BACHELOR OF SCIENCE WITH A MAJOR IN BIOLOGY (STEM)

Biological sciences explore the science of life, from biomolecules to ecosystems. Courses and ongoing research programs are focused in three general areas: cell and molecular biology, ecology, and evolution and systematics. In research laboratories, students and faculty members work together on projects that range from dinosaur evolution through an investigation of how misfolded proteins interfere with insulin production. Many departmental faculty members have working relationships with scientists in surrounding education and federal institutions, and the program has a collaboration of more than 100 years standing with the Smithsonian Institution National Museum of Natural History.

This is a STEM designated program.

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/).

REQUIREMENTS

The following requirements must be fulfilled:

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

Program-specific curriculum:

Code	Title	Credits
Required		
BISC 1111	Introductory Biology: Cells and Molecules	
BISC 1112	Introductory Biology: The Biology of Organisms	
BISC 2202	Cell Biology	
BISC 2207	Genetics	
BISC 2450	Organic Evolution	
CHEM 1111	General Chemistry I	
BISC 2452	Animal Behavior	
or BISC 2454	General Ecology	
or BISC 3460	Conservation Biology	
CHEM 1112	General Chemistry II	
PHYS 1011	General Physics I	
or PHYS 1021	University Physics I	
or PHYS 1025	University Physics I with Biological Applications	

Concentration requirement

Students must fulfill the requirements of one of the three concentrations shown below. All concentrations require a minimum of 18 credits in upper-level Biology (BISC) courses.

Laboratory course requirements*

At least three BISC courses numbered 2000 or above must have a laboratory component, either built into the course or as a separate course number. Students who complete 1 credit of BISC 4171 or BISC 4171W, Undergraduate Research, may count this experience toward one of their laboratory requirements. A maximum of 6 credits of BISC 4171 or BISC 4171W may be applied toward degree requirements.

Honors thesis

Students who qualify based on academic performance are strongly encouraged to develop an honors thesis based on their research experience.

Code	Title	Credits
Laboratory Courses		
BISC 2208	Genetics Laboratory	
BISC 2216	Scanning Electron Microscopy Laboratory	
BISC 2224	Biology of Horticulture	
BISC 2332	Comparative Vertebrate Anatomy	
BISC 2335	Insect Biology Lab	
BISC 2337	Introductory Microbiology Laboratory	
BISC 2339	Parasitology	
BISC 2453	Animal Behavior Laboratory	
BISC 2456	General Ecology Laboratory	
BISC 3123	Human Physiology Lab	

BISC 3208	Molecular Biology Laboratory
BISC 3211	Nanobiotechnology Laboratory
BISC 3215	Genome Editing Laboratory
BISC 3453	Plant Comparative Structure and Function Lab
BISC 3455	Marine Ecology Laboratory
BISC 3459	Field Biology
BISC 3462	Plant-Animal Interactions Laboratory
BISC 4171	Undergraduate Research
or BISC 4171W	Undergraduate Research
BISC 4234	Microbial Genomics Laboratory

Biology electives

Code	Title	Credits
Systems category		
BISC 2208	Genetics Laboratory [1]	
BISC 2213	Biology of Cancer	
BISC 2220	Developmental Neurobiology	
BISC 2320	Neural Circuits and Behavior	
BISC 3122	Human Physiology	
BISC 3123	Human Physiology Lab [1]	
BISC 3165	Biochemistry I	
BISC 3167		
or BISC 3262	Biochemistry Laboratory	
BISC 3208	Molecular Biology Laboratory [1]	
BISC 3209	Molecular Biology	
BISC 3210	Nanobiotechnology	
BISC 3211	Nanobiotechnology Laboratory [1]	
BISC 3212	Immunology	
BISC 3214	Developmental Biology	
BISC 3215	Genome Editing Laboratory	
BISC 3263	Special Topics in Biochemistry	
BISC 3320	Human Neurobiology	
BISC 4132	Advanced Cellular-Molecular Biology	
BISC 4212	Virology and Antiviral Immunity	
BISC 6205	Current Topics in Cell and Molecular Biology	
BISC 6218	Innate Immunity	
BISC 6219	Host-Microbe Interactions	
PUBH 3202	Introduction to Genomics	
Organisms category		
BISC 2000	Biodiversity Studies in a Changing Planet	
BISC 2305	Plant Biology	
BISC 2331	Insect Biology	
BISC 2335	Insect Biology Lab [1]	
BISC 2332	Comparative Vertebrate Anatomy [1]	
BISC 2333	Evolution and Extinction of Dinosaurs	
BISC 2334W	Integrative Biology of Fishes	
BISC 2336	Introductory Microbiology	
BISC 2337	Introductory Microbiology Laboratory [1]	
BISC 2339	Parasitology [1]	
BISC 2401	Biodiversity in A Changing World	
BISC 6215	Vertebrate Phylogeny [1]	
BISC 6249	Seminar: Developmental Biology	
Evolution, ecology, and environment category		
BISC 2010	Global Change Biology	
BISC 2224	Biology of Horticulture	
BISC 2451	History of Life	
BISC 2452	Animal Behavior	
BISC 2453	Animal Behavior Laboratory [1]	
BISC 2454	General Ecology	
BISC 2456	General Ecology Laboratory [1,2]	
BISC 3450	Evolutionary Medicine	
or BISC 3450W	Evolutionary Medicine	
BISC 3453	Plant Comparative Structure and Function Lab [1,2]	

BISC 3454	Marine Ecology
BISC 3455	Marine Ecology Laboratory [2]
BISC 3458	Plant Comparative Structure and Function
BISC 3458	Plant Comparative Structure and Function
BISC 3459	Field Biology [1,2]
BISC 3460	Conservation Biology [3]
or BISC 3460W	Conservation Biology
BISC 3461	Plant-Animal Interactions
BISC 3462	Plant-Animal Interactions Laboratory [1,2]
BISC 3464	Ecology and Evolution of Societies
BISC 6210	Methods of Study of Evolution
BISC 6211	Biogeography and Speciation
BISC 6243	Seminar: Ecology
Quantitative category	
BISC 2585	Biometry
MATH 1231	Single-Variable Calculus I
or MATH 1220 & MATH 1221	Calculus with Precalculus I and Calculus with Precalculus II
MATH 1232	Single-Variable Calculus II
PUBH 3201	Introduction to Bioinformatics
or BISC 2584	Introduction to Bioinformatics
STAT 1127	Statistics for the Biological Sciences

[1]Laboratory course.

[2]Field component.

[3]If not taken as a required course option.

Concentrations

General Biology Concentration

Code	Title	Credits
Required		
CHEM 2151 & CHEM 2152	Organic Chemistry I and Organic Chemistry II	
CHEM 2153 & CHEM 2154	Organic Chemistry Laboratory I and Organic Chemistry Laboratory II	
CHEM 3165	Biochemistry I	
or BISC 3261	Introductory Medical Biochemistry	
Electives		
At least one 3-credit course from each of the four elective category listed below for a total of 12 credits, in addition to the courses satisfying the core course requirements. These 12 credits count toward the 18 required upper-level biology credits.		

Cellular and Molecular Biology Concentration

Code	Title	Credits
Required		
BISC 3209 & BISC 3208	Molecular Biology and Molecular Biology Laboratory	
CHEM 2151 & CHEM 2153	Organic Chemistry I and Organic Chemistry Laboratory I	
CHEM 2152 & CHEM 2154	Organic Chemistry II and Organic Chemistry Laboratory II	
BISC 3261	Introductory Medical Biochemistry	
or CHEM 3165	Biochemistry I	
Electives		
In addition to the courses satisfying the core course requirements, at least one 3-credit course from each of the four elective categories listed below for a total of 12 credits. These 12 credits count toward the 18 required upper-level biology credits.		

Ecology, Evolution, and Environment Concentration

Code	Title	Credits
Required		
In addition to the courses satisfying the core course requirements, at least one 3-credit course from both the systems electives and organism electives lists; at least 6 credits from the evolution, ecology, and environment electives list, including one course with a field component; and 6 credits from the quantitative electives list, including at least one statistics course.		

GENERAL EDUCATION

In addition to the University General Education Requirement (https://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://bulletin.gwu.edu/arts-sciences/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 **(**https://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 (https://bulletin.gwu.edu/arts-sciences/#majorstext) page in this Bulletin.

SPECIAL HONORS

In addition to the general requirements stated under University Regulations, in order to be considered for graduation with special honors, a student must maintain a cumulative 3.5 grade-point average in biological sciences courses and at least a 3.0 cumulative overall grade-point average. Students who meet these criteria and wish to pursue special honors must complete an approved research project under faculty direction.

COMBINED PROGRAM

Combined program

- Dual Bachelor of Science with a major in biology and Master of Science in the field of biological sciences (https://bulletin.gwu.edu/arts-sciences/biological-sciences/combined-bs-ms/)