) must be at the 400-level or above. The elective courses completed must be taken for a minimum of 3 credit hours. Highly recommended electives may be found in the Highly Recommended Electives list (below).

Highly Recommended Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAM 415 / CAAM 425 / MATH 423</td>
<td>THEORETICAL NEUROSCIENCE: FROM CELLS TO LEARNING SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 488 / NEUR 415</td>
<td>DYNAMICAL SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 435 / MATH 435</td>
<td>PARTIAL DIFFERENTIAL EQUATIONS I</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 435 / MATH 435</td>
<td>MODERN FUNCTIONAL ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 435 / MATH 435</td>
<td>DYNAMICAL SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 436 / MATH 435</td>
<td>DYNAMICAL SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 436 / MATH 435</td>
<td>DYNAMICAL SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 444 / MATH 444</td>
<td>DYNAMICAL SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>or CAAM 471</td>
<td>LINEAR AND INTEGER PROGRAMMING</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 519</td>
<td>COMPLEX ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>CAAM 551</td>
<td>COMPLEX ANALYSIS</td>
<td>3</td>
</tr>
</tbody>
</table>

CAAM 552 FOUNDATIONS OF FINITE ELEMENT METHODS 3
CAAM 560 OPTIMIZATION THEORY 3
CAAM 564 NUMERICAL OPTIMIZATION 3
CAAM 565 CONVEX OPTIMIZATION 3
CAAM 570 GRAPH THEORY 3
CAAM 574 COMBINATORIAL OPTIMIZATION 3
MATH 322 INTRODUCTION TO ANALYSIS II 3
MATH 425 INTEGRATION THEORY 3
MATH 427 COMPLEX ANALYSIS 3

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/.

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/.