BIOLOGY, BS

Banner Code: SC-BS-BIOL

Academic Advising

1200 Exploratory Hall
Fairfax Campus

Website: https://science.gmu.edu/academics/departments-units/biology/biology-bs

The Bachelor of Science in Biology provides a sound liberal arts education with substantial experience in quantitative and analytical thought, along with preparation for related professions. The program provides the strong background necessary for not only graduate study in the life sciences, but also enables students to develop careers in a wide variety of disciplines, including teaching, environmental management, microbiology, molecular biology, biotechnology, genetics, wildlife management, fisheries biology, and marine science. Furthermore, our curriculum prepares students for careers in the health sciences including medicine, dentistry, veterinary science, and related allied health disciplines.

Admissions & Policies

Admissions

University-wide admissions policies can be found in Undergraduate Admissions Policies (https://catalog.gmu.edu/admissions/undergraduate-policies/).

To apply for this program, please complete the George Mason University Admissions Application (https://www2.gmu.edu/admissions-aid/apply-now/).

Policies

Students must fulfill all Requirements for Bachelor's Degrees (https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2), including the Mason Core (https://catalog.gmu.edu/mason-core/).

Important information and departmental policies are listed in the Department of Biology (https://catalog.gmu.edu/colleges-schools/science/biology/).

BIOL 308 Foundations of Ecology and Evolution (Mason Core) (https://catalog.gmu.edu/mason-core/) or MLAB 300 Science Writing (Mason Core) (https://catalog.gmu.edu/mason-core/) meet the writing intensive requirement for this major.

For policies governing all undergraduate degrees, see AP.5 Undergraduate Policies (https://catalog.gmu.edu/policies/academic/undergraduate-policies/).

Important Program Requirements

- Students may not apply more than 4 credits of lower-level BIOL prefixed courses (or equivalent transfer credit at the 100 to 200-level) toward the BS without Concentration electives if taken before the successful completion of BIOL 213 Cell Structure and Function.
- Biology majors must earn a minimum grade of 'C' in all Core Courses under the "Biology Core Courses" header. A grade of 'C' or better must be earned in BIOL 213 Cell Structure and Function in order to advance to other core requirements.
- Students may **not** count BIOL 124 Human Anatomy and Physiology I and/or BIOL 125 Human Anatomy and Physiology II toward any Biology, BS requirement.
- Students may count BIOL 303 Animal Biology and/or BIOL 304 Plant Biology as biology electives.
- At least 44 credits must be in biology core and elective coursework.
- BIOL 493 Honors Research in Biology, BIOL 495 Directed Studies in Biology, and BIOL 497 Special Problems in Biology do not satisfy the requirements of the BS degree which state that students must complete at least two upper division courses that include a laboratory. The courses do, however, count as non-laboratory electives.
  - The total limit for BIOL 493 Honors Research in Biology, BIOL 495 Directed Studies in Biology, and BIOL 497 Special Problems in Biology combined is 6 credits toward the 44 credits required for the BS.

Several optional concentrations are available; details on each can be found in the Requirements tab.

Teacher Licensure

Students majoring in biology who wish to pursue a career teaching secondary school may consider applying for the Secondary Education - Biology (6-12) Undergraduate Certificate (https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/secondary-education-biology-6-12-undergraduate-certificate/) offered by the College of Education and Human Development (https://catalog.gmu.edu/colleges-schools/education-human-development/) as an option in seeking an initial Virginia teaching license.

Other routes to licensure include the Biology, BA or BS/Curriculum and Instruction, Accelerated MEd (https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/curriculum-instruction-med/#acceleratedmasterstext) (Secondary Education Biology Concentration) or select traditional Master's programs. Please contact the College of Education and Human Development (https://catalog.gmu.edu/colleges-schools/education-human-development/) for more information.

Requirements

Degree Requirements

Total credits: minimum 120

Students should refer to the Admissions & Policies tab for specific policies related to this program.

Students must complete the program with a minimum GPA of 2.00.

All students must complete the Biology Core Courses and the Supporting Core Courses listed below. Students then elect to complete the BS degree either with a concentration or without a concentration.

Biology Core Courses

Code	Title	Credits
BIOL 102	Introductory Biology I-Survey of Biodiversity and Ecology (Mason Core) (https://catalog.gmu.edu/mason-core/)	4
BIOL 103 & BIOL 105	Introductory Biology II-Survey of Cell and Molecular Biology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Introductory Biology II Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/)	4
BIOL 213	Cell Structure and Function	4
BIOL 308	Foundations of Ecology and Evolution (Mason Core) (https://catalog.gmu.edu/mason-core/) [1]	4-5
or BIOL 300	BioDiversity	
BIOL 311	General Genetics	4
Total Credits		**20-21**

[1] Fulfills writing intensive requirement.

Supporting Core Courses

Code	Title	Credits
Chemistry		
CHEM 211 & CHEM 213	General Chemistry I (Mason Core) (https://catalog.gmu.edu/mason-core/) and General Chemistry Laboratory I (Mason Core) (https://catalog.gmu.edu/mason-core/)	4
CHEM 212 & CHEM 214	General Chemistry II (Mason Core) (https://catalog.gmu.edu/mason-core/) and General Chemistry Laboratory II (Mason Core) (https://catalog.gmu.edu/mason-core/)	4
CHEM 313 & CHEM 315	Organic Chemistry I and Organic Chemistry Lab I	5
Physics		
Select from one of the following sequences:		8
PHYS 160 & PHYS 161 & PHYS 260 & PHYS 261	University Physics I (Mason Core) (https://catalog.gmu.edu/mason-core/) and University Physics I Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/) and University Physics II (Mason Core) (https://catalog.gmu.edu/mason-core/) and University Physics II Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/)	
PHYS 243 & PHYS 244 & PHYS 245 & PHYS 246	College Physics I (Mason Core) (https://catalog.gmu.edu/mason-core/) and College Physics I Lab (Mason Core) (https://catalog.gmu.edu/mason-core/) and College Physics II (Mason Core) (https://catalog.gmu.edu/mason-core/) and College Physics II Lab (Mason Core) (https://catalog.gmu.edu/mason-core/)	
Mathematics		
BIOL 214	Biostatistics for Biology Majors	4
Select one from the following: [1]		3-4
MATH 111	Linear Mathematical Modeling (Mason Core) (https://catalog.gmu.edu/mason-core/)	
MATH 113	Analytic Geometry and Calculus I (Mason Core) (https://catalog.gmu.edu/mason-core/)	
MATH 123 & MATH 124	Calculus with Algebra/Trigonometry, Part A and Calculus with Algebra/Trigonometry, Part B (Mason Core) (https://catalog.gmu.edu/mason-core/)	
Computer Science		**3**
CDS 130	Computing for Scientists (Mason Core) (https://catalog.gmu.edu/mason-core/) [2]	
Any course(s) that fulfill the Mason Core: Information Technology Requirement (https://catalog.gmu.edu/mason-core/#information-technology)		
Total Credits		**31-32**

[1] Students expecting to enter a health professions school or a graduate program are strongly encouraged to complete MATH 113 Analytic Geometry and Calculus I (Mason Core) (https://catalog.gmu.edu/mason-core/).

[2] Recommended by the Department of Biology.

BS without Concentration

This program provides a sound liberal arts education with substantial experience in quantitative and analytical thought. The BS without Concentration option provides students with the flexibility to explore and prepare for a career in a wide variety of disciplines, including: teaching, health sciences, environmental management, microbiology, molecular biology, biotechnology, genetics, wildlife management, fisheries biology, and marine science.

Students pursuing the BS without Concentration option must complete the curriculum requirements listed below:

Code	Title	Credits
Biology Electives		
Select 20 credits from the following: [1]		20
Non-lab Courses		
BIOL 101	Biology Freshman Seminar	
BIOL 177	Introductory Ecology for Environmental Engineers	
BIOL 302	Alternative Careers in Biology	
BIOL 305	Biology of Microorganisms	
BIOL 309	Oceanography	

or EVPP 309	Oceanography
or GEOL 309	Oceanography
BIOL 312	Biostatistics for Bioinformatics
BIOL 318	Conservation Biology
BIOL 322	Developmental Biology
BIOL 326	Animal Physiology
BIOL 331	Invertebrate Zoology
BIOL 334	Vertebrate Paleontology
or GEOL 334	Vertebrate Paleontology (Mason Core) (https://catalog.gmu.edu/mason-core/)
BIOL 336	Invertebrate Paleontology
or GEOL 312	Invertebrate Paleontology
BIOL 344	Plant Diversity and Evolution
BIOL 345	Plant Ecology
BIOL 350	Freshwater Ecosystems
or EVPP 350	Freshwater Ecosystems
BIOL 377	Applied Ecology
or EVPP 377	Applied Ecology
BIOL 382	Introduction to Virology
BIOL 385	Biotechnology and Genetic Engineering
BIOL 404	Medical Microbiology
BIOL 408	Mushrooms, Molds and Society
or EVPP 408	Mushrooms, Molds and Society
BIOL 412	Phage Genomics
BIOL 413	Histotechniques
BIOL 417	Selected Topics in Molecular and Cellular Biology
BIOL 420	Vaccines
BIOL 421	Genetics of Human Diseases
BIOL 423	Biology of Obesity and Weight Loss
BIOL 425	Human Physiology
BIOL 426	Mechanisms of Aging
BIOL 427	Conservation Medicine
or EVPP 427	Conservation Medicine
BIOL 429	Biological Foundations of Pharmacology
BIOL 432	Clinical Applications in Human Physiology
BIOL 435	Selected Topics in Biology
BIOL 443	Tropical Ecology
BIOL 449	Marine Ecology
BIOL 450	Marine Conservation
BIOL 452	Immunology
BIOL 454	Marine Mammal Biology and Conservation
BIOL 457	Reproductive Strategies
BIOL 460	Infectious Diseases Wildlife
or EVPP 460	Infectious Diseases of Wildlife
BIOL 472	Introductory Animal Behavior
BIOL 482	Introduction to Molecular Genetics
BIOL 483	General Biochemistry
EVPP 419	Marine Mammal Biology and Conservation
EVPP 421	Marine Conservation
EVPP 449	Marine Ecology
EVPP 451	Fungi and Ecosystems
CONS 472	Introduction to Animal Behavior
CONS 480	Primate Behavior, Ecology and Conservation
Upper-level Laboratory Courses	
BIOL 303	Animal Biology
BIOL 304	Plant Biology
BIOL 305 & BIOL 306	Biology of Microorganisms and Biology of Microorganisms Laboratory [2]
BIOL 322 & BIOL 323	Developmental Biology and Environmental Effects on Embryonic Development
BIOL 377 & BIOL 378	Applied Ecology and Applied Ecology Laboratory
BIOL 385 & BIOL 486	Biotechnology and Genetic Engineering and Molecular Biology and Biotechnology Laboratory
BIOL 401	Phage Discovery
BIOL 405	Microbial Genetics
BIOL 407	Microbial Diversity
BIOL 430	Advanced Human Anatomy and Physiology I
BIOL 431	Advanced Human Anatomy and Physiology II
BIOL 437	Ornithology
or EVPP 437	Ornithology
BIOL 438	Mammalogy
or EVPP 438	Mammalogy
BIOL 439	Herpetology
or EVPP 439	Herpetology
BIOL 440	Field Biology
or CONS 440	Ecology Field Skills
BIOL 443 & BIOL 444	Tropical Ecology and Tropical Ecology Laboratory
BIOL 452 & BIOL 453	Immunology and Immunology Laboratory
BIOL 465	Histology
BIOL 472 & BIOL 473	Introductory Animal Behavior and Introductory Laboratory in Animal Behavior
BIOL 485	Cell Signaling Laboratory
EVPP 441	Protist Diversity and Ecology
CONS 332	Insect Biology
CONS 402	Applied Conservation
CONS 404	Biodiversity Monitoring
CONS 405	Landscape and Macrosystems Ecology
CONS 406	Small Population Management
Additional Science Courses	
Students are encouraged to consult with a biology faculty advisor to determine which option (A, B, or C) best meets their career goals. Select one from the following options	3-8
Option A:	
CHEM 314 & CHEM 318	Organic Chemistry II and Organic Chemistry Lab II

Option B:	
One 3 credit chemistry course at the 300 or 400-level (not CHEM 314) (https://catalog.gmu.edu/courses/chem/)	
Option C:	
GEOL 101 & GEOL 103	Physical Geology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Physical Geology Lab (Mason Core) (https://catalog.gmu.edu/mason-core/) (Natural Science courses)
GEOL 102 & GEOL 104	Historical Geology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Historical Geology Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/)
Total Credits	**23-28**

[1] Of which, at least 15 credits must be upper division, and at least two of the upper division courses must include a laboratory.

[2] This lecture and lab combination can be taken together or separately.

Concentration in Bioinformatics (BNF)

The highly interdisciplinary field of bioinformatics has emerged as a powerful modern science. There is a great demand for undergraduate and graduate-level trained individuals with a background in bioinformatics in industry as well as in academia.

Code	Title	Credits
Computer Science		**3**
CDS 230	Modeling and Simulation I	
Bioinformatics		**6**
BINF 401	Bioinformatics and Computational Biology I	
BINF 402	Bioinformatics and Computational Biology II	
Biology		**14**
BIOL 305 & BIOL 306	Biology of Microorganisms and Biology of Microorganisms Laboratory	
BIOL 312	Biostatistics for Bioinformatics	
BIOL 401	Phage Discovery	
BIOL 412	Phage Genomics	
Additional Science Courses		
Select one from the following options: [1]		3-8
Option A:		
CHEM 314 & CHEM 318	Organic Chemistry II and Organic Chemistry Lab II	
Option B:		
One 3 credit chemistry course at the 300 or 400-level (https://catalog.gmu.edu/courses/chem/) [2]		
Option C:		
GEOL 101 & GEOL 103	Physical Geology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Physical Geology Lab (Mason Core) (https://catalog.gmu.edu/mason-core/)	
GEOL 102 & GEOL 104	Historical Geology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Historical Geology Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/)	
Total Credits		**26-31**

[1] Students are encouraged to consult with a biology advisor to determine which option (A, B, or C) best meets their career goals.

[2] CHEM 314 Organic Chemistry II does not fulfill this requirement.

Concentration in Biopsychology (BP)

The biopsychology concentration consists of a selection of courses designed to address the needs and interest of students who wish to study biology in more depth while simultaneously exploring psychology and neurobiology. This concentration will help prepare students for the MCAT section related to psychology and provide veterinary students with a background in animal learning/behavior.

Code	Title	Credits
Biopsychology Courses		
BIOL 430	Advanced Human Anatomy and Physiology I	4
BIOL 431	Advanced Human Anatomy and Physiology II	4
PSYC 372	Biopsychology	3
PSYC 373	Biopsychology Laboratory	2
Additional Psychology/Neuroscience Course		
Select 3-4 credits from the following:		3-4
PSYC 304	Principles of Learning (Mason Core) (https://catalog.gmu.edu/mason-core/)	
PSYC 376	Brain and Behavior	
PSYC 406	Psychology of Communication (Mason Core) (https://catalog.gmu.edu/mason-core/)	
NEUR 327	Cellular Neuroscience	
NEUR 335	Developmental and Systems Neuroscience	
Additional Biology Courses		
Select 3-4 credits, not previously taken, from the Biology Electives listed under the BS without Concentration option (above).		3-4
Additional Chemistry Courses		
Select one from the following options: [1]		3-5
Option A:		
CHEM 314 & CHEM 318	Organic Chemistry II and Organic Chemistry Lab II	
Option B:		
One chemistry course at the 300 or 400-level (https://catalog.gmu.edu/courses/chem/) [2]		
Total Credits		**22-26**

[1] Students are encouraged to consult with a biology faculty advisor to determine which option best meets their career goals.

[2] CHEM 314 Organic Chemistry II alone does not fulfill this requirement.

Concentration in Biotechnology and Molecular Biology (BTMB)

The biotechnology and molecular biology concentration consists of a selection of courses that provide essential skills to students who seek employment in the field or wish to include an applied component in their undergraduate training in biology.

Code	Title	Credits
Biotechnology Courses		
BIOL 305 & BIOL 306	Biology of Microorganisms and Biology of Microorganisms Laboratory	4
BIOL 385	Biotechnology and Genetic Engineering	3
BIOL 483	General Biochemistry	4
Additional Biology Courses		
Select 9-10 credits from the following, at least one of the courses must include a laboratory:		9-10
Laboratory Courses:		
BIOL 405	Microbial Genetics	
BIOL 452 & BIOL 453	Immunology and Immunology Laboratory	
BIOL 465	Histology	
BIOL 486	Molecular Biology and Biotechnology Laboratory	
Non-laboratory Courses:		
BIOL 314	Introduction to Research Design and Analysis	
BIOL 382	Introduction to Virology	
BIOL 401	Phage Discovery	
BIOL 411	Advanced General Genetics	
BIOL 412	Phage Genomics	
BIOL 417	Selected Topics in Molecular and Cellular Biology [1]	
BIOL 418	Current Topics in Microbiology [1]	
BIOL 420	Vaccines	
BIOL 421	Genetics of Human Diseases	
BIOL 422	Stem Cell Biology and Regenerative Medicine	
BIOL 482	Introduction to Molecular Genetics	
BIOL 484	Cell Signaling and Disease	
BIOL 497	Special Problems in Biology [1]	
Additional Chemistry Courses		
CHEM 314 & CHEM 318	Organic Chemistry II and Organic Chemistry Lab II	5
Total Credits		**25-26**

[1] Registration for BIOL 417 Selected Topics in Molecular and Cellular Biology, BIOL 418 Current Topics in Microbiology, or BIOL 497 Special Problems in Biology is subject to approval by the Director of Undergraduate Studies and the Chair of the Department of Biology.

Concentration in Environmental and Conservation Biology (ESCB)

This concentration is offered to students seeking a biology degree that focuses on ecology and organismal biology and prepares them for graduate work or employment in environmental and conservation fields, such as natural resources management, fisheries, forestry, water quality management, aquatic and wetland ecology, and conservation biology. The concentration is staffed and supported by the Department of Environmental Science and Policy (https://catalog.gmu.edu/colleges-schools/science/environmental-policy/).

Code	Title	Credits
Environmental and Conservation Biology		
BIOL 318	Conservation Biology	3
BIOL 377	Applied Ecology	3
Biology Electives		
Select 14 credits from the following: [1]		14
BIOL 309	Oceanography	
or EVPP 309	Oceanography	
or GEOL 309	Oceanography	
BIOL 314	Introduction to Research Design and Analysis	
BIOL 326	Animal Physiology	
BIOL 331	Invertebrate Zoology	
BIOL 332	Insect Biology	
BIOL 344	Plant Diversity and Evolution	
BIOL 345	Plant Ecology	
BIOL 350	Freshwater Ecosystems	
or EVPP 350	Freshwater Ecosystems	
BIOL 351	Conservation Seminar	
BIOL 352	Monitoring and Assessment of Biodiversity	
BIOL 355	Ecological Engineering and Ecosystem Restoration	
BIOL 357	Ecology Field Skills	
BIOL 378	Applied Ecology Laboratory	
BIOL 379	RS: Ecological Sustainability (Mason Core) (https://catalog.gmu.edu/mason-core/)	
BIOL 437	Ornithology	
or EVPP 437	Ornithology	
BIOL 438	Mammalogy	
or EVPP 438	Mammalogy	
BIOL 439	Herpetology	
or EVPP 439	Herpetology	
BIOL 440	Field Biology	
BIOL 443	Tropical Ecology	
BIOL 446	Ecological and Evolutionary Physiology	
BIOL 449	Marine Ecology	
BIOL 450	Marine Conservation	
BIOL 454	Marine Mammal Biology and Conservation	
BIOL 457	Reproductive Strategies	
BIOL 459	Fungi and Ecosystems	
BIOL 468	Vertebrate Natural History	
BIOL 472 & BIOL 473	Introductory Animal Behavior and Introductory Laboratory in Animal Behavior	
BIOL 480	The Diversity of Fishes	

BIOL 497	Special Problems in Biology [4]	
Additional Science Courses		
Select one from the following options: [2]		3-8
Option A:		
CHEM 314 & CHEM 318	Organic Chemistry II and Organic Chemistry Lab II	
Option B:		
One chemistry course at the 300 or 400-level (https://catalog.gmu.edu/courses/chem/) [3]		
Option C:		
GEOL 101 & GEOL 103	Physical Geology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Physical Geology Lab (Mason Core) (https://catalog.gmu.edu/mason-core/)	
GEOL 102 & GEOL 104	Historical Geology (Mason Core) (https://catalog.gmu.edu/mason-core/) and Historical Geology Laboratory (Mason Core) (https://catalog.gmu.edu/mason-core/)	
Total Credits		**23-28**

1 Of which, two courses must be selected from the list above and must have either: 2 laboratory courses or 1 laboratory course and 1 field course (consult with an advisor for guidance).

2 Students are encouraged to consult with a biology faculty advisor to determine which option best meets their career goals.

3 CHEM 314 Organic Chemistry II alone does not fulfill this requirement.

4 Registration in BIOL 497 Special Problems in Biology is subject to approval by the Director of Undergraduate Studies and the Chairman of the Department of Biology.

Concentration in Microbiology (MIB)

This concentration offers lecture and laboratory courses in microbiology to prepare students for employment or advanced study in microbial genetics, physiology, diversity, and related fields.

Code	Title	Credits
Microbiology Courses		
BIOL 305 & BIOL 306	Biology of Microorganisms and Biology of Microorganisms Laboratory	4
BIOL 405	Microbial Genetics	4
BIOL 407	Microbial Diversity	4
Biology Electives		
Select 11 credits from the following:		11
BIOL 314	Introduction to Research Design and Analysis	
BIOL 382	Introduction to Virology	
BIOL 385	Biotechnology and Genetic Engineering	
BIOL 401	Phage Discovery	
BIOL 404	Medical Microbiology	
BIOL 412	Phage Genomics	
BIOL 418	Current Topics in Microbiology	
BIOL 420	Vaccines	
BIOL 452	Immunology	
BIOL 453	Immunology Laboratory	
BIOL 459	Fungi and Ecosystems	
BIOL 483	General Biochemistry	
Additional Chemistry Courses		
CHEM 314 & CHEM 318	Organic Chemistry II and Organic Chemistry Lab II	5
Total Credits		**28**

Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires additional credits (specific credit counts by concentration are shown below), which may be applied toward any remaining Mason Core (https://catalog.gmu.edu/mason-core/) requirements (outlined below), Requirements for Bachelor's Degrees (https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2), and electives. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

- Without concentration: 39-46 credits
- BNF concentration: 36-43 credits
- BP concentration: 41-47 credits
- BTMB concentration: 41-44 credits
- ESCB concentration: 39-46 credits
- MIB concentration: 39-41credits

Mason Core

Some Mason Core (https://catalog.gmu.edu/mason-core/) requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core (https://catalog.gmu.edu/mason-core/) requirements.

Students who have completed the following credentials are eligible for a waiver of the Foundation and Exploration (lower level) requirement categories. The Integration category (upper level) is not waived under this policy. See Admissions (https://catalog.gmu.edu/admissions/undergraduate-policies/#transfertext) for more information.

- VCCS Uniform Certificate of General Studies
- VCCS or Richard Bland Associate of Science (A.S.), Associate of Arts (A.A.), Associate of Arts and Sciences (A.A.&S.), or Associate of Fine Arts (A.F.A.)

Code	Title	Credits
Foundation Requirements		
Written Communication (lower-level) (https://catalog.gmu.edu/mason-core/#written)		3
Oral Communication (https://catalog.gmu.edu/mason-core/#oral)		3
Quantitative Reasoning (https://catalog.gmu.edu/mason-core/#quantitative)		3
Information Technology and Computing (https://catalog.gmu.edu/mason-core/#information-technology)		3
Exploration Requirements		
Arts (https://catalog.gmu.edu/mason-core/#arts)		3
Global Contexts (https://catalog.gmu.edu/mason-core/#global-contexts)		3
Global History (https://catalog.gmu.edu/mason-core/#global-history)		3
Literature (https://catalog.gmu.edu/mason-core/#literature)		3

Natural Science (https://catalog.gmu.edu/mason-core/#natural-science)	7
Social and Behavioral Sciences (https://catalog.gmu.edu/mason-core/#social-behavioral-science)	3
Just Societies (optional) (https://catalog.gmu.edu/mason-core/#justsocieties) [1]	
Integration Requirements	
Written Communication (upper-level) (https://catalog.gmu.edu/mason-core/#written)	3
Writing Intensive (https://catalog.gmu.edu/mason-core/#wi) [2]	3
Mason Apex (https://catalog.gmu.edu/mason-core/#apex) [3]	3
Total Credits	**40**

1. In addition to covering content related to the designated category, Exploration level courses marked with a Just Societies "flag" are specifically designed to help students learn how to interact effectively with others from all walks of life, including those with backgrounds and beliefs that differ from their own. Students who wish to increase their knowledge and skills in this area may choose to enroll in a Just Societies-flagged course. Students interested in this approach to completing their Mason Core Exploration Requirements should work closely with their advisor to identify the appropriate Just Societies-flagged courses.
2. Most programs include the writing-intensive course designated for the major as part of the major requirements; this course is therefore not counted towards the total required for Mason Core.
3. Minimum 3 credits required.

Honors

Honors in the Major

Admissions

Minimum requirements for invitation:

- GPA in biology courses must be 3.33 or better
- GPA in supporting requirements (math and other science) must be 3.00 or better
- Grade of 'B' or better in BIOL 213 Cell Structure and Function

Students should apply for admission to the Honors Program during their first or second year at the university. Contact the Department of Biology (https://catalog.gmu.edu/colleges-schools/science/biology/) for information on applying.

Retention Requirements

Students in honors biology must maintain a biology GPA of 3.33 or better and a supporting GPA of 3.00 or better from the time they have accumulated 30 hours and thereafter. Students who fall below this standard will be given a one semester probationary period in which to bring their GPA back up to the minimum standard.

Requirements to Graduate with Biology Honors

Students are required to take 6 to 8 credits in honors courses in BIOL including three semesters of BIOL 494 Honors Seminar in Biology or two semesters of BIOL 494 Honors Seminar in Biology and one semester of BIOL 493 Honors Research in Biology. BIOL 498 Research Seminar may count towards one of the semester requirements of BIOL 494 Honors Seminar in Biology. The GPA requirements are as follows:

- Minimum 3.33 GPA in honors biology courses
- Minimum 3.33 GPA in biology requirements
- Minimum 3.00 GPA in supporting requirements
- Minimum 3.00 GPA overall

Accelerated Master's

Biology, BS/Biology, Accelerated MS

Overview

This bachelor's/accelerated master's degree program allows academically strong undergraduates with a commitment to advance their education to obtain both the Biology, BS and the Biology, MS (https://catalog.gmu.edu/colleges-schools/science/systems-biology/biology-ms/) degrees within an accelerated timeframe. Upon completion of this 138 credit accelerated program, students will be exceptionally well prepared for entry into their careers or into a doctoral program in the field or in a related discipline.

Students are eligible to apply for this accelerated program once they have earned at least 60 undergraduate credits and can enroll in up to 18 credits of graduate coursework after successfully completing 75 undergraduate credits. This flexibility makes it possible for students to complete a bachelor's and a master's in five years.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/). For more information on undergraduates enrolling in graduate courses, see AP.1.4.4 Graduate Course Enrollment by Undergraduates (https://catalog.gmu.edu/policies/academic/registration-attendance/#text).

Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies (https://catalog.gmu.edu/admissions/graduate-policies/) section of this catalog.

Important application information and processes for this accelerated master's program can be found here (https://www2.gmu.edu/admissions-aid/how-apply/accelerated-masters/).

Students should seek out the graduate program's advisor who will aid in choosing the appropriate graduate courses and help prepare the student for graduate studies.

Three letters of recommendation, including one from a prospective thesis or project advisor, are required.

GRE scores are not required for students in this accelerated program.

Successful applicants will have an overall undergraduate GPA of at least 3.10. Additionally, they will have completed the following courses with a GPA of 3.00 or higher[2]:

Code	Title	Credits
BIOL 213	Cell Structure and Function	4
BIOL 214	Biostatistics for Biology Majors	4
BIOL 300	BioDiversity [1]	4
or BIOL 311	General Genetics	
CHEM 313 & CHEM 315	Organic Chemistry I and Organic Chemistry Lab I [2]	5

[1] Students should speak with an advisor to choose the course most appropriate for their post-graduation goals.

[2] Grades of 2.50 in CHEM 313 and CHEM 315 are acceptable for admission into this accelerated pathway.

Accelerated Option Requirements

After the completion of 75 undergraduate credits, students may complete 3 to 12 credits of graduate coursework that can apply to both the undergraduate and graduate degrees.

In addition to applying to graduate from the undergraduate program, students in the accelerated program must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (https://registrar.gmu.edu/forms/)) to the College of Science's Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us/) by the last day to add classes of their final undergraduate semester. Students should enroll for courses in the master's program in the fall or spring semester immediately following conferral of the bachelor's degree, but should contact an advisor if they would like to defer up to one semester.

Students must maintain an overall GPA of 3.00 or higher in all graduate coursework and should consult with their faculty advisor to coordinate their academic goals.

Reserve Graduate Credit

Accelerated master's students may also take up to 6 graduate credits as reserve graduate credits. These credits do not apply to the undergraduate degree, but will reduce the master's degree by up to 6 credits. With 12 graduate credits counted toward the undergraduate and graduate degrees plus the maximum 6 reserve graduate credits, the credits necessary for the graduate degree can be reduced by up to 18.

Graduate Course Suggestions

The following list of suggested courses is provided for general reference. To ensure an efficient route to graduation and post-graduation readiness, students are strongly encouraged to meet with an advisor before registering for graduate-level courses.

Code	Title	Credits
BIOL 508	Selected Topics in Animal Biology (When the topic is "Research and Development in a Biotechnological Company")	1-4
BIOL 682	Advanced Eukaryotic Cell Biology	3
BIOL 689	Interdisciplinary Tools in the Biosciences	3
BIOL 690	Introduction to Graduate Studies in Biology	1-2
BIOL 695	Seminar in Molecular, Microbial, and Cellular Biology	1

Bachelor's Degree (selected), Bioinformatics Management, Accelerated PSM

Overview

This bachelor's/accelerated master's degree program allows academically strong undergraduates with a commitment to advance their education to obtain both the Biology, BS (https://catalog.gmu.edu/colleges-schools/science/biology/biology-bs/), or the Chemistry, BS (https://catalog.gmu.edu/colleges-schools/science/chemistry-biochemistry/chemistry-bs/), or the Computational and Data Sciences, BS (https://catalog.gmu.edu/colleges-schools/science/computational-data-sciences/computational-data-sciences-bs/), or the Physics, BS (https://catalog.gmu.edu/colleges-schools/science/physics-astronomy/physics-bs/), or the Neuroscience, BS (https://catalog.gmu.edu/colleges-schools/science/neuroscience-program/neuroscience-bs/) and the Bioinformatics Management, PSM (https://catalog.gmu.edu/colleges-schools/science/systems-biology/bioinformatics-management-professional-science-masters/) degrees within an accelerated timeframe. Upon completion of this 138 credit accelerated program, students will be exceptionally well prepared for entry into their careers or into a doctoral program in the field or in a related discipline.

Students are eligible to apply for this accelerated program once they have earned at least 60 undergraduate credits and can enroll in up to 18 credits of graduate coursework after successfully completing 75 undergraduate credits. This flexibility makes it possible for students to complete a bachelor's and a master's in five years.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/). For more information on undergraduates enrolling in graduate courses, see AP.1.4.4 Graduate Course Enrollment by Undergraduates (https://catalog.gmu.edu/policies/academic/registration-attendance/#text).

Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies (https://catalog.gmu.edu/admissions/graduate-policies/) section of this catalog.

Important application information and processes for this accelerated master's program can be found here (https://www2.gmu.edu/admissions-aid/how-apply/accelerated-masters/).

Students in the Biology, BS (https://catalog.gmu.edu/colleges-schools/science/biology/biology-bs/); Chemistry, BS (https://catalog.gmu.edu/colleges-schools/science/chemistry-biochemistry/chemistry-bs/); Computational and Data Sciences, BS (https://catalog.gmu.edu/colleges-schools/science/computational-data-sciences/computational-data-sciences-bs/); Neuroscience, BS (https://catalog.gmu.edu/colleges-schools/science/neuroscience-program/neuroscience-bs/); or Physics, BS (https://catalog.gmu.edu/colleges-schools/science/physics-astronomy/physics-bs/) with an overall GPA of at least 3.00 in their last 60 credits are welcome to apply to the Bioinformatics Management, PSM (https://catalog.gmu.edu/colleges-schools/science/systems-biology/bioinformatics-management-professional-science-masters/) accelerated master's program. Applicants to this accelerated master's should

have previously taken courses in molecular biology, computer science, calculus, physical chemistry, and statistics. Students with deficiencies in one or more of these areas may be required to take additional courses from the undergraduate curriculum.

The GRE requirement is waived for students accepted into this accelerated program.

Students should seek out the graduate program's advisor who will aid in choosing the appropriate graduate courses and help prepare the student for graduate studies.

Accelerated Option Requirements

After the completion of 75 undergraduate credits, students may complete 3 to 12 credits of graduate coursework that can apply to both the undergraduate and graduate degrees.

In addition to applying to graduate from the undergraduate program, students in the accelerated program must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (https://registrar.gmu.edu/forms/)) to the College of Science's Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us/) by the last day to add classes of their final undergraduate semester. Students should enroll for courses in the master's program in the fall or spring semester immediately following conferral of the bachelor's degree, but should contact an advisor if they would like to defer up to one semester.

Students must maintain an overall GPA of 3.00 or higher in all graduate coursework and should consult with their faculty advisor to coordinate their academic goals.

Reserve Graduate Credits

Accelerated master's students may also take up to 6 graduate credits as reserve graduate credits. These credits do not apply to the undergraduate degree, but will reduce the master's degree by up to 6 credits. With 12 graduate credits counted toward the undergraduate and graduate degrees plus the maximum 6 reserve graduate credits, the credits necessary for the graduate degree can be reduced by up to 18.

Graduate Course Suggestions

The following list of suggested courses is provided for general reference. To ensure an efficient route to graduation and post-graduation readiness, students are strongly encouraged to meet with an advisor before registering for graduate-level courses.

Code	Title	Credits
BINF 630	Bioinformatics Methods	3
BINF 631	Molecular Cell Biology for Bioinformatics	3
GBUS 623	Marketing Management	3
GBUS 643	Managerial Finance	3
GBUS 738	Data Mining for Business Analytics	3

Biology, BA or BS/Secondary Education, Accelerated MEd (Secondary Education - Science Concentration)

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a BA (https://catalog.gmu.edu/colleges-schools/science/biology/biology-ba/) or BS in Biology (degree without concentration) and an MEd in Secondary Education (Secondary Education - Science concentration) (https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/secondary-education-med/) in an accelerated time-frame after satisfactory completion of a minimum of 143 credits.

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

This accelerated option is offered jointly by the Biology Undergraduate Program (https://catalog.gmu.edu/colleges-schools/science/biology/) and the School of Education (https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/).

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/#text).

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 (https://catalog.gmu.edu/admissions/graduate-policies/) and Bachelor's/Accelerated Master's Degree (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) policies. For information specific to this accelerated master's program, see Application Requirements and Deadlines (https://cehd.gmu.edu/bachelors-accelerated-masters-program/).

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits, and additional unit-specific criteria.

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 pre-requisites.

Accelerated Master's Admission Requirements

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

- 3.0 overall GPA
- Completion of specific undergraduate coursework
- Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following which can be taken as Advanced Standing or Reserve Graduate credit (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) (to be determined by the student and their advisor):

Code	Title	Credits
EDRD 619	Literacy Across the Disciplines	3
EDUC 545	Teaching Science and Engineering Practices	3

SEED 522	Foundations of Secondary Education	3
SEED 540	Human Development and Learning: Secondary Education	3
SEED 573	Teaching Science in the Secondary School	3
SEED 673	Advanced Methods of Teaching Science in the Secondary School	3
One of the following:		
SEED 507	Assessing Learning and Teaching in the Secondary Classroom	
SEED 508	Creating Advocacy with Adolescent Learners	
SEED 509	Perspectives on Extraordinary Teaching	
SEED 510	Secondary Education in International Contexts	

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