

# BACHELOR OF SCIENCE WITH A MAJOR IN DATA SCIENCE (STEM)

## ADMISSIONS

For information about the admission process, including deadlines, visit the Office of Undergraduate Admissions website (<https://undergraduate.admissions.gwu.edu/>). Applications can be submitted via the Common Application (<https://go.gwu.edu/commonapp/>).

Supporting documents not submitted online should be mailed to:

Office of Undergraduate Admissions  
The George Washington University  
800 21st St NW Suite 100  
Washington, DC 20052

For questions visit [undergraduate.admissions.gwu.edu/contact-us](http://undergraduate.admissions.gwu.edu/contact-us) (<http://undergraduate.admissions.gwu.edu/contact-us/>).

This is a STEM designated program.

## GENERAL EDUCATION

In addition to the University General Education Requirement (<http://bulletin.gwu.edu/university-regulations/general-education/>), undergraduate students in Columbian College must complete a further, College-specific general education curriculum—Perspective, Analysis, Communication (G-PAC) (<https://advising.columbian.gwu.edu/general-education-curriculum-gpac/>) as well as the course CCAS 1001 First-Year Experience. 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.

**Coursework (<http://bulletin.gwu.edu/university-regulations/general-education/#generaleducationtext>) for the University General Education Requirement is distributed as follows:**

- One course in critical thinking in the humanities.
- Two courses in critical thinking, quantitative reasoning, or scientific reasoning in the social sciences.
- One course that has an approved oral communication component.
- One course in quantitative reasoning (must be in mathematics or statistics).
- One course in scientific reasoning (must be in natural and/or physical laboratory sciences).
- UW 1020 (<https://bulletin.gwu.edu/search/?P=UW%201020>) University Writing (4 credits).

- After successful completion of UW 1020, 6 credits distributed over at least two writing in the discipline (WID) courses taken in separate semesters. WID courses are designated by a "W" appended to the course number.

**Coursework for the CCAS G-PAC requirement is distributed as follows:**

- Arts—one approved arts course 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.
- 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 additional 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).
- Humanities—one additional approved humanities course that involves critical thinking skills (in addition to the one course in this category required by the University General Education Requirement).
- CCAS 1001 First-Year Experience

**Certain courses are approved to fulfill GPAC requirements in more than one category.**

Courses taken in fulfillment of G-PAC requirements may also 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.

Lists of approved courses in the above categories are included on each undergraduate major's (<http://bulletin.gwu.edu/arts-sciences/#majorstext>) page in this Bulletin.

## 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>).

Curriculum requirements for the major:

Code	Title	Credits
<b>Prerequisite courses</b>		
15 credits		
CSCI 1012	Introduction to Programming with Python	

MATH 1231	Single-Variable Calculus I
or MATH 1221	Calculus with Precalculus II
MATH 1232	Single-Variable Calculus II
MATH 2184	Linear Algebra I
STAT 1051	Introduction to Business and Economic Statistics
or STAT 1053	Introduction to Statistics in Social Science
or STAT 1111	Business and Economic Statistics I
or STAT 1127	Statistics for the Biological Sciences

### Core courses

18 credits

DATS 1001	Data Science for All
DATS 2101	Ethical Life in a Digital World
DATS 2102	Data Visualization for Data Science
DATS 2103	Data Mining for Data Science
DATS 2104	Data Warehousing for Data Science
DATS 4001	Data Science Capstone

### Domain concentration

Students complete a minimum of 9 credits in a 3-course domain. Focus area options are astronomy and astrophysics; biology–biodiversity and global change; biology–biotechnology; data journalism; economics; geospatial data science; mathematical modeling; physics; and science, technology, and society.

Students can petition to substitute a second major or a minor in another discipline for the domain.

### Astronomy and astrophysics domain

#### Prerequisites

PHYS 1011	General Physics I
or PHYS 1021	University Physics I
PHYS 1012	General Physics II
or PHYS 1022	University Physics II

#### Required

ASTR 2121	Introduction to Modern Astrophysics
ASTR 3141	Data Analysis in Astrophysics

One course selected from the following:

ASTR 2131	Astrophysics Seminar
ASTR 3161	Space Astrophysics

### Biology–biodiversity and global change domain

#### Prerequisites

BISC 1111	Introductory Biology: Cells and Molecules
BISC 1112	Introductory Biology: The Biology of Organisms

#### Required

BISC 2450	Organic Evolution
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Two courses selected from the following:

BISC 2010	Global Change Biology
BISC 2332	Comparative Vertebrate Anatomy
BISC 2333	Evolution and Extinction of Dinosaurs
BISC 2454	General Ecology
BISC 3454	Marine Ecology
BISC 3458	Plant Comparative Structure and Function
BISC 3460	Conservation Biology

### Biology–biotechnology domain

#### Prerequisites

BISC 1111	Introductory Biology: Cells and Molecules
BISC 1112	Introductory Biology: The Biology of Organisms

#### Required

BISC 2207	Genetics
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Two courses selected from the following:

BISC 2202	Cell Biology
BISC 2213	Biology of Cancer
BISC 3209	Molecular Biology
PUBH 3201	Introduction to Bioinformatics

### Economics domain

#### Required

ECON 2104	Intermediate Macroeconomic Theory: A Mathematical Approach
or ECON 2102	Intermediate Macroeconomic Theory

ECON 2123 Introduction to Econometrics

One course selected from the following:

ECON 3105 Economic Forecasting

ECON 3142 Labor Economics

ECON 4198W Proseminar in Economics

### Data journalism domain

Prerequisite

SMPA 2110W Introduction to News Writing and Reporting

Required

SMPA 2111W Advanced News Reporting

SMPA 3230 Reporting in the Digital Age

One course selected from the following:

SMPA 3233 Photojournalism

SMPA 3234 Editing and Design for Print and Web

SMPA 3235W Broadcast News Writing

SMPA 3240W Washington Reporting

SMPA 3241W Campaign Reporting

SMPA 3242 Investigative Reporting

SMPA 3246 Specialized Reporting

### Geospatial data science domain

Required

GEOG 2104 Introduction to Cartography and GIS

GEOG 3105 Techniques of Spatial Analysis

One course selected from the following:

GEOG 3106 Intermediate Geographic Information Systems

GEOG 3107 Introduction to Remote Sensing

GEOG 3196 Special Topics in Techniques

### Mathematics domain

Prerequisite

MATH 2233 Multivariable Calculus

Required

Three courses selected from the following:

MATH 3553 Introduction to Numerical Analysis

MATH 3359 Introduction to Mathematical Modeling

MATH 3410 Mathematics of Finance

MATH 3411 Stochastic Calculus Methods in Finance

MATH 3632 Introduction to Graph Theory

MATH 3740 Computational Complexity

MATH 4981 Seminar: Topics in Mathematics

STAT 4157 Introduction to Mathematical Statistics I

STAT 4181 Applied Time Series Analysis

### Physics domain

Prerequisites

MATH 2233 Multivariable Calculus

MATH 3342 Ordinary Differential Equations

PHYS 1021 University Physics I

or PHYS 1025 University Physics I with Biological Applications

PHYS 1022 University Physics II

or PHYS 1026 University Physics II with Biological Applications

Required:

PHYS 2023 Modern Physics

PHYS 3161 Mechanics

PHYS 3181 Computational Physics

### Science, technology, and society domain

Required

Three courses selected from the following:

AMST 2610 Science, Technology, and Politics in Modern America

or HIST 2610 Science, Technology, and Politics in Modern America

AMST 2620 Human Mind and Artificial Intelligence

AMST 2680W Hashtag America

ANTH 2502 Anthropology of Science and Technology: Twenty-First Century Brave New Worlds

ANTH 3531 Methods in Sociocultural Anthropology

ANTH 3691 Special Topics in Linguistic Anthropology

SMPA 3476 Media, Technology, and Culture

SMPA 3477 Information Technology and Politics