

Program Change Request

Date Submitted: 01/15/18 2:48 pm

Viewing: **SC-BS-BIOL : Biology, BS**

Last approved: 12/05/17 3:41 pm

Last edit: 01/15/18 2:48 pm

Changes proposed by: jbazaz

Catalog Pages
Using this Program
[Biology, BS](#)

In Workflow

1. **BIOL Program Chair**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. SC CAT Editor
5. Assoc Provost-Undergraduate
6. Registrar-Programs

Are you completing this form on someone else's behalf?

Yes

Requestor:

Approval Path

1. 01/18/18 8:54 am
Larry Rockwood
(lrockwoo):
Approved for BIOL
Program Chair

History

1. Oct 23, 2017 by
clmig-jwehrheim

2. Dec 5, 2017 by
clmig-jwehrheim

Effective Catalog:

2018-2019

Program Level:

Undergraduate

Program Type:

Bachelor's

Degree Type:

Bachelor of Science

Title:

Biology, BS

Approved

Registrar/OAPI Use
Only – SCHEV
Status

Registrar's Office
Use Only –
Program Start
Term

Registrar/OAPI Use
Only – SCHEV
Letter

Concentration(s):

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
1	Bioinformatics	BNF
2	Biopsychology	BP
3	Biotechnology and Molecular Biology	BTMB
4	Environmental and Conservation Biology	ESCB
5	Microbiology	MIB

Registrar/IRR Use
Only –
Concentration CIP
Code

College/School: College of Science

Department /
Academic Unit: Biology

Jointly Owned
Program? No

Justification

New biology courses were created to compliment BIOL 537, 538, and 539. The undergraduate courses are added in place of the graduate versions.

Total Credits
Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code:
SC-BS-BIOL

Registrar/IRR Use
Only – Program CIP
Code

**Admission
Requirements:**

Admissions

University-wide admissions policies can be found in the [Undergraduate Admissions Policies](#) section of this catalog.

To apply for this program, please complete the [George Mason University Admissions Application](#).

**Program-Specific
Policies:**

Policies

Students must fulfill all [Requirements for Bachelor's Degrees](#), including the [Mason Core](#).

Important information and departmental policies are listed in the [Department of Biology](#) section of this catalog.

[BIOL 308](#) Foundations of Ecology and Evolution meets the writing intensive requirement for this major.

For policies governing all undergraduate degrees, see [AP.5 Undergraduate Policies](#).

Important Program Requirements

- Students may apply no more than 8 credits of [BIOL 103](#) Introductory Biology I ([Mason Core](#)) or [BIOL 107 Intro Biology II Lecture \(Mason Core\)](#) and [BIOL 106 Introductory Biology II Laboratory \(Mason Core\)](#) toward [BIOL 104](#) ~~Course BIOL 104 Not Found (Mason Core)~~ toward elective credit (or equivalent transfer credit at the 100 to 200-level) if taken before successful completion of [BIOL 213](#) Cell Structure and Function ([Mason Core](#)).
- Biology majors must earn a minimum grade of 'C' in all biology core courses. A grade of 'C' or better must be earned in [BIOL 213](#) Cell Structure and Function ([Mason Core](#)) in order to advance to other core requirements.
- Students may repeat [BIOL 213](#) Cell Structure and Function ([Mason Core](#)) once, but a second time only with permission from the Department of Biology.
- Students may **not** count [BIOL 124](#) Human Anatomy and Physiology and/or [BIOL 125](#) Human Anatomy and Physiology toward any biology major requirement.
- Students who take [BIOL 310](#) Biodiversity may **not** count [BIOL 303](#) Animal Biology and/or [BIOL 304](#) Plant Biology toward any biology major requirement.
- 44 credits must be in biology 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.

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](#) offered by the [College of Education and Human Development](#) as an option in seeking an initial Virginia teaching **license**.
~~license.~~

~~The certificate includes current endorsement and licensure coursework embedded within your major. Students apply to add this as a secondary program during their sophomore year and complete required content and education coursework leading to initial licensure in the state of Virginia within 120 credits.~~ Other routes to licensure include the [Biology, BA or BS/Curriculum and Instruction, Accelerated MEd](#) (Secondary Education Biology Concentration) or select traditional Master's programs. Please contact the Undergraduate Advisor in [College of Education and Human Development](#) for more information.

Degree Requirements:

Students should refer to the [Admissions & Policies](#) tab for specific policies related to this program.

Students must complete their biology coursework and the supporting requirements which follow with a minimum GPA of 2.00.

All students must complete the biology core, chemistry, physics, mathematics, and computer science courses listed below. Students then elect to complete the BS degree either with a concentration or without a concentration.

Biology Core Courses

Course List		
Code	Title	Credits
BIOL 213	Cell Structure and Function (Mason Core)	4
BIOL 214	Biostatistics for Biology Majors	4
BIOL 308	Foundations of Ecology and Evolution 1	5
BIOL 310	Biodiversity	5
& BIOL 330	and Biodiversity Lab and Recitation	
BIOL 311	General Genetics	4
Total Credits		22

1 Fulfills writing intensive requirement.

Chemistry

Course List		
Code	Title	Credits
		4

Code	Title	Credits
<u>CHEM 211</u>	General Chemistry I (<u>Mason Core</u>)	
& <u>CHEM 213</u>	and General Chemistry Laboratory I (<u>Mason Core</u>) (Natural Science course)	
<u>CHEM 212</u>	General Chemistry II (<u>Mason Core</u>)	4
& <u>CHEM 214</u>	and General Chemistry Laboratory II (<u>Mason Core</u>) (Natural Science course)	
<u>CHEM 313</u>	Organic Chemistry I	3
<u>CHEM 315</u>	Organic Chemistry Lab I	2
Total Credits		13

Physics

Course List		
Code	Title	Credits
Select from one from the following Mason Core: Natural Science sequences:		8
<u>PHYS 243</u>	College Physics I (<u>Mason Core</u>)	
& <u>PHYS 244</u>	and College Physics Lab (<u>Mason Core</u>)	
& <u>PHYS 245</u>	and College Physics II (<u>Mason Core</u>)	
& <u>PHYS 246</u>	and College Physics Lab (<u>Mason Core</u>)	
<u>PHYS 160</u>	University Physics I (<u>Mason Core</u>)	
& <u>PHYS 161</u>	and University Physics I Laboratory (<u>Mason Core</u>)	
& <u>PHYS 260</u>	and University Physics II (<u>Mason Core</u>)	
& <u>PHYS 261</u>	and University Physics II Laboratory (<u>Mason Core</u>)	
Total Credits		8

Mathematics

Course List		
Code	Title	Credits
Select one from the following:		3-6
<u>MATH 111</u>	Linear Mathematical Modeling (<u>Mason Core</u>)	
or <u>MATH 113</u>	Analytic Geometry and Calculus I (<u>Mason Core</u>)	
<u>MATH 123</u>	Calculus with Algebra/Trigonometry, Part A	
& <u>MATH 124</u>	and Calculus with Algebra/Trigonometry, Part B (<u>Mason Core</u>)	
Total Credits		3-6

Computer Science

Course List		
Code	Title	Credits
Select one from the following:		3
<u>CDS 130</u>	Computing for Scientists (<u>Mason Core</u>) 1	
<u>Any course(s) that fulfills the Mason Core: Information Technology requirement</u>		

Code	Title	Credits
Total Credits		3
1 Recommended by the Department of Biology		

BS without Concentration

Students who do not select an optional concentration must complete the biology core and shared courses shown above in addition to the curriculum requirements listed below.

Biology Electives

Course List		
Code	Title	Credits
<u>Complete 22 credits of additional biology courses</u> 1		22
Total Credits		22

1Of which, at least 14 credits must be upper division, and at least two of the upper division courses must include a laboratory.

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.

Course List		
Code	Title	Credits
Select one from the following options:		3-8
Option A:		
<u>CHEM 314</u>	Organic Chemistry II	
& <u>CHEM 318</u>	and Organic Chemistry Lab II	
Option B:		
<u>One 3 credit chemistry course at the 300 or 400-level (not CHEM 314)</u>		
Option C:		
<u>GEOL 101</u>	Introductory Geology I (<u>Mason Core</u>)	
& <u>GEOL 102</u>	and Introductory Geology II (<u>Mason Core</u>) (Natural Science courses)	
Total Credits		3-8

Note:

Students expecting to enter a professional school are strongly encouraged to complete MATH 113 Analytic Geometry and Calculus I (Mason Core).

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.

Course List		
Code	Title	Credits

Code	Title	Credits
Computer Science		3
Please note: CDS 130 is recommended to fulfill the Computer Science requirement in the shared core above.		
CDS 230	Modeling and Simulation I	
Bioinformatics		6
BINF 401	Bioinformatics and Computational Biology I	
BINF 402	Bioinformatics and Computational Biology II	
Biology		14-16
BIOL 312	Biostatistics for Bioinformatics	
BIOL 401	Phage Discovery	
BIOL 412	Phage Genomics	
Biology Lab Elective		
Select one from the following:		
BIOL 320	Comparative Chordate Anatomy	
BIOL 322	Developmental Biology	
& BIOL 323	and Lab for Developmental Biology	
BIOL 331	Invertebrate Zoology	
BIOL 332	Insect Biology	
BIOL 334	Vertebrate Paleontology	
BIOL 336	Invertebrate Paleontology	
BIOL 344	Plant Diversity and Evolution	
BIOL 345	Plant Ecology	
BIOL 350	Freshwater Ecosystems	
BIOL 355	Ecological Engineering and Ecosystem Restoration	
BIOL 379	RS: Ecological Sustainability (Mason Core)	
BIOL 385	Biotechnology and Genetic Engineering	
& BIOL 486	and Molecular Biology and Biotechnology Laboratory	
BIOL 405	Microbial Genetics	
BIOL 406	Microbial Physiology and Metabolism	
BIOL 407	Microbial Diversity	
BIOL 430	Advanced Human Anatomy and Physiology I	
BIOL 431	Advanced Human Anatomy and Physiology II	
BIOL 437	Orinthology	
BIOL 438	Mammalogy	
BIOL 439	Herpetology	
BIOL 452	Immunology	
& BIOL 453	and Immunology Laboratory	
BIOL 454	Marine Mammal Biology and Conservation	
& BIOL 455	and Marine Mammal Biology and Conservation Field Course	

Code	Title	Credits
<u>BIOL 465</u>	Histology	
<u>BIOL 468</u>	Vertebrate Natural History	
<u>BIOL 472</u>	Introductory Animal Behavior	
& <u>BIOL 473</u>	and Introductory Laboratory in Animal Behavior	
<u>BIOL 484</u>	Eukaryotic Cell Biology	
& <u>BIOL 485</u>	and Eukaryotic Cell Biology Laboratory	
<u>BIOL 509</u>	DNA Analysis of Biological Evidence	
& <u>BIOL 510</u>	and Forensic DNA Analysis Laboratory	
<u>BIOL 537</u>	Ornithology	
<u>BIOL 538</u>	Mammalogy	
<u>BIOL 539</u>	Herpetology	
<u>BIOL 543</u>	Tropical Ecosystems	
or <u>BIOL 305</u>	Biology of Microorganisms	
& <u>BIOL 306</u>	and Biology of Microorganisms Laboratory	
Total Credits		23-25

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.

Course List

Code	Title	Credits
Biopsychology Courses		
<u>BIOL 430</u>	Advanced Human Anatomy and Physiology I	4
<u>BIOL 431</u>	Advanced Human Anatomy and Physiology II	4
<u>PSYC 372</u>	Physiological Psychology	3
<u>PSYC 373</u>	Physiological Psychology Laboratory	1
Additional Psychology/Neuroscience Course		
Select 3-4 credits from the following:		3-4
<u>PSYC 304</u>	Principles of Learning	
<u>PSYC 376</u>	Brain and Behavior	
<u>PSYC 406</u>	Psychology of Communication (<u>Mason Core</u>)	
<u>NEUR 327</u>	Cellular, Neurophysiological, and Pharmacological Neuroscience	
<u>NEUR 335</u>	Molecular, Developmental, and Systems Neuroscience	
Additional Biology Courses		
Select 6-7 credits from the following:		6-7
<u>BIOL 305</u>	Biology of Microorganisms	
<u>BIOL 306</u>	Biology of Microorganisms Laboratory	

Code	Title	Credits
<u>BIOL 314</u>	Introduction to Research Design and Analysis	
<u>BIOL 322</u>	Developmental Biology	
<u>BIOL 323</u>	Lab for Developmental Biology	
<u>BIOL 437</u>	Orinthology	
<u>BIOL 438</u>	Mammalogy	
<u>BIOL 472</u>	Introductory Animal Behavior	
<u>BIOL 473</u>	Introductory Laboratory in Animal Behavior	
<u>BIOL 483</u>	General Biochemistry	
<u>BIOL 537</u>	Ornithology	
<u>BIOL 538</u>	Mammalogy	

Additional Chemistry Courses

Select one from the following options: 1 3-5

Option A:

[CHEM 314](#) Organic Chemistry II
& [CHEM 318](#) and Organic Chemistry Lab II

Option B:

[One chemistry course at the 300 or 400-level](#) ²

Total Credits 24-28

¹Students 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.

Course List

Code	Title	Credits
Biotechnology Courses		
<u>BIOL 305</u>	Biology of Microorganisms	3
<u>BIOL 306</u>	Biology of Microorganisms Laboratory	1
<u>BIOL 385</u>	Biotechnology and Genetic Engineering	3
<u>BIOL 483</u>	General Biochemistry	4

Additional Biology Courses

Select 11 credits from the following, at least one of the courses must include a laboratory: 11

Laboratory Courses:

[BIOL 402](#) Applied and Industrial Microbiology
& [BIOL 403](#) and Techniques in Applied and Industrial Microbiology
[BIOL 405](#) Microbial Genetics

Code	Title	Credits
<u>BIOL 406</u>	Microbial Physiology and Metabolism	
<u>BIOL 452</u>	Immunology	
& <u>BIOL 453</u>	and Immunology Laboratory	
<u>BIOL 486</u>	Molecular Biology and Biotechnology Laboratory	
Non-laboratory Courses:		
<u>BIOL 314</u>	Introduction to Research Design and Analysis	
<u>BIOL 382</u>	Introduction to Virology	
<u>BIOL 411</u>	Advanced General Genetics	
<u>BIOL 417</u>	Selected Topics in Molecular and Cellular Biology 1	
<u>BIOL 418</u>	Current Topics in Microbiology 1	
<u>BIOL 420</u>	Vaccines	
<u>BIOL 421</u>	Genetics of Human Diseases	
<u>BIOL 422</u>	Stem Cell Biology and Regenerative Medicine	
<u>BIOL 482</u>	Introduction to Molecular Genetics	
<u>BIOL 484</u>	Eukaryotic Cell Biology	
<u>BIOL 497</u>	Special Problems in Biology 1	
Additional Chemistry Courses		
<u>CHEM 314</u>	Organic Chemistry II	3
<u>CHEM 318</u>	Organic Chemistry Lab II	2
Total Credits		27

1Registration 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 Chairman 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](#).

Course List		
Code	Title	Credits
Environmental and Conservation Biology		
<u>BIOL 318</u>	Conservation Biology	3
<u>BIOL 377</u>	Applied Ecology	3
Biology Electives		
Select 16 credits from the following: 1		16
<u>BIOL 309</u>	Introduction to Oceanography	
<u>BIOL 314</u>	Introduction to Research Design and Analysis	

Code	Title	Credits
<u>BIOL 326</u>	Animal Physiology	
<u>BIOL 331</u>	Invertebrate Zoology	
<u>BIOL 332</u>	Insect Biology	
<u>BIOL 344</u>	Plant Diversity and Evolution	
<u>BIOL 345</u>	Plant Ecology	
<u>BIOL 350</u>	Freshwater Ecosystems	
<u>BIOL 355</u>	Ecological Engineering and Ecosystem Restoration	
<u>BIOL 379</u>	RS: Ecological Sustainability (<u>Mason Core</u>)	
<u>BIOL 440</u>	Field Biology	
<u>BIOL 446</u>	Ecological and Evolutionary Physiology	
<u>BIOL 449</u>	Marine Ecology	
<u>BIOL 450</u>	Marine Conservation	
<u>BIOL 454</u>	Marine Mammal Biology and Conservation	
<u>BIOL 455</u>	Marine Mammal Biology and Conservation Field Course	
<u>BIOL 457</u>	Reproductive Strategies	
<u>BIOL 459</u>	Fungi and Ecosystems	
<u>BIOL 468</u>	Vertebrate Natural History	
<u>BIOL 472</u>	Introductory Animal Behavior	
& <u>BIOL 473</u>	and Introductory Laboratory in Animal Behavior	
<u>BIOL 480</u>	The Diversity of Fishes	

Additional Science Courses

Select one from the following options: 2 3-8

Option A:

[CHEM 314](#) Organic Chemistry II
& [CHEM 318](#) and Organic Chemistry Lab II

Option B:

[One chemistry course at the 300 or 400-level](#) ³

Option C:

[GEOL 101](#) Introductory Geology I ([Mason Core](#))
& [GEOL 102](#) and Introductory Geology II ([Mason Core](#))

Total Credits 25-30

¹Of 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).

²Students 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.

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.

Course List

Code	Title	Credits
Microbiology Courses		
<u>BIOL 305</u>	Biology of Microorganisms	3
<u>BIOL 306</u>	Biology of Microorganisms Laboratory	1
<u>BIOL 405</u>	Microbial Genetics	4
<u>BIOL 407</u>	Microbial Diversity	4
Biology Electives		
Select 10 credits from the following:		10
<u>BIOL 314</u>	Introduction to Research Design and Analysis	
<u>BIOL 382</u>	Introduction to Virology	
<u>BIOL 385</u>	Biotechnology and Genetic Engineering	
<u>BIOL 402</u>	Applied and Industrial Microbiology	
<u>BIOL 403</u>	Techniques in Applied and Industrial Microbiology	
<u>BIOL 404</u>	Medical Microbiology	
<u>BIOL 418</u>	Current Topics in Microbiology	
<u>BIOL 420</u>	Vaccines	
<u>BIOL 452</u>	Immunology	
<u>BIOL 453</u>	Immunology Laboratory	
<u>BIOL 459</u>	Fungi and Ecosystems	
<u>BIOL 483</u>	General Biochemistry	
Additional Chemistry Courses		
<u>CHEM 314</u>	Organic Chemistry II	3
<u>CHEM 318</u>	Organic Chemistry Lab II	2
Total Credits		27

Plan of Study:

Honors Information:

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 ([Mason Core](#))

Students should apply for admission to the Honors Program during their first or second year at the university.

Contact the [Department of 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

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

**Courses offered via
distance (if
applicable):**

**What is the
primary delivery
format for the
program?**

Face-to-Face Only

Does any portion of this program occur off-campus?

No

Are you working with a vendor / other collaborators to offer your program?

No

Related
Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

No

Are you adding or removing a licensure component?

No

Additional SCHEV & SACSCOC Information

Are you changing the total number of credits required for this program?

Are you changing the delivery format in any way (e.g adding an online option)?

Are you adding/removing a licensure option which was approved by SCHEV?

Will any portion of this program be offered at an off-campus location?

Are you adding significant new content areas to the program?

Will this program change affect any specialized accreditation?

Green Leaf Program Designation

Is this a Green Leaf
program? No

Does this program cover material which crosses into another department?

No

**Additional
Attachments**

SCHEV Proposal

**Executive
Summary**

**Reviewer
Comments**

**Additional
Comments**