

# STATISTICAL SCIENCE, PHD

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The PhD in Statistical Science represents the highest academic attainment for a statistician and, as such, requires in-depth knowledge of modern statistical theory and practice. The degree program is a hybrid of theory, computation, and data analysis; and students are expected to be proficient in all three. Current research areas of key department faculty in the program include biostatistics, modern statistical methodology, big data, data analytics, statistical or machine learning, applied probability, statistical networks, statistical computing, statistical imaging, bioinformatics, financial statistics, Bayesian statistics, data confidentiality, and statistics interfaced with other disciplines.

## Admissions & Policies

### Admissions

We welcome applications to our PhD program from students with a bachelor's or a master's degree earned with a minimum 3.5 GPA on a 4.0 scale in the fields of Mathematics, Statistics, Computer Science, Engineering, or any other discipline (including social science) with training in mathematics and at least one course in advanced calculus, MATH 315 Advanced Calculus I or equivalent, successfully completed with a grade of B or better.

Students entering with a master's degree may receive a reduction of credit (see AP.6.5.2. (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-5-2>)). Students should have completed coursework equivalent to STAT 544 Applied Probability, STAT 554 Applied Statistics I and STAT 652 Statistical Inference. If not, students may be required to take them as part of the degree program (with a reduced credit reduction for their MS degree).

Specific application deadlines and requirements (<https://www2.gmu.edu/admissions-aid/apply-now/how-apply/graduate/>) are available through the Office of Graduate Admissions. Students can find additional details on the Statistics Department Webpage (<https://statistics.gmu.edu/academics/phd-statistical-science/>).

### Policies

For policies governing all graduate programs, see AP.6 Graduate Policies (<https://catalog.gmu.edu/policies/academic/graduate-policies/>).

### Reduction of Credit

Students must complete a minimum of 72 graduate credits, which may be reduced by a maximum of 24 credits with a master's degree in statistics, mathematics, or similar discipline, or by 30 credits with a Master's degree from the George Mason University Department of Statistics. Reduction of credit requires the approval of the Director(s) of the PhD program in Statistical Science or designee and the dean or designee of the school. They determine whether the credits are eligible for reduction of credit and applicable to the degree program and the number of credits to be reduced.

## Requirements

### Degree Requirements

Total credits: 72

The 72 hours of required doctoral-level credits typically consist of 48 credits of regular coursework and 24 credits of dissertation research. The following degree plan is based on a student who receives a 24 credit reduction. Students who receive more or less than a 24 credit reduction should consult with their advisor.

### Doctoral Coursework

Students are required to complete a minimum of 24 credits of advanced emphasis coursework, including six core courses:

Code	Title	Credits
STAT 662	Multivariate Analysis and Statistical Learning	3
STAT 676	Linear Models and Advanced Regression Modeling	3
STAT 778	Statistical Computing	3
STAT 971	Probability Theory	3
STAT 972	Mathematical Statistics I	3
STAT 973	Mathematical Statistics II	3
	The remaining two courses are selected and approved by the Dissertation Committee and the Director(s) of the PhD program in Statistical Science and should be numbered 600 or above. <sup>1</sup>	6
Total Credits		24

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STAT 652 and STAT 654 do not count toward advanced emphasis coursework, if a student has received a 24 credit reduction.

### Qualifying Exams

Written qualifying exams will be taken in the following areas:

- Applied Statistics
- Theoretical Statistics

The exam on Applied Statistics will cover content from three applied courses, including STAT 662 Multivariate Analysis and Statistical Learning, STAT 676 Linear Models and Advanced Regression Modeling and STAT 778 Statistical Computing. The exam on Theoretical Statistics will cover content from three fundamental courses, including STAT 971 Probability Theory, STAT 972 Mathematical Statistics I, and STAT 973 Mathematical Statistics II.

Qualifying exams are offered in August and January. Full-time students who enter the Ph.D. program with a master's degree must take the qualifying exams in August following the year of enrollment. Full-time students who enter the Ph.D. program with a bachelor's degree as their highest degree must take the exams within two years of enrollment. Part-time students must take the qualifying exams within the first three years of enrollment in the program. The outcomes of the qualifying exams include Pass, Conditional Pass, and Fail. Students who receive a Conditional Pass for an exam are required to meet specific condition(s)

as determined by the exam review committee(s) and the graduate program director. If the condition is met by the student prior to the next round of exams, the Conditional Pass is viewed as Pass; Otherwise, it is equivalent to Fail. Students who do not pass both exams in two consecutive exam periods are terminated from the program.

## Dissertation Research

In order to advance to candidacy, students must complete all coursework, pass the qualifying exams, and defend a dissertation proposal.

Code	Title	Credits
Select 24 credits from the following:		24
STAT 990	Dissertation Topic Presentation (required)	
STAT 998	Doctoral Dissertation Proposal	
STAT 999	Doctoral Dissertation (must complete a minimum of 12 credits)	
Total Credits		24

## Dissertation Committee Selection

Following successfully passing the qualifying exams, students should identify a dissertation director who is willing to work with them and together assemble a Dissertation Committee. The chair of the Dissertation Committee must be a member of the graduate faculty with a regular appointment in the Department of Statistics, and will typically be the dissertation director. The Dissertation Committee consists of a chair, two members of the graduate faculty who hold regular appointments in the Department of Statistics, and an external member; see AP.6.10.5 Dissertation Committee (<http://catalog.gmu.edu/policies/academic/graduate-policies/#text>). The Dissertation Committee must be approved by the Director(s) of the PhD program in Statistical Science.

In the PhD in Statistical Science program, the Dissertation Committee, chaired by the dissertation advisor, administers, reviews and determines the outcome of doctoral degree milestones including the dissertation proposal defense, the dissertation predefense, and final defense. The Dissertation advisor/committee may also require a PhD candidate to meet requirements for academic research publications and other academically-relevant activities in addition to the minimum formal degree requirements articulated in the university catalog.

Student disagreements with any committee evaluation must be reviewed by the committee, with the Department Chairperson as the last arbiter of the appeal. The Department Chairperson's role is to ensure that no procedural irregularities have occurred. The decision of the Department Chairperson is final and is not subject to appeal. See AP.6.10 (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-10>). of the University Catalog.

## Advancement to Candidacy

Admission to candidacy is acquired on completion of a dissertation proposal examination. A dissertation proposal examination consists of:

- A proposal manuscript containing a problem statement, a review of related scholarly work, preliminary results, and an outline of the work to be conducted.
- An oral proposal presentation and a subsequent examination by the Dissertation Committee on aspects within the scope of the proposal that pertain to principles and questions fundamental to the field of Statistics. The presentation and examination are attended by the

Dissertation Committee and the Director(s) of the PhD program in Statistical Science.

A student who fails the dissertation proposal examination may take it a second time, within six months. If the student fails a second time, the student is terminated from the program.

## Doctoral Defense

The dissertation defense serves as the student's final examination and is conducted by the Dissertation Committee. Both the pre-defense and final defense are scheduled on approval of a written request to the department chair; see AP.6.10.8 Doctoral Defense. (<http://catalog.gmu.edu/policies/academic/graduate-policies/#text>)