

MATHEMATICS, PRE-COLLEGE MATHEMATICS TEACHING 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.

In addition, students in the Applied Mathematics Concentration must demonstrate proficiency at the level of CSCI 241 Data Structures or MATH 240 Programming for the Mathematical Sciences. This is normally done by taking and passing one of these courses.

Core Course Requirements

Code	Title	Hours
MATH 109 & 109L	Linear Algebra and Computational Linear Algebra Lab	3
MATH 111 or MATH 131	Calculus I Calculus I for Life Sciences	4
MATH 112 or MATH 132	Calculus II Calculus II for Life Sciences	4
MATH 212 or MATH 213	Introduction to Multivariable Calculus 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 Pre-College Mathematics Teaching Concentration

This concentration is designed for students seeking certification as pre-college mathematics teachers. The major requirements of this 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 Calculus I for Life Sciences	4
MATH 112 or MATH 132	Calculus II Calculus II for Life Sciences	4
MATH 212 or MATH 213	Introduction to Multivariable Calculus Multivariable Calculus for Science and Mathematics	3-4
MATH 214	Foundations of Math	3
Major Writing Requirement ¹		1-6
Select one of the following:		
MATH 300	Mathematical Sciences Writing (with C- or higher)	
MATH 400	Mathematical Connections	
MATH 495 & MATH 496	Honors and Honors (with C- or higher)	
Computer Proficiency Requirements		
CSCI 141	Modern Programming Fundamentals	4
Additional Requirements		
MATH 302	Ordinary Differential Equations	3
MATH 307 or MATH 307H	Abstract Algebra Honors Abstract Algebra	3
MATH 316	Euclidean and Non-Euclidean Geometry	3
MATH 323	Operations Research: Deterministic Models	3
MATH 351	Probability and Statistics for Scientists	3
MATH 412	Intro Number Theory	3
Select at least one additional three-credit upper-division mathematics course ²		3
EDUC 301 or EDUC 310	Educational Psychology Social, Philosophical, Cultural & Historical Foundations of American Education	3
Total Hours		47-53

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. For students in the Pre-College Mathematics Teaching Concentration, the writing requirement must incorporate some element of the history of mathematics.

² (unless MATH 495 Honors-MATH 496 Honors Honors is completed as the writing requirement), not including MATH 400 Mathematical Connections or a MATH course counted as the COLL 400 requirement.

Probability-MATH 452 Mathematical Statistics may replace MATH 351 Probability and Statistics for Scientists (along with the additional upper-division course). Mathematics courses from other institutions (other than Study Abroad), taken after matriculation at William & Mary, cannot transfer for credit towards a Mathematics major. Note that in the major writing requirement discussed above, some element of the history of mathematics must be incorporated. Additional education courses and a student teaching requirement are needed for a degree in Secondary Mathematics Education. It is important for students to contact the School of Education very early in order to ensure the completion of all requirements.

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.

Additional Information

The department chair may authorize variations in the requirements for this concentration for individual students. In particular, MATH 451