

COMPUTATIONAL AND APPLIED MATHEMATICS AND STATISTICS, OPERATIONS RESEARCH TRACK (BS IN COMPUTATIONAL AND APPLIED MATHEMATICS AND STATISTICS)

The CAMS Operations Research major gives students skills to build mathematical models of complex systems using tools introduced in various Mathematics, Business, Computer Science, and Data Science classes. The required classes build foundational skills in model building, linear programming, stochastic modeling, probability, and statistics. Elective courses include supply chain optimization, lean six sigma, machine learning, graph theory, mathematical statistics, and statistical learning.

Minimum Course Pre-requisites

Code	Title	Hours
MATH 111	Calculus I	4
MATH 131	Calculus I for Life Sciences	4
MATH 112	Calculus II	4
MATH 132	Calculus II for Life Sciences	4

Note: other prerequisite courses may be needed depending upon elective courses selected.

Major Writing Requirement

The upper-division writing requirement is satisfied by one of the following ways:

- Completion of MATH 352 Statistical Data Analysis or MATH 455 Statistical Learning or MATH 459 Topics in Statistics with a grade of C- or better, or
- CAMS 495 Honors and CAMS 496 Honors which requires the writing of an Honors thesis.

Code	Title	Hours
MATH 111	Calculus I	4
or MATH 131	Calculus I for Life Sciences	
MATH 112	Calculus II	4
or MATH 132	Calculus II for Life Sciences	

Major Mathematics Requirement

Proficiency in linear algebra and multivariable calculus at the level of MATH 211 and MATH 212 or MATH 213 is required. This is normally done by taking and passing these courses.

MATH 109	Linear Algebra	3
MATH 212	Introduction to Multivariable Calculus	3
or MATH 213	Multivariable Calculus for Science and Mathematics	

Major Computing Requirement

CSCI 141	Modern Programming Fundamentals	4
CSCI 241	Data Structures	3

Operations Research and Statistics Requirements		
BUAD 349	Overview of Operations Research with Business Applications	3
or CAMS 210	Topics in Computational and Applied Mathematics and Statistics	
MATH 323	Operations Research: Deterministic Models	3
MATH 424	Operations Research: Stochastic Models	3
MATH 351	Probability and Statistics for Scientists	3
or MATH 451	Probability	
Operations Research Electives (choose six courses for 18 credits)		18
BUAD 460	Big Data Analytics with Machine Learning	
BUAD 461	Lean Six Sigma Process Improve	
BUAD 463	Supply Chain Analytics	
BUAD 467	Predictive Analytics	
BUAD 468	Prescriptive Analytics	
MATH 332	Graph Theory and its Applications	
MATH 352	Statistical Data Analysis	
MATH 353	Advanced Statistical Data Analysis	
MATH 408	Matrix Analysis	
MATH 450	Statistical Learning with Survival Data	
MATH 452	Mathematical Statistics	
MATH 455	Statistical Learning	
CSCI 416	Fundamentals of Artificial Intelligence/Machine Learning	
CSCI 421	Database Systems	
CSCI 426	Simulation	
CSCI 446	Neural Networks for Machine Learning	
DATA 302	Databases	
Any CSCI course numbered CSCI 6X8 for undergraduate credit with appropriate approvals		
Total Hours		51

Note:

With approval from the Operations Research Track director and/or the CAMS director, students may petition to replace one elective requirement with one or more independent study or research credits, including CAMS 495 496 Honors, which must total 3 credits. Permission may be granted if the research content is considered equivalent to the elective requirement.