

BIOSTATISTICS, MS

Banner Code: EC-MS-BSTA

Phone: 703-993-3645

Email: statistics@gmu.edu

Website: statistics.gmu.edu

The MS in Biostatistics will allow students to specialize in the design and analysis of health-related and biological studies, while maintaining the rigor and technical training of the Statistical Science master's program.

In this degree, students will take a statistics core and a "bio" core, involving courses in public health, biology, and clinical medicine (including ethics). It also involves a research core which allows students to solve real data problems in the biological or health area and collaborate with other scientists in an interdisciplinary team. Finally, students will choose from electives in bioinformatics, global and community health, or targeted statistics courses.

This graduate degree prepares students for analyzing difficult data specific to biology and health. The program, with its research core, will also be sufficiently rigorous for students who wish to pursue a PhD in Biostatistics.

Admissions & Policies

Admissions

In addition to satisfying general admission requirements for graduate study, all applicants are expected to have basic computer literacy. They must hold a bachelor's degree from an accredited institution in a field that includes one year coursework in calculus, and one semester coursework in matrix or linear algebra. Applicants with degrees in such fields as mathematics, statistics, and some engineering programs usually meet these requirements. For applicants with degrees in other fields, these requirements are normally satisfied if students have successfully completed courses equivalent to the listed Mason courses.

Note that coursework taken to correct deficiencies in undergraduate preparation is not counted toward the degree.

Code	Title	Credits
MATH 113	Analytic Geometry and Calculus I (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
MATH 114	Analytic Geometry and Calculus II	4
MATH 203 or MATH 321	Linear Algebra Abstract Algebra	3

Specific application deadlines and requirements (https://admissions.gmu.edu/grad/application-deadlines-and-requirements/?academicUnit=VS&_ga=1.107632321.273102085.1480697294) are available through the Office of Graduate Admissions.

Requirements

Degree Requirements

Total credits: 30

In addition to meeting general requirements that apply to master's degrees at Mason, all students must complete the 21-credit core requirements for the degree. A grade of "B-" or better is required in all 500-level statistics core courses. Students build on these core requirements by choosing 9 credits of electives.

Core Courses

Statistics Core

The Statistics core provides the basic probability, statistical analysis techniques, and statistical modeling tools that all biostatisticians must know, and provides a basis for higher level elective coursework.

Code	Title	Credits
STAT 544	Applied Probability	3
STAT 554	Applied Statistics I	3
STAT 654	Applied Statistics II	3
Total Credits		9

Bio Core

The Bio core is designed to provide the biological background necessary for biostatisticians. These courses offer preparation in the areas of public health and epidemiology (GCH 712 Introduction to Epidemiology), bioengineering (BENG 501 Bioengineering Research Methods, BENG 538 Medical Imaging) as well as bioinformatics (BINF 630 Bioinformatics Methods). In addition, this portion of the core curriculum ensures that students are trained in the statistical techniques required for clinical medicine, and includes material on ethics in research (STAT 560 Biostatistical Methods).

Code	Title	Credits
GCH 712 or BENG 501	Introduction to Epidemiology Bioengineering Research Methods	3
BINF 630 or BENG 538	Bioinformatics Methods Medical Imaging	3
STAT 560	Biostatistical Methods	3
Total Credits		9

Research Core

The Research core has been designed to assist students in the development of the requisite skills for careers in consulting or research. These courses will allow students to consult directly with biologists and medical and public health scientists on real data problems and provide opportunities to write reports and give oral presentations.

Code	Title	Credits
STAT 634 or STAT 798	Case Studies in Data Analysis Master's Research Project	3
Total Credits		3

Electives

The electives labeled STAT are specifically chosen from the department's master's-level electives to include techniques that are particularly important for biostatisticians.

Code	Title	Credits
Select three electives from the following:		9
GCH 782	International Research Ethics and Methods	
GCH 806	Advanced Multivariate Statistics and Data Analysis for Health Care Research	
STAT 652	Statistical Inference	
STAT 657	Nonparametric Statistics	
STAT 662	Multivariate Analysis and Statistical Learning	
STAT 663	Statistical Graphics and Data Visualization	
STAT 665	Categorical Data Analysis	
STAT 668	Survival Analysis	
STAT 672	Statistical Learning and Data Analytics	
STAT 760	Advanced Biostatistical Methods	
STAT 773	Statistical Methods for Longitudinal Data Analysis	
STAT 778	Statistical Computing	
BENG 526	Neural Engineering	
BENG 537	Medical Image Processing	
BENG 541	Biomaterials	
BENG 550	Advanced Biomechanics	
Total Credits		9

Accelerated Master's

Bioengineering, BS/Biostatistics, Accelerated MS

Overview:

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program (BAM) and obtain the Bioengineering, BS (<http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/bioengineering/bioengineering-bs/>) and the Biostatistics, MS in an accelerated time-frame after satisfactory completion of a minimum of 146 credits.

Admitted students are able to use up to 6 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (<https://catalog.gmu.edu/policies/academic/graduate-policies/>).

BAM Pathway Admission Requirements:

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and

Bachelor's/Accelerated Master's Degree policies.

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.0.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific prerequisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the Biostatistics, MS program if they meet the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- Completion of Mason's requirements for undergraduate degree conferral (graduation) and completion of application for graduation.
- An overall GPA of at least 3.0.
- Completion of the following Mason courses each with a grade of C or better:

Code	Title	Credits
MATH 213	Analytic Geometry and Calculus III	3
BENG 320	Bioengineering Signals and Systems	3

Accelerated Pathway Requirements:

To maintain the integrity and quality of both the undergraduate and graduate degree programs, students complete all credits that satisfy requirements for the BS and MS programs. Students can take up to six credits of the following approved graduate level courses listed below as part of their undergraduate degree that will also be applied to the graduate degree.

Code	Title	Credits
BENG 501	Bioengineering Research Methods	3
STAT 554	Applied Statistics I	3
STAT 560	Biostatistical Methods	3
STAT 663	Statistical Graphics and Data Exploration I	3

All graduate course prerequisites must be completed prior to enrollment.

Each graduate course must be completed with a grade of B or better to apply toward the MS program. The graduate courses may be counted as Technical Electives toward Bioengineering, BS (<http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/bioengineering/bioengineering-bs/>) program requirements, with approval of the Bioengineering Department undergraduate coordinator.

While still in undergraduate status, a maximum of six additional graduate credits may be taken as reserve graduate credit and applied to the master's program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degrees policies.

Degree Conferral:

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form (<https://>

registrar.gmu.edu/forms/). At the completion of MS requirements, a master's degree is conferred.

Statistics, BS/Biostatistics, Accelerated MS

Overview:

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program (BAM) and obtain the Statistics, BS (<http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistics-bs/>) and the Biostatistics, MS in an accelerated time-frame after satisfactory completion of a minimum of 138 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>).

BAM Pathway Admission Requirements:

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/Accelerated Master's Degree policies.

Students will be considered for admission into the BAM Pathway after completion of 60 credits with an overall GPA of 3.0.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific prerequisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the Biostatistics, MS program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- Completion of Mason's requirements for undergraduate degree conferral (graduation) and completion of application for graduation.
- An overall GPA of 3.00.
- Completion of the following Mason courses each with a grade of C or better:

Code	Title	Credits
MATH 114	Analytic Geometry and Calculus II	4
MATH 203	Linear Algebra	3
STAT 334	Introduction to Probability Models and Simulation	3
or STAT 346	Probability for Engineers	
STAT 354	Probability and Statistics for Engineers and Scientists II	3

or STAT 360	Introduction to Statistical Practice II	
STAT 362	Introduction to Computer Statistical Packages	3

Accelerated Pathway Requirements:

To maintain the integrity and quality of both the undergraduate and graduate degree programs, students complete all credits that satisfy requirements for the BS and MS program with up to twelve credits overlap chosen from the following graduate courses:

Code	Title	Credits
STAT 544	Applied Probability ¹	3
STAT 554	Applied Statistics I ¹	3
STAT 560	Biostatistical Methods ²	3
STAT 663	Statistical Graphics and Data Exploration I ¹	3

¹ May be counted as a Technical Elective towards the BS program requirements.

² Replaces the corresponding undergraduate version STAT 460 as a Statistical Elective. Credit may not be received for both STAT 460 and STAT 560.

All graduate course prerequisites must be completed prior to enrollment. Each graduate course must be completed with a grade of B or better to apply toward the MS degree.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master's program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degrees (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) policies.

Degree Conferral:

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and Graduate Recruitment and Enrollment Services. At the completion of MS requirements, a master's degree is conferred.