

MATHEMATICAL SCIENCES, MASTER OF SCIENCE (M.S.) WITH A CONCENTRATION IN STATISTICS

Program goal

The Department of Mathematics and Applied Mathematics and the Department of Statistical Sciences and Operations Research jointly offer the M.S. in Mathematical Sciences.

The mission of the Department of Statistical Sciences and Operations Research is to offer a strong undergraduate and graduate education, with an increasing focus on the development of cross-disciplinary efforts that will prepare students for real-world applications and stimulating employment and career opportunities.

The program offers maximum flexibility by allowing students, in consultation with their graduate committees, to design a course of study that will best develop competence in those areas most relevant to their scholarly and professional objectives. Students may obtain a designation on their transcripts indicating that their graduate study has emphasized the mathematics concentration by completing the requirements that are listed here. A student who has not satisfied the requirements for one of the program concentrations offered, but who has otherwise fulfilled all the requirements for a master's degree, will be awarded a degree of Master of Science in Mathematical Sciences without any specialization.

Student learning outcomes

1. Students will demonstrate a comprehensive understanding of basic statistical concepts, probability and inference, general linear modeling, calculus, and linear algebra.
2. Students will know how to select appropriate samples and conduct appropriate experimental data collection methods.
3. Students will be able to perform appropriate analysis of data, including knowledge of the assumptions associated with the procedures and how to determine the appropriate procedure to use.
4. Students will be able to use statistical software packages to solve various problems.
5. Students will know how to clearly and concisely present technical information in writing and through oral presentations.

VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the Graduate School website (<http://www.graduate.vcu.edu/>) and academic regulations in individual school and department publications and

on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

Visit the **academic regulations section** for additional information on academic regulations for graduate students. (<http://bulletin.vcu.edu/academic-regs/>)

Degree candidacy requirements

A graduate student admitted to a program or concentration requiring a final research project, work of art, thesis or dissertation, must qualify for continuing master's or doctoral status according to the degree candidacy requirements of the student's graduate program. Admission to degree candidacy, if applicable, is a formal statement by the graduate student's faculty regarding the student's academic achievements and the student's readiness to proceed to the final research phase of the degree program.

Graduate students and program directors should refer to the following degree candidacy policy as published in the VCU Graduate Bulletin for complete information and instructions.

Visit the **academic regulations section** for additional information on degree candidacy requirements. (<http://bulletin.vcu.edu/academic-regs/grad/candidacy/>)

Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the **academic regulations section** for additional information on graduation requirements. (<http://bulletin.vcu.edu/academic-regs/grad/graduation-info/>)

Apply online today. (<https://www.vcu.edu/admissions/apply/graduate/>)

Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
M.S.	Fall	Mar 1	GRE-General
	Spring	Oct 1	TOEFL (International students only)

In addition to the general admission requirements of the VCU Graduate School (<http://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/>), the following requirements represent the minimum acceptable standards for admission:

1. Thirty credit hours in undergraduate mathematical sciences, computer science or related areas of which at least 18 credit hours must represent upper-level courses
2. Three letters of recommendation pertaining to the student's potential ability as a graduate student in mathematical sciences

Provisional admission may be granted when deficiencies exist. These deficiencies must be removed by the end of the first year of residence, or its part-time equivalent, when the student's application will be re-examined. Courses that are remedial or designed to remove deficiencies will not be accepted for credit hours toward the fulfillment of the course requirements for the master's degree.

Degree requirements

In addition to the VCU Graduate School graduation requirements (<http://bulletin.vcu.edu/academic-regs/grad/graduation-info/>), students are required to complete course work in core and elective courses and to meet the following requirements.

1. Credit hour requirements: Students in the M.S. in Mathematical Sciences program are required to earn a minimum of 30 graduate-level credit hours. At least one-half of the credit hours presented for graduation must be at the 600 level or higher.
2. Other requirements: All students must pass two comprehensive examinations: statistical theory (covering STAT 513 and STAT 514) and statistical application (covering STAT 546, STAT 642 and STAT 643). All students will be given two attempts to pass each exam.

Curriculum requirements

Course	Title	Hours
Concentration core courses		
SSOR 690	Research and Communications Seminar	3
STAT/BIOS 513	Mathematical Statistics I ¹	3
STAT/BIOS 514	Mathematical Statistics II ¹	3
STAT 546	Linear Models	3
STAT 642	Design and Analysis of Experiments I	3
STAT 643	Applied Linear Regression	3
Additional courses		
Statistics electives (Choose courses from list one below.)		6
Statistics and allied fields electives (Choose courses from list two below.)		6
Total Hours		30

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If student previously received credit for STAT 513/BIOS 513 and/or STAT 514/BIOS 514 or their equivalents, then one or two other statistics courses must be taken in their place.

The minimum total of graduate credit hours required for this degree is 30.

List one: recommended electives in statistics

Course	Title	Hours
500-, 600- or 700-level STAT courses, except the following:		
STAT 508	Introduction to Social Statistics	
STAT 543	Statistical Methods I	
STAT 544	Statistical Methods II	
STAT 608	Statistics for Social Research	

List two: recommended electives in statistics and allied fields

Course	Title	Hours
500-, 600- or 700-level MATH, OPER, STAT or SYSM courses, except the following:		

MATH 592	Teaching and Communicating Mathematics
MATH 661	Number and Operations
MATH 662	Geometry and Measurement
MATH 663	Functions and Algebra
MATH 664	Statistics and Probability
MATH 665	Rational Numbers and Proportional Reasoning
MATH 667	Functions and Algebra II
MATH 668	Modeling With Mathematics
MATH 690	Research Seminar
MATH 697	Directed Research
MATH 698	Thesis
OPER 696	Applied Project
OPER 697	Directed Research
OPER 698	Thesis
STAT 508	Introduction to Social Statistics
STAT 543	Statistical Methods I
STAT 544	Statistical Methods II
STAT 608	Statistics for Social Research
SYSM 681	Systems Seminar I
SYSM 682	Systems Seminar II
SYSM 683	Systems Seminar III

Accelerated opportunities

The department offers opportunities for qualified undergraduate students to earn both an undergraduate and graduate degree in a minimum of five years by completing approved graduate courses during the senior year of their undergraduate program. **See the program page in the Undergraduate Bulletin** for details.

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Program website: ssor.vcu.edu (<http://ssor.vcu.edu>)