

BACHELOR OF SCIENCE WITH A MAJOR IN MATHEMATICS

REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under Columbian College of Arts and Sciences, Undergraduate Programs (<http://bulletin.gwu.edu/arts-sciences/#degreeregulationstext>).

Program-specific curriculum:

Code	Title	Credits
Required		
MATH 1231	Single-Variable Calculus I (or the equivalent)	
MATH 1232	Single-Variable Calculus II	
MATH 2185	Linear Algebra I for Math Majors *	
or MATH 2184 & MATH 3125	Linear Algebra I and Linear Algebra II	
MATH 2233	Multivariable Calculus	
MATH 2971	Introduction to Mathematical Reasoning	
One course (3 credits) from the following:		
CSCI 1011	Introduction to Programming with Java	
CSCI 1012	Introduction to Programming with Python	
CSCI 1041	Introduction to FORTRAN Programming	
CSCI 1111	Introduction to Software Development	
CSCI 1121	Introduction to C Programming	
CSCI 1131	Introduction to Programming with C	
For students in the pure mathematics concentration, an alternative course may substituted for the CSCI course with the approval of the department.		

*Of the two options for linear algebra, MATH 2185 is preferred.

Concentration requirement

All students must complete requirements for one of the following three concentrations:

Pure mathematics concentration

Code	Title	Credits
Required		
MATH 4121	Introduction to Abstract Algebra I	
MATH 4239	Real Analysis I	
Two courses (6 credits) from the following:		
MATH 3125	Linear Algebra II	
MATH 3257	Introduction to Complex Variables	
MATH 3806	Introduction to Topology	
MATH 4122	Introduction to Abstract Algebra II	
MATH 4240	Real Analysis II	
Five additional mathematics (MATH) courses (15 credits) numbered 3000 or above. For students who complete the bachelor of science requirements for a major in astronomy and astrophysics, biology, biophysics, chemistry, economics, physics, statistics, finance, or any major in SEAS, this requirement is reduced to three additional MATH courses (9 credits) numbered 3000 or above.		

Applied mathematics concentration

Code	Title	Credits
Required		
MATH 3342	Ordinary Differential Equations	
MATH 3343	Partial Differential Equations	
MATH 3553	Introduction to Numerical Analysis	
MATH 3359	Introduction to Mathematical Modeling	
MATH 4239	Real Analysis I	
Four additional mathematics (MATH) courses (12 credits) numbered 3000 or above. For students who complete the bachelor of science requirements for a major in astronomy and astrophysics, biology, biophysics, chemistry, economics, physics, statistics, finance, or any major in SEAS, this requirement is reduced to two additional MATH courses (6 credits) numbered 3000 or above.		

Interdisciplinary mathematics concentration

Code	Title	Credits
Required		
MATH 3342	Ordinary Differential Equations	
MATH 3553	Introduction to Numerical Analysis	

MATH 3359 Introduction to Mathematical Modeling

Six additional mathematics (MATH) courses (18 credits) numbered 3000 or above. For students who complete the bachelor of science requirements for a major in astronomy and astrophysics, biology, biophysics, chemistry, economics, physics, statistics, finance, or any major in SEAS, this requirement is reduced to four additional mathematics MATH courses (12 credits) numbered 3000 or above.

Minor or second major requirement: students in the interdisciplinary concentration must complete an approved minor or second major in a field in which mathematics is applied. The pre-approved fields are astronomy and astrophysics, biology, bioinformatics, biophysics, chemistry, economics, physics, statistics, finance, and all fields in the School of Engineering and Applied Science.

GENERAL EDUCATION

In addition to the University General Education Requirement (<http://bulletin.gwu.edu/university-regulations/general-education/#text>), undergraduate students in Columbian College must complete a further, College-specific general education curriculum—Perspective, Analysis, Communication, or G-PAC. Together with the University General Education Requirement, G-PAC engages students in active intellectual inquiry across the liberal arts. Students achieve a set of learning outcomes that enhance their analytical skills, develop their communication competencies, and invite them to participate as responsible citizens who are attentive to issues of culture, diversity, and privilege.

G-PAC approved courses, Dean's Seminars, and Sophomore Colloquia that may be available for registration are listed on the CCAS Advising website (<https://advising.columbian.gwu.edu/general-education-courses/>).

Coursework for the University General Education Requirement is distributed as follows:

- Writing—one approved course in university writing and two approved writing in the disciplines (WID) courses.
- Humanities—one approved course in the humanities that involves critical or creative thinking skills.
- Mathematics or Statistics—one approved course in either mathematics or statistics.
- Natural or Physical Science—one approved laboratory course that employs the process of scientific inquiry.
- Social Sciences—two approved courses in the social sciences.

Coursework for the Columbian College general education curriculum is distributed as follows:

- Arts—one approved course in the arts that involves the study or creation of artwork based on an understanding or interpretation of artistic traditions or knowledge of art in a contemporary context.

- Global or Cross-Cultural Perspective—one approved course that analyzes the ways in which institutions, practices, and problems transcend national and regional boundaries.
- Humanities—one approved course in the humanities that involves critical thinking skills (in addition to the one course in this category required by the University General Education Requirement).
- Local or Civic Engagement—one approved course that develops the values, ethics, disciplines, and commitment to pursue responsible public action.
- Natural or Physical Science—one approved laboratory course that employs the process of scientific inquiry (in addition to the one course in this category required by the University General Education Requirement).
- Oral Communication—one course in oral communication.

Certain courses are approved to fulfill the requirement in more than one of these categories.

Courses taken in fulfillment of G-PAC also may be counted toward majors or minors. Transfer courses taken prior to, but not after, admission to George Washington University may count toward the University General Education Requirement and G-PAC, if those transfer courses are equivalent to GW courses that have been approved by the University and the College.

SPECIAL HONORS

To graduate with Special Honors, a student must meet the general requirements stated under University Regulations; maintain a grade-point average of at least 3.5 in courses in the major; complete 3 credits of MATH 4995 Reading and Research in addition to the other required courses in the major; and present an oral defense of a senior thesis prepared for MATH 4995 Reading and Research.