

MATHEMATICS, STATISTICS CONCENTRATION (BS IN MATHEMATICS)

Description of Courses

Note: A student cannot receive credit for any mathematics course that is a prerequisite for another mathematics course for which the student has already received credit. The department chair may authorize individual exceptions to this rule.

Graduate Program

See the Computational Operations Research Concentration description in the Computer Science Department section of the graduate catalog and the Applied Mathematics program in the Applied Science Department.

Mathematics Core Requirements

23-24 Credits

Major Writing Requirement

3-6 Credits

A student in any Mathematics major concentration satisfies the upper-division mathematics writing requirement in one of the following ways:

- Completion of the course MATH 400 Mathematical Connections Credits: (3) or a MATH course with COLL 400 attribute and writing requirement
- Completion of an Honors Thesis in MATH 495 Honors/MATH 496 Honors Credits: (6)
- Completion of MATH 300 Mathematical Sciences Writing Credits: (1) with a grade of C- or better, through the completion of a supervised expository individual writing project.

Options 1 and 2 above will also count as the student's COLL 400 requirement. A student should only choose option 3 in MATH 300 Mathematical Sciences Writing if that student is taking the COLL 400 requirement in another department (through an honors thesis or otherwise). For option 1 in MATH 400 Mathematical Connections, the student just needs to register for this course. For options 2 and 3, the student should first communicate with a faculty member about supervising the honors thesis or writing project. The student can then register for the course in a section corresponding to the faculty member who has agreed to supervise the student. Note that the MATH 400 Mathematical Connections option above is a standard course which meets regularly, while the other two options are individually supervised and do not have a lecture component. For students in the Pre-College Mathematics Teaching Concentration, the writing requirement must incorporate some element of the history of mathematics.

Major Computing Requirement

A student in any Mathematics major concentration must show proficiency in some high-level computer programming language at the level of CSCI 141 Modern Programming Fundamentals. This is normally done by receiving a grade of at least C- in CSCI 141 Modern Programming Fundamentals. Exceptions require the department chair's permission.

Core Course Requirements

Code	Title	Hours
MATH 109 & 109L	Linear Algebra and Computational Linear Algebra Lab	3
MATH 111 or MATH 131	Calculus I or Calculus I for Life Sciences	4
MATH 112 or MATH 132	Calculus II or Calculus II for Life Sciences	4
MATH 212 or MATH 213	Introduction to Multivariable Calculus or Multivariable Calculus for Science and Mathematics	3-4
MATH 214	Foundations of Math	3
Total Hours		17-18

Requirements for Major

The study of mathematics is motivated by its wide applicability and its intrinsic beauty. Mathematical theories often grow out of problems that appear in the physical and biological sciences, engineering, economics, finance and the social sciences. The mathematics program at William and Mary allows students to design a major based on their own interests and career goals and prepares students for post-baccalaureate employment and for further study of mathematical sciences and related disciplines. There are four concentrations within the major - the Standard Concentration, the Applied Mathematics Concentration, the Pre-College Mathematics Teaching Concentration, and the Statistics Concentration. Study options include applied and pure mathematics, operations research, statistics, and teaching at the elementary or secondary level. Students can also design elective programs needed for careers in actuarial science and industrial mathematics, for interdisciplinary work in fields such as economics, business and social sciences, or for graduate studies.

Information about the mathematics major, career choices and appropriate courses of study is available from the department's academic advisors and the Office of Career Services as well as informally from the mathematics faculty.

Enriching the Mathematics Major

The requirements described below are the minimal requirements for the mathematics major, and most mathematics majors take courses beyond that minimum. Students wishing to obtain a deeper understanding of mathematics (e.g., in preparation for graduate school) should take additional upper-division courses. Second courses to make year-long sequences in linear algebra, analysis, abstract algebra, numerical analysis, statistics, or operations research are particularly recommended.

The Statistics Concentration

This concentration is designed for students who want to pursue applications of statistics or a double major in statistics and another discipline.

The major requirements of the Statistics Concentration are:

Code	Title	Hours
A Core Consisting of		
MATH 109 & 109L	Linear Algebra and Computational Linear Algebra Lab	4
MATH 111 or MATH 131	Calculus I or Calculus I for Life Sciences	4

MATH 112	Calculus II	4
or MATH 132	Calculus II for Life Sciences	
MATH 212	Introduction to Multivariable Calculus	3-4
or MATH 213	Multivariable Calculus for Science and Mathematics	
MATH 214	Foundations of Math	3
Major Writing Requirement ¹		1-6
Select one of the following:		
MATH 400	Mathematical Connections	
MATH 495 & MATH 496	Honors and Honors (with C- or higher)	
MATH 300	Mathematical Sciences Writing (with C- or higher)	
Computer Proficiency Requirement		
CSCI 141	Modern Programming Fundamentals (with C- or higher)	4
CSCI 241	Data Structures	3
or MATH 240	Programming for the Mathematical Sciences	
Additional Requirements		
Select one of the following:		3
MATH 307	Abstract Algebra	
MATH 307H	Honors Abstract Algebra	
MATH 311	Elementary Analysis	
MATH 311H	Honors Elementary Analysis	
MATH 451	Probability	3
MATH 452	Mathematical Statistics	3
Select one of the following:		12-15
Option 1:		
At least four distinct three-credit mathematics courses at the 300-400 level, with at least two courses chosen from the elective courses listed below (for a total of at least seven upper-division courses) ²		
Option 2:		
MATH 495	Honors	
MATH 496	Honors	
At least three distinct three-credit mathematics courses at the 300-400 level, with at least two chosen from the elective courses listed below (for a total of at least eight upper-division courses).		
Total Hours		47-56

¹ MATH 400 or MATH 495/496 will also count as the student's COLL 400 requirement. For MATH 400, the student just needs to register for this course.

A student should only choose MATH 300, if that student is taking the COLL 400 requirement in another department (through an honors thesis or otherwise). For MATH 300 or MATH 495/496, the student should first communicate with a faculty member about supervising the honors thesis or writing project. The student can then register for the course in a section corresponding to the faculty member who has agreed to supervise the student.

Note that the MATH 400 option above is a standard course which meets regularly, while the other two options are individually supervised and do not have a lecture component.

² (Excluding MATH 495 Honors- MATH 496 Honors)

Statistics Elective Courses

Code	Title	Hours
MATH 352	Statistical Data Analysis	3
MATH 353	Advanced Statistical Data Analysis	3
MATH 424	Operations Research: Stochastic Models	3
MATH 450	Statistical Learning with Survival Data	3
MATH 455	Statistical Learning	3
MATH 459	Topics in Statistics	1-3
CSCI 688	Topics in Computational Operations Research (Linear Regression)	3
CSCI 688	Topics in Computational Operations Research (Design of Experiments)	3

Advanced Standing

Entering students may receive credit for mathematics courses through AP or IB and transfer credit. In each of the mathematics major concentrations, well-prepared students may begin their studies beyond MATH 111 Calculus I without receiving credit for earlier courses listed in the core requirements section of each concentration. Each skipped course for which the student does not receive credit must be replaced by an additional three-credit 300-400 level mathematics course.