

# 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 ([ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements](http://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 (49-54 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 (37-39 credit hours), depending on course selection, 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 official certifier). Students and their academic advisors should identify and clearly document the courses to be taken.

### Summary

Code	Title	Credit Hours
Total Credit Hours Required for the Major in Computational and Applied Mathematics		49-54
Total Credit Hours Required for the BA Degree with a Major in Computational and Applied Mathematics		120

### Degree Requirements

Code	Title	Credit Hours
<b>Core Requirements</b>		
Introductory Courses <sup>1</sup>		
CAAM 210	INTRODUCTION TO ENGINEERING COMPUTATION	3
CAAM 335	MATRIX ANALYSIS	3

MATH 101	SINGLE VARIABLE CALCULUS I <sup>2</sup>	3
MATH 102	SINGLE VARIABLE CALCULUS II	3
Select 1 from the following:		3-6
MATH 212	MULTIVARIABLE CALCULUS	
MATH 221 & MATH 222	HONORS CALCULUS III and HONORS CALCULUS IV	
Intermediate Courses <sup>3</sup>		
CAAM 336	DIFFERENTIAL EQUATIONS IN SCIENCE AND ENGINEERING	3
CAAM 378	INTRODUCTION TO OPERATIONS RESEARCH AND OPTIMIZATION	3
MATH 321 or MATH 302	INTRODUCTION TO ANALYSIS I <sup>4</sup> ELEMENTS OF ANALYSIS	3
STAT 310 / ECON 307	PROBABILITY AND STATISTICS	3
Advanced Courses <sup>5</sup>		
CAAM 453	NUMERICAL ANALYSIS I	3
CAAM 454 or CAAM 471	NUMERICAL ANALYSIS II LINEAR AND INTEGER PROGRAMMING	3
Design Project <sup>6</sup>		
CAAM 495	SENIOR DESIGN PROJECT I	2-3
CAAM 496	SENIOR DESIGN PROJECT II	2-3
Elective Requirements <sup>7</sup>		
Students must select 4 elective courses (see below for Highly Recommended Electives list).		12
<b>Total Credit Hours Required for the Major in Computational and Applied Mathematics</b>		<b>49-54</b>
Additional Credit Hours to Complete BA Degree Requirements		6-11
University Graduation Requirements ( <a href="http://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements">ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements</a> ) <sup>*</sup>		60
Total Credit Hours		120

### Footnotes and Additional Information

\* 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.

<sup>1</sup> The Introductory Courses requirement is typically fulfilled during the student's first two years.

<sup>2</sup> Students with prior experience with calculus may replace MATH 101 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.

<sup>3</sup> The Intermediate Courses requirement is typically fulfilled by the end of the student's third year.

<sup>4</sup> Students who plan to pursue graduate studies in Computational and Applied Mathematics should take MATH 321 **and** MATH 302.

<sup>5</sup> The Advanced Courses requirement is typically completed by the end of the student's fourth year.

<sup>6</sup> The Design Project requirement is typically fulfilled during the student's fourth year.

<sup>7</sup> 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 from the following departmental course offerings: Computational and Applied Mathematics (CAAM), Mathematics (MATH) or Statistics (STAT). At least 2 elective courses (6 credit hours) from the CAAM, MATH, or STAT courses selected must be at the 400-level or above (chosen in consultation with a Computational and Applied Mathematics undergraduate advisor). 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

Code	Title	Credit Hours
CAAM 423 / MATH 423	PARTIAL DIFFERENTIAL EQUATIONS I	3
CAAM 519	COMPUTATIONAL SCIENCE I	3
CAAM 536 / CEVE 555	NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS	3
CAAM 560	OPTIMIZATION THEORY	3
CAAM 570	GRAPH THEORY	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 ([ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit](http://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: <http://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.

For additional information, please see the Computational and Applied Mathematics website: <http://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 ([ga.rice.edu/undergraduate-students/](http://ga.rice.edu/undergraduate-students/)

[honors-distinctions/university](http://ga.rice.edu/undergraduate-students/honors-distinctions/university)) (*summa cum laude*, *magna cum laude*, and *cum laude*) and Distinction in Research and Creative Work ([ga.rice.edu/undergraduate-students/honors-distinctions/university](http://ga.rice.edu/undergraduate-students/honors-distinctions/university)). Some departments have department-specific Honors awards or designations.

### Professional Master's 5th Year Degree Option for Rice Undergraduates

Rice students have an option to achieve 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 during their junior year to the MCAAM professional degree program. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking required core courses of the MCAAM degree program during their senior year. A plan of study based on their particular focus area will need to be approved by the program director. Students 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).

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