Program Approval Form

For approval of new programs and deletions or modifications to an existing program.

Action Requested:

- [ ] Create New (SCHEV approval required except for minors)
- [ ] Inactivate Existing
- [x] Modify Existing (check all that apply)
  - [ ] Title (SCHEV approval required except for minors)
  - [ ] **Concentration** (Choose one): [ ] *Add* [ ] *Delete* [ ] *Modify*
  - [x] Degree Requirements
  - [ ] Admission Standards/ Application Requirements
  - [ ] Other Changes: _____

Type (Check one)**:**

- [ ] B.A. [x] B.S. [ ] Minor
- [ ] M.A. [ ] M.S. [ ] M.Ed.
- [ ] Ph.D.
- [ ] Undergraduate Certificate*
- [ ] Graduate Certificate*
- [ ] Other:

College/School:	College of Science	**Department:**	BIOL		
Submitted by:	Jen Gettys	**Ext:**	3.5302	**Email:**	jbazaz@gmu.edu

Effective Term: Fall 2015

Please note: For students to be admitted to a new degree, minor, certificate or concentration, the program must be fully approved, entered into Banner, and published in the University Catalog.

Justification: (attach separate document if necessary)

Adding "Mason Core and Elective Credits" and "Mason Core" sections in order to have the catalog listing clearly show how the degree equals 120 credits and how the Mason Core requirements can be fulfilled.

	Existing	New/Modified
Program Title: (Required) Title must identify subject matter. Do not include name of college/school/dept.	Biology, BS	
Concentration(s):		
Admissions Standards / Application Requirements: (Required only if different from those listed in the University Catalog)		
Degree Requirements: Consult University Catalog for models, attach separate document if necessary using track changes for modifications	[Mason Core and Electives section not included]	See the bottom portion of the degree listing attached.
Courses offered via distance: (if applicable)		
TOTAL CREDITS REQUIRED:		

***For Certificates Only:** Indicate whether students are able to pursue on a [ ] **Full-time basis** [ ] **Part-time basis**

Approval Signatures

Department	Date	College/School	Date	Provost's Office	Date
				Required for Minors and Interdisciplinary Programs	

If this program may impact another unit or is in collaboration with another unit at Mason, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Graduate Programs Only

Graduate Council Member	Provost Office	Graduate Council Approval Date

For Registrar Office's Use Only: Received_____Banner_____Catalog_____

revised 6/7/12

Program Proposal Submitted to the College of Science Curriculum Committee (COSCC)

The form above is processed by the Office of the University Registrar. This second page is for the COSCC's reference. Please complete the applicable portions of this page to clearly communicate what the form above is requesting.

FOR ALL PROGRAMS (required)

Program Title: Biology, BS

Date of Departmental Approval: 3/11/2015

FOR INACTIVATED PROGRAMS (required if inactivating a program)

- Reason for Inactivation:

FOR MODIFIED PROGRAMS (required if modifying a program)

- Summary of the Modification: Adding "Mason Core and Elective Credits" and "Mason Core" sections.
- Text before Modification (title, degree requirements, etc.): Sections weren't included.
- Text after Modification (title, degree requirements, etc.): See attached.
- Reason for the Modification: In order to have the catalog listing clearly show how the degree equals 120 credits and how the Mason Core requirements can be fulfilled.

FOR NEW PROGRAMS (required if creating a new program)

- Reason for the New Program:
- Relationship to Existing Programs:
- Relationship to Existing Courses:
- Semester of Initial Offering:
- Insert Tentative SCHEV Proposal Below

Acalog ACMS™ 2015-2016 University Catalog {working}

Biology, BS

Banner Code: SC-BS-BIOL

This program of study is offered by the Department of Biology in the College of Science.

Students must fulfill all requirements for bachelor's degrees including the Mason Core. Students must complete their biology coursework and the supporting requirements below with a minimum GPA of 2.00.

Additionally:

- Students may apply no more than 8 credits of BIOL 103 or BIOL 104 toward elective credit (or equivalent transfer credit at the 100 to 200-level) if taken before successful completion of BIOL 213.
- Biology majors must earn a minimum grade of 'C' in all biology core courses listed below. A grade of 'C' or better must be earned in BIOL 213 in order to advance to other core requirements.
- Students may repeat BIOL 213 once, but a second time only with permission from the Department of Biology.
- Students may not count BIOL 124 and/or BIOL 125 toward any biology major requirement.
- Students who take BIOL 310 may not count BIOL 303 and/or BIOL 304 toward any biology major requirement.
- BIOL 308 meets the writing intensive requirement for this major.

Several optional concentrations are available (see below). Each concentration's description will outline which Mason Core requirements are met.

This undergraduate program offers students the option of applying to the accelerated master's program in biology or curriculum and instruction (SECB concentration). See each listing for specific requirements.

Important information and departmental policies are listed in the Department of Biology section of this catalog.

Degree Requirements

All students must complete the biology core (22 credits), chemistry (13 credits), physics (8 credits), mathematics (3-6 credits), and computer science (3 credits) courses listed below. Through this coursework, students will satisfy the Mason Core requirements for 'Natural Science', 'Information Technology', and 'Quantitative Reasoning'. Students then elect to complete the BS degree either with a concentration or without a concentration.

Biology Core Courses (22 credits)

- BIOL 213 - Cell Structure and Function Credits: 4 (Mason Core: Natural Science course)
- BIOL 214 - Biostatistics for Biology Majors Credits: 4
- BIOL 308 - Foundations of Ecology and Evolution Credits: 5
- BIOL 310 - Biodiversity Credits: 3 **and** BIOL 330 - Biodiversity Lab and Recitation Credits: 2
- BIOL 311 - General Genetics Credits: 4

Chemistry (13 credits)

- CHEM 211 - General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 212 - General Chemistry Credits: 4 (Mason Core: Natural Science course)
- CHEM 313 - Organic Chemistry Credits: 3
- CHEM 315 - Organic Chemistry Lab I Credits: 2

Physics (8 credits)

Choose one sequence of Mason Core: Natural Science courses:

- PHYS 243 - College Physics Credits: 3
- PHYS 244 - College Physics Lab Credits: 1
- PHYS 245 - College Physics Credits: 3
- PHYS 246 - College Physics Lab Credits: 1

Or

- PHYS 160 - University Physics I Credits: 3
- PHYS 161 - University Physics I Laboratory Credits: 1
- PHYS 260 - University Physics II Credits: 3
- PHYS 261 - University Physics II Laboratory Credits: 1

Mathematics (3-6 credits)

- MATH 111 - Linear Mathematical Modeling Credits: 3 **or** MATH 113 - Analytic Geometry and Calculus I Credits: 4 (Mason Core: Quantitative Reasoning courses)**,**

Or both

- MATH 123 - Calculus with Algebra/Trigonometry, Part A Credits: 3 **and** MATH 124 - Calculus with Algebra/Trigonometry, Part B Credits: 3

Computer Science (3 credits)

- CDS 130 - Computing for Scientists Credits: 3 (Mason Core: Information Technology course and is recommended by the Department of Biology)
- **Or** any course(s) that fulfills the Mason Core: Information Technology requirement

Biology Core and Shared Courses Total: 49-52 credits

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.

22 Credits of Biology Electives

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

3-8 Additional Credits

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

- *Option A:* CHEM 314 - Organic Chemistry II Credits: 3 **and** CHEM 318 - Organic Chemistry Lab II Credits: 2
- *Option B:* One 3 credit chemistry course at the 300 or 400-level (not CHEM 314)
- *Option C:* GEOL 101 - Introductory Geology I Credits: 4 **and** GEOL 102 - Introductory Geology II Credits: 4 (Mason Core: Natural Science courses)

Note:

Students expecting to enter a professional school are strongly encouraged to complete MATH 113 and MATH 114.

Without Concentration Total: 25-30 credits

BS with Concentration

Students pursuing the degree with a concentration must complete the biology core and shared courses as shown above and the requirements for the concentration. Concentration options described below include:

- Biology Education (with Licensure)
- Biopsychology
- Biotechnology and Molecular Biology
- Environmental and Conservation Biology
- Microbiology

▲ Concentration in Biology Education with Licensure (BIED)

The education concentration consists of a selection of courses that provide essential skills to students who wish to pursue a career teaching high school biology. Completing the Biology, BS with this concentration allows students to receive a license to teach biology in Virginia secondary schools.

The coursework below will satisfy the Mason Core requirements for 'Synthesis' and 'Social and Behavioral Science'. Students who choose to undertake this concentration must complete their biology coursework (including the core) and the supporting requirements with a minimum GPA of 2.00 and fulfill all requirements for bachelor's degrees including the Mason Core and the additional rules for the Biology, BS listed above.

8 Credits of Anatomy and Physiology

- BIOL 430 - Advanced Human Anatomy and Physiology I Credits: 4
- BIOL 431 - Advanced Human Anatomy and Physiology II Credits: 4

8 Credits of Biology Electives

- 8 credits of additional biology courses
  - Of which, 4 credits must be upper division biology
  - BIOL 124 and BIOL 125 are not eligible to fulfill this requirement

3-8 Additional Credits

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

- *Option A:* CHEM 314 - Organic Chemistry II Credits: 3 **and** CHEM 318 - Organic Chemistry Lab II Credits: 2
- *Option B*: One chemistry course at the 300 or 400-level (not CHEM 314)
- *Option C:* GEOL 101 - Introductory Geology I Credits: 4 **and** GEOL 102 - Introductory Geology II Credits: 4 (Mason Core: Natural Science courses)

Teacher Licensure Requirement (21 credits)

EDCI 473 and EDCI 483 will count towards the 44 required hours in biology. A grade of 'C' or better is required for all licensure coursework.

- EDCI 473 - Teaching Science in the Secondary School Credits: 3
- EDCI 483 - Advanced Methods of Teaching Science in Secondary School Credits: 3
- EDCI 490 - Student Teaching in Education Credits: 6 (Mason Core: Synthesis course)
- EDRD 419 - Literacy in the Content Areas Credits: 3
- EDUC 372 - Human Development, Learning, and Teaching Credits: 3 (Mason Core: Social and Behavioral Science course)
- EDUC 422 - Foundations of Secondary Education Credits: 3

BIED Concentration Total: 40-45 credits

▲ 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.

Students who choose to undertake this concentration must complete their biology core and shared courses (listed above) and the supporting requirements with a minimum GPA of 2.00 and fulfill all requirements for bachelor's degrees including the Mason Core requirements and the additional rules for the Biology, BS. Depending upon course choice, the Mason Core requirement for 'Synthesis' may be fulfilled.

12 Credits of Biopsychology Courses

- BIOL 430 - Advanced Human Anatomy and Physiology I Credits: 4
- BIOL 431 - Advanced Human Anatomy and Physiology II Credits: 4
- PSYC 372 - Physiological Psychology Credits: 3
- PSYC 373 - Physiological Psychology Laboratory Credits: 1

3-4 Additional Credits

Choose from:

- PSYC 304 - Principles of Learning Credits: 4

- PSYC 376 - Brain and Behavior Credits: 3
- PSYC 406 - Psychology of Communication Credits: 3 (Mason Core: Synthesis course)
- NEUR 327 - Cellular, Neurophysiological, and Pharmacological Neuroscience Credits: 3
- NEUR 335 - Molecular, Developmental, and Systems Neuroscience Credits: 3

6-7 Credits

Choose from:

- BIOL 305 - Biology of Microorganisms Credits: 3
- BIOL 306 - Biology of Microorganisms Laboratory Credits: 1
- BIOL 314 - Introduction to Research Design and Analysis Credits: 4
- BIOL 322 - Developmental Biology Credits: 3
- BIOL 323 - Lab for Developmental Biology Credits: 1
- BIOL 472 - Introductory Animal Behavior Credits: 3
- BIOL 473 - Introductory Laboratory in Animal Behavior Credits: 1
- BIOL 483 - General Biochemistry Credits: 4
- BIOL 537 - Ornithology Credits: 4
- BIOL 538 - Mammology Credits: 4

3-5 Additional Chemistry Credits

Students are encouraged to consult with a biology faculty advisor to determine which of the following options (A or B) best meets their career goals.

- *Option A:* CHEM 314 - Organic Chemistry II Credits: 3 **and** CHEM 318 - Organic Chemistry Lab II Credits: 2
- *Option B:* One chemistry course at the 300 or 400-level (not CHEM 314)

BP Concentration Total: 24-28 credits

▲ 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.

Students who choose to undertake this concentration must complete the biology core and shared courses (listed above) and the supporting requirements with a minimum GPA of 2.00 and fulfill all requirements for bachelor's degrees including the Mason Core and the additional rules for the Biology, BS listed above.

11 Credits of Biotechnology Courses

- BIOL 305 - Biology of Microorganisms Credits: 3
- BIOL 306 - Biology of Microorganisms Laboratory Credits: 1
- BIOL 385 - Biotechnology and Genetic Engineering Credits: 3
- BIOL 483 - General Biochemistry Credits: 4

11 Additional Biology Credits

Of these 11 credits, at least one of the courses must include a laboratory. Choose from:

Laboratory courses:

- BIOL 402 - Applied and Industrial Microbiology Credits: 3 **and** BIOL 403 - Techniques in Applied and Industrial Microbiology Credits: 1
- BIOL 405 - Microbial Genetics Credits: 4
- BIOL 406 - Microbial Physiology and Metabolism Credits: 4
- BIOL 452 - Immunology Credits: 3 **and** BIOL 453 - Immunology Laboratory Credits: 1
- BIOL 486 - Molecular Biology and Biotechnology Laboratory Credits: 2

Non-laboratory courses:

- BIOL 314 - Introduction to Research Design and Analysis Credits: 4
- BIOL 382 - Introduction to Virology Credits: 3
- BIOL 411 - Advanced General Genetics Credits: 3
- BIOL 417 - Selected Topics in Molecular and Cellular Biology Credits: 1-4 *
- BIOL 418 - Current Topics in Microbiology Credits: 3 *
- BIOL 420 - Vaccines Credits: 3
- BIOL 421 - Genetics of Human Diseases Credits: 3
- BIOL 422 - Stem Cell Biology and Regenerative Medicine Credits: 3
- BIOL 482 - Introduction to Molecular Genetics Credits: 3
- BIOL 484 - Eukaryotic Cell Biology Credits: 3
- BIOL 497 - Special Problems in Biology Credits: 1-4 *

Note:

*Registration for BIOL 417, BIOL 418, or BIOL 497 is subject to approval by the Director of Undergraduate Studies and the Chairman of the Department of Biology.

5 Additional Chemistry Credits

- CHEM 314 - Organic Chemistry II Credits: 3
- CHEM 318 - Organic Chemistry Lab II Credits: 2

BTMB Concentration Total: 27 credits

▲ 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.

Students who choose to undertake this concentration must complete the biology core and shared courses (listed above) and the supporting requirements with a minimum GPA of 2.00 and fulfill all requirements for bachelor's degrees including the Mason Core and the additional rules for the Biology, BS listed above.

6 Credits in Environmental and Conservation Biology

- BIOL 318 - Conservation Biology Credits: 3

- BIOL 377 - Applied Ecology Credits: 3

16 Credits of Biology Electives

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

Choose from:

- BIOL 309 - Introduction to Oceanography Credits: 3
- BIOL 314 - Introduction to Research Design and Analysis Credits: 4
- BIOL 326 - Animal Physiology Credits: 3
- BIOL 331 - Invertebrate Zoology Credits: 4
- BIOL 332 - Insect Biology Credits: 4
- BIOL 344 - Plant Diversity and Evolution Credits: 4
- BIOL 345 - Plant Ecology Credits: 4
- BIOL 350 - Freshwater Ecosystems Credits: 4
- BIOL 355 - Ecological Engineering and Ecosystem Restoration Credits: 4
- BIOL 379 - RS: Ecological Sustainability Credits: 4
- BIOL 440 - Field Biology Credits: 0-4
- BIOL 446 - Ecological and Evolutionary Physiology Credits: 3
- BIOL 449 - Marine Ecology Credits: 3
- BIOL 450 - Marine Conservation Credits: 3
- BIOL 454 - Marine Mammal Biology and Conservation Credits: 3
- BIOL 455 - Marine Mammal Biology and Conservation Field Course Credits: 1
- BIOL 457 - Reproductive Strategies Credits: 3
- BIOL 459 - Fungi and Ecosystems Credits: 3
- BIOL 468 - Vertebrate Natural History Credits: 4
- BIOL 472 - Introductory Animal Behavior Credits: 3 **and** BIOL 473 - Introductory Laboratory in Animal Behavior Credits: 1
- BIOL 480 - The Diversity of Fishes Credits: 3

3-8 Additional Credits

Students are encouraged to consult with a biology faculty advisor to determine which of the following options (A, B, or C) best meets their career goals.

- *Option A:* CHEM 314 - Organic Chemistry II Credits: 3 **and** CHEM 318 - Organic Chemistry Lab II Credits: 2
- *Option B*: One chemistry course at the 300 or 400-level (not CHEM 314)
- *Option C:* GEOL 101 - Introductory Geology I Credits: 4 **and** GEOL 102 - Introductory Geology II Credits: 4 (Mason Core: Natural Science courses)

ESCB Concentration Total: 25-30 credits

▲ 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.

Students who choose to undertake this concentration must complete the biology core and shared courses (listed above) and the supporting requirements with a minimum GPA of 2.00 and fulfill all requirements for bachelor's degrees including the Mason Core and the additional rules for the Biology, BS listed above.

16 Credits of Microbiology Courses

- BIOL 305 - Biology of Microorganisms Credits: 3
- BIOL 306 - Biology of Microorganisms Laboratory Credits: 1
- BIOL 405 - Microbial Genetics Credits: 4
- BIOL 406 - Microbial Physiology and Metabolism Credits: 4
- BIOL 407 - Microbial Diversity Credits: 4

6 Credits of Biology Electives

Choose from:

- BIOL 314 - Introduction to Research Design and Analysis Credits: 4
- BIOL 382 - Introduction to Virology Credits: 3
- BIOL 385 - Biotechnology and Genetic Engineering Credits: 3
- BIOL 402 - Applied and Industrial Microbiology Credits: 3
- BIOL 403 - Techniques in Applied and Industrial Microbiology Credits: 1
- BIOL 404 - Medical Microbiology Credits: 3
- BIOL 418 - Current Topics in Microbiology Credits: 3
- BIOL 420 - Vaccines Credits: 3
- BIOL 452 - Immunology Credits: 3
- BIOL 453 - Immunology Laboratory Credits: 1
- BIOL 459 - Fungi and Ecosystems Credits: 3
- BIOL 483 - General Biochemistry Credits: 4

5 Additional Chemistry Credits

- CHEM 314 - Organic Chemistry II Credits: 3
- CHEM 318 - Organic Chemistry Lab II Credits: 2

MIB Concentration Total: 27 credits

Mason Core and Elective Credits (23-47 credits)

The remaining credits (see below for specific credit counts by concentration) are available to fulfill any remaining Mason Core requirements (outlined below). Once those and all requirements for bachelor's degrees are met, any remaining credits may be completed by elective courses. Students are strongly encouraged to consult with their advisor to ensure that they fulfill all requirements.

- Without concentration: 38-46 credits
- BIED concentration: 23-31 credits
- BP concentration: 40-47 credits
- BTMB concentration: 41-44 credits
- ESCB concentration: 38-46 credits

- MIB concentration: 41-44 credits

Mason Core

Please note that some Mason Core requirements may already be fulfilled by the major requirements listed above.

Expand each item below for a link to specific course lists for each category:

Foundation Requirements (15-19 credits)

- Mason Core UWCU - Written Communication Credits: 6
- Mason Core UOC - Oral Communication Credits: 3
- Mason Core UQR - Quantitative Reasoning Credits: 3
- Mason Core UITC - Information Technology Credits: 3-7

Core Requirements (22 credits)

- Mason Core UFA - Arts Credits: 3
- Mason Core UGU - Global Understanding Credits: 3
- Mason Core ULIT - Literature Credits: 3
- Mason Core UNSL - Natural Science Credits: 7
- Mason Core USBS - Social and Behavioral Sciences Credits: 3
- Mason Core UWC - Western Civilization/Western History Credits: 3

Synthesis/Capstone Requirement (minimum 3 credits)

- Mason Core USYN - Synthesis/Capstone Credits: minimum 3

Degree Total: Minimum 120 credits