Program Change Request

Date Submitted: 02/23/24 3:56 pm

Viewing: SC-MS-BIOL : Biology, MS

Last approved: 03/31/23 2:08 pm

Last edit: 03/01/24 10:24 am

Changes proposed by: jbazaz

Catalog Pages Using this Program

Biology, MS

No Longer Anticipated closure date (i.e., calendar Rationale for

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

No

Effective Catalog: 2024-2025

Program Level: Graduate

Program Type: Master's

Degree Type: Master of Science

Title:

Biology, MS

Approval Criteria

1. What was the process used within your academi
2. Who was involved in approving the badge?
3. What evidence was used to identify need/demand
4. Please attest to the following statements regardi
a. Have you ensured there are no other existing badges
b. Has CPE confirmed the proposed badge does not
c. Has the instructor(s) for this badge experience been
d. Is there a contact hour minimum?
e. Is an assessment required?
f. Does this badge provide a benefit for current or
5. Is this badge co-sponsored with another organization, association, or unit? (If you would like an
a. What is the organization, program, or department

Earning Criteria

Course:

In Workflow

1. SSB CC
2. SSB Program Chair
3. SC Curriculum Committee
4. SC Assistant Dean
5. Assoc Provost-Graduate
6. Registrar-Programs

Approval Path

1. 03/01/24 10:42 am Ramin Hakami (rhakami): Approved for SSB CC
2. 03/22/24 11:43 am Iosif Vaisman (ivaisman): Approved for SSB Program Chair

History

1. Nov 16, 2017 by clmig-jwehrheim
2. Mar 15, 2018 by rzachari
3. Sep 30, 2019 by Jennifer Bazaz Gettys (jbazaz)
4. Feb 5, 2020 by Jennifer Bazaz Gettys (jbazaz)
5. Aug 4, 2020 by Jennifer Bazaz Gettys (jbazaz)

Badge:
Participant:
Payment:
Portfolio:
Presentation:
Assessment:
Credential:
Education
Other:
Project:
Professional
Schedule/Registration:
Volunteer:

Skills Tag

Skills Tag

Badge Attributes

Please select one from each category:
Achievement Type:
Mastery Level:
Time Commitment:
Cost:
Industry Standards:
Recommendations:

Issuance information and Pricing

Pricing: See https://cpe.gmu.edu/digitalbadgepricing/ for more information

Estimated Number of Badges Expected to be Issued:

Notes:

- All badge requests will be routed to CPE for review and approval. Please allow 7
- A Mason Digital Credentials Advisory Group may be developed to review badge

6. Oct 30, 2020 by Tory Sarro (vsarro)
7. Jan 29, 2021 by Jennifer Bazaz Gettys (jbazaz)
8. Feb 23, 2021 by jriemen
9. Mar 7, 2021 by jriemen
10. Feb 8, 2022 by Jennifer Bazaz Gettys (jbazaz)
11. May 2, 2022 by Jennifer Bazaz Gettys (jbazaz)
12. Sep 28, 2022 by Jennifer Bazaz Gettys (jbazaz)
13. Mar 31, 2023 by Jennifer Bazaz Gettys (jbazaz)

Banner Title:	Biology, MS
Is this a retitling of an existing program?	
Existing Program	
Registrar/OAPI Use Only – SCHEV Status	Approved
Registrar's Office Use Only – Program Start Term	
Registrar/OAPI Use Only – SCHEV Letter	
Registrar/OAPI Use Only – SACSCOC Status	

Concentration(s):

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
1	Evolutionary Biology	EB
2	Microbiology and Infectious Disease	MID
3	Molecular Biology	MOB
4	Neuroscience	NEUR
5	Nutrition Genetics and Nutraceuticals	NGN
6	Translational and Clinical Research	TCR

INTO Major(s):

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: School of Systems Biology

Jointly Owned Program? No

Participating

Participating

Justification

What: Referring applicants to central admissions language and removing extraneous wording.

Why: To make the program more adaptable to changes in university policies.

Catalog Published Information

Total Credits Required: Total credits: 30

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

Registrar/IRR Use Only – Program CIP Code

Admission Requirements:

Admissions

University-wide admissions policies can be found in the Graduate Admissions Policies section of this catalog. International students and students having earned international degrees should also refer to Admission of International Students for additional requirements.

~~To apply for this program, please complete the George Mason University Admissions Application.~~Eligibility

While each applicant's qualifications are reviewed as a whole, the following are required: Applicants to the program must have a bachelor's degree in biology or other relevant fields from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent. Additionally, all MS concentrations require a GPA of 3.00 in biology coursework or in the last 60 credits of undergraduate study.

~~study.~~

~~Prospective students should supply a copy of official transcripts from each college and graduate institution attended, a current résumé, and an expanded goalsstatement.Applicants should also include two letters ofrecommendation.TOEFL or IELTS scores are required for all internationalapplicants.~~Previous research experience or relevant employment is a plus.

~~plus. Admission is contingent on acceptance by a faculty research advisor.~~

Admission is contingent upon acceptance by a faculty research advisor.

~~The GRE is not required for admission into thisprogram.~~Evolutionary Biology (EB) Concentration Applicants

Students who choose the Evolutionary Biology concentration must also submit a personal statement/statement of interest consistent with at least one faculty member's research program.

Microbiology and Infectious Disease (MID) Concentration Applicants

Students who choose the Microbiology and Infectious Disease concentration must also have a lecture and lab course in microbiology and a lecture course in biochemistry.

Application Requirements

To apply for this program, prospective students should submit the George Mason University Admissions Application and its required supplemental documentation, a goals statement, and two letters of recommendation.
The GRE is not required for admission into this program.

Program-Specific Policies:

Policies

For policies governing all graduate programs, see AP.6 Graduate Policies.

Transferring Previous Graduate Credit into this Program

Previously earned and relevant graduate credits may be eligible for transfer into this program; details can be found in the Credit by Exam or Transfer section of this catalog.

Degree Requirements:

Students should refer to the Admissions & Policies tab for specific policies related to this program.
Candidates for the Biology, MS must complete the Core Courses and may choose one concentration or the MS without concentration requirements, detailed below, for a total of 30 credits (minimum).

Program of Study

The faculty advisor and the student work together to develop a program of study that best fits the student's background and interests. The student must submit a program of study to the program director for approval within the first 12 credits of coursework. By the end of the second semester of coursework, students will form a graduate committee made up of three faculty members. At least two committee members must be full-time faculty in the School of Systems Biology.
Students must complete all core courses and choose one concentration option:

Core Courses

Cell and Molecular Requirement		3
BIOL 682	Advanced Eukaryotic Cell Biology	
or BIOS 744	Molecular Genetics	
Professional Methods Requirement		4
BIOL 690	Introduction to Graduate Studies in Biology	
Choose one from the following:		
BIOL 689	Interdisciplinary Tools in the Biosciences	
BIOL 691	Current Topics in Biology 1	
or BIOS 702	Research Methods	
NEUR 702	Research Methods	
Seminar Requirement		3
Select a total of 3 credits from the following courses:		
BINF 704	Colloquium in Bioinformatics	
BIOL 692	Seminar in Biology (may be repeated) 2	
BIOL 695	Seminar in Molecular, Microbial, and Cellular Biology (may be repeated) 3	
BIOS 704	Topics in Biosciences	
Systems Biology/Evolution Requirement		3
BIOL 691	Current Topics in Biology 4	
or BIOL 502	Adaptation in Biosystems	
or BMED 604	Fundamentals of Human Physiology	
Research Requirement		2-6

Students have the option to complete a 2-3 credit research project (BIOL 798 Master's Research Project) or a 3-5 credit master's thesis (BIOL 799 Thesis). In accordance with AP.6 Graduate Policies, the same quality of work is expected of students regardless of which option they choose.

Research Project: The MS project is most appropriate for students who have scheduling commitments, such as a full-time job, that may preclude performing a complete series of laboratory experiments. Students pursuing the project option must successfully complete written and oral comprehensive exams. Additionally, students should

present their research orally or as a poster to a community outside of the classroom, at Mason conferences or at external conferences.

Thesis: In general, the MS thesis is most appropriate for students planning or considering a research career. Students pursuing the thesis option must write a formal thesis that meets the requirements of the school and must defend their thesis and present their results in a public seminar.

Select a Research Project or a Master's Thesis

BIOL 798	Master's Research Project (2-3 credits)	
BIOL 799	Thesis (3-5 credits)	
Total Credits		15-19

1
When the topic is "Research Methods," or "Creativity and Innovation," or "Principles of Biomedical Literature Review".

2
May be taken up to two times in this program under different topics.

3
May be taken up to six times in this program under different topics.

4
BIOL 691 Current Topics in Biology is permissible when the topic is "Fun Concepts of Evolution".

5
Available only to students in the Advanced Biomedical Sciences Graduate Certificate.

MS without Concentration

General Coursework 12

In consultation with an advisor, select at least 12 credits of graduate coursework from BIOL, BIOS, BMED, or NEUR-prefixed courses. Suggestions include:

BIOL 508	Selected Topics in Animal Biology 1
BIOL 553	Advanced Topics in Immunology
BIOL 566	Cancer Genomics
BIOL 568	Advanced Topics in Molecular Genetics 2
BIOL 575	Selected Topics in Genetics
BIOL 579	Molecular Evolution and Conservation Genetics
BIOL 583	General Biochemistry
BIOL 585	Eukaryotic Cell Biology Laboratory
BIOL 667	Signal Transduction in Cancer
BIOL 693	Directed Studies in Biology 3
or BINF 795	Bioinformatics Internship
BIOL 793	Research in Biology
BIOS 740	Laboratory Methods in Functional Genomics and Biotechnology
BIOS 741	Genomics
BIOS 742	Biotechnology
BIOS 743	Genomics, Proteomics, and Bioinformatics
BIOS 744	Molecular Genetics

BIOS 767	Molecular Evolution	
BMED 604	Fundamentals of Human Physiology 4	
Total Credits:		30

1

Suggested section topics: "Research and Development in a Biotechnology Company," "Biology of Obesity and Weight Loss," "Human Anatomy," or "Medical Biochemistry". Other relevant topics may only be applied toward the degree with advisor approval.

2

When the topic is "Epigenetics".

3

- No more than 3 credits of directed study or internship can be applied.
- Topics should be relevant and approved by the program director.

4

Course is only available for students also enrolled in the Advanced Biomedical Sciences Graduate Certificate.

Concentration in Evolutionary Biology (EB)

Populations and Species		3-6
Select 3-6 credits from the following:		
BIOL 574	Population Genetics	
BIOL 579	Molecular Evolution and Conservation Genetics	
or BIOS 767	Molecular Evolution	
BIOL 648	Population Ecology	
BIOL 691	Current Topics in Biology	
Organismal Biology		3-6
Select 3-6 credits from the following:		
BIOL 501	Microbial Diversity: An Organismal Approach	
BIOL 507	Selected Topics in Ecology	
BIOL 508	Selected Topics in Animal Biology	
BIOL 518	Conservation Biology	
BIOL 528	Planetary Health	
BIOL 532	Animal Behavior	
BIOL 533	Selected Topics in Plant Biology	
BIOL 537	Ornithology	
BIOL 538	Mammalogy	
BIOL 539	Herpetology	
BIOL 543	Tropical Ecosystems	
BIOL 559	Fungi and Ecosystems	
BIOL 566	Cancer Genomics	
BIOL 581	Estuarine and Coastal Ecology	
BIOL 582	Estuarine and Coastal Ecology Laboratory	
BIOL 643	Microbial Ecology	
EVPP 536	The Diversity of Fishes	

Molecular Techniques	3-4

Select 3-4 credits from the following:

BIOL 693	Directed Studies in Biology 1
or BINF 795	Bioinformatics Internship
BINF 630	Bioinformatics Methods
BIOS 716	Methods in Evolutionary Biology
EVPP 515	Molecular Environmental Biology I
EVPP 615	Molecular Environmental Biology II

Electives	2-6

If needed in order to reach a total of 30 credits, select from the following courses: 2

BIOL 693	Directed Studies in Biology 1
or BINF 795	Bioinformatics Internship
BIOS 741	Genomics
Any additional course listed in the Core Courses section	

Total Credits:	30

1

- No more than 3 credits of directed study or internship can be applied to this concentration.
- Topics should be relevant to the concentration and should be approved by the program director.

2

Other relevant graduate-level coursework may be selected in consultation with the advisor.

Concentration in Microbiology and Infectious Disease (MID)

Microbiology and Infectious Diseases	12

In consultation with an advisor, select 12 credits from the following:

BINF 739	Topics in Bioinformatics 1
BIOL 553	Advanced Topics in Immunology
BIOL 563	Virology
BIOL 685	Emerging Infectious Diseases
BIOL 693	Directed Studies in Biology 2
BIOL 669	Pathogenic Microbiology
BIOL 715	Microbial Physiology

Electives	0-3

If needed to reach a total of 30 credits, select from the following courses:

BIOL 508	Selected Topics in Animal Biology 3
BIOL 560	Infectious Diseases of Wildlife
BIOL 564	Techniques in Virology
BIOL 583	General Biochemistry
BIOL 718	Techniques in Microbial Pathogenesis
BIOS 742	Biotechnology
Any additional course listed in the Core Courses section	

Total Credits:	30

1

When the topic is "Computational Analysis: Viral Genomes".

2

- No more than 3 credits of directed study can be applied to this concentration.
- Topics should be relevant to the concentration and should be approved by the program director.

3

When the topic is "Water and Disease".

Concentration in Molecular Biology (MOB)

Molecular Biology	12

In consultation with an advisor, select 12 credits from the following:

BIOL 508	Selected Topics in Animal Biology 1
or BIOL 583	General Biochemistry
BIOL 568	Advanced Topics in Molecular Genetics
BIOL 579	Molecular Evolution and Conservation Genetics
or BIOS 767	Molecular Evolution
BIOL 580	Computer Applications for the Life Sciences
or BINF 630	Bioinformatics Methods
BIOL 583	General Biochemistry
BIOL 585	Eukaryotic Cell Biology Laboratory
BIOL 678	Cell-Based Assays
BIOL 693	Directed Studies in Biology 2
or BINF 795	Bioinformatics Internship
BIOS 701	Systems Biology
BIOS 716	Methods in Evolutionary Biology
BIOS 742	Biotechnology
or BINF 633	Molecular Biotechnology
BINF 739	Topics in Bioinformatics
NEUR 651	Molecular Neuropharmacology

Electives	0-3

If needed to reach a total of 30 credits, select from the following courses:

BINF 641	Biomolecular Modeling
BIOL 693	Directed Studies in Biology 2
or BINF 795	Bioinformatics Internship
BIOS 741	Genomics
NEUR 592	Special Topics in Neuroscience 3
or NEUR 689	Topics in Neuroscience
CHEM 564	General Biochemistry II
CHEM 660	Protein Biochemistry
Any additional course listed in the Core Courses section	

Total Credits:	30

1

When the topic is "Research and Development in a Biotechnology Company," or "Medical Biochemistry".

2

- No more than 3 credits of directed study or internship can be applied to this concentration.
- Topics should be relevant to the concentration and should be approved by the program director.

3

When the topic is "Glutamatergic Systems" or "Epigenetics".

Concentration in Neuroscience (NEUR)

Statistics		3
Select 3 credits from the following:		
BINF 530	Introduction to Bioinformatics Methods	
BINF 630	Bioinformatics Methods	
BINF 702	Biological Data Analysis	
BIOL 691	Current Topics in Biology 1	
STAT 535	Analysis of Experimental Data	
STAT 544	Applied Probability	
STAT 554	Applied Statistics I	
Neurobiology		9
In consultation with an advisor, select 9 credits from the following, at least 6 of which must be in NEUR-prefixed courses:		
BIOL 508	Selected Topics in Animal Biology 2	
BIOL 568	Advanced Topics in Molecular Genetics 3	
BIOL 693	Directed Studies in Biology 4	
or BINF 795	Bioinformatics Internship	
NEUR 592	Special Topics in Neuroscience	
NEUR 601	Developmental Neuroscience	
NEUR 602	Cellular Neuroscience	
NEUR 603	Mammalian Neuroanatomy	
NEUR 612	Bioscience, Neurotechnology Society	
NEUR 621	Synaptic Plasticity	
NEUR 634	Neural Modeling	
NEUR 651	Molecular Neuropharmacology	
NEUR 689	Topics in Neuroscience (any topic is allowed; may be repeated)	
NEUR 701	Neuroscience Laboratory	
NEUR 709	Neuroscience Seminars	
NEUR 710	Special Topics in Neuroscience	
NEUR 734	Computational Neurobiology	
NEUR 741	Introduction to Neuroimaging	
Electives		0-3
If needed to reach a total of 30 credits, select from the following:		
BIOL 583	General Biochemistry	
BIOL 691	Current Topics in Biology 5	

or BIOS 743	Genomics, Proteomics, and Bioinformatics	
BIOL 693	Directed Studies in Biology 4	
or BINF 795	Bioinformatics Internship	
Any additional NEUR-prefixed course at the 500-700 levels		
Other relevant graduate-level coursework may be selected in consultation with the advisor		
Total Credits:		30

1

When the topic is "MATLAB for Brain, Biological, and Cognitive Scientists".

2

When the topic is "Biology of Obesity and Weight Loss".

3

When the topic is "Epigenetics".

4

- No more than 3 credits of directed study or internship can be applied to this concentration.
- Topics should be relevant to the concentration and should be approved by the program director.

5

When the topic is "Genomics, Proteomics, and Bioinformatics".

Concentration in Nutrition Genetics and Nutraceuticals (NGN)

Nutrition		6
In consultation with an advisor, choose 6 credits from the following:		
BIOL 508	Selected Topics in Animal Biology 1	
NUTR 522	Nutrition Across the Lifespan	
NUTR 553	Nutrients	
NUTR 651	Nutrition Assessment	
NUTR 670	Nutrition Research Methods	
Human Diseases		6
In consultation with an advisor, choose 6 credits from the following:		
BIOL 508	Selected Topics in Animal Biology (when the topic is "Medical Biochemistry")	
BIOL 566	Cancer Genomics	
or BIOL 667	Signal Transduction in Cancer	
BIOL 586	Medical Biochemistry	
BIOL 666	Human Genetics Concepts for Health Care	
BIOS 743	Genomics, Proteomics, and Bioinformatics	
NUTR 662	Medical Nutrition Therapy I	
Electives		
If needed to reach a total of 30 credits, select from the following courses:		
BIOL 508	Selected Topics in Animal Biology 2	
BIOL 562	Personalized Medicine	
BIOL 568	Advanced Topics in Molecular Genetics	
BIOL 583	General Biochemistry	
BIOL 693	Directed Studies in Biology 3	

	or BINF 795Bioinformatics Internship	
	CHEM 564 General Biochemistry II	
	Any additional course listed in the Core Courses section	
Total Credits		30

1

When the topic is "Biology of Obesity and Weight Loss," or "Medical Biochemistry".

2

When the topic is "Research and Development in Biotechnology Companies".

3

- No more than 3 credits of directed study or internship can be applied to this concentration.
- Topics should be relevant to the concentration and should be approved by the program director.

Concentration in Translational and Clinical Research (TCR)

Translational and Clinical Research 1		12
In consultation with an advisor, select 12 credits from the following:		
BIOL 508	Selected Topics in Animal Biology 2	
BIOL 562	Personalized Medicine	
BIOL 566	Cancer Genomics	
BIOL 666	Human Genetics Concepts for Health Care	
BIOL 667	Signal Transduction in Cancer	
BIOL 691	Current Topics in Biology 3	
or BIOS 743	Genomics, Proteomics, and Bioinformatics	
BIOL 693	Directed Studies in Biology 4	
or BINF 795	Bioinformatics Internship	
BMED 603	Cell Biology and Microscopic Anatomy 5	
BMED 604	Fundamentals of Human Physiology 5	
BMED 605	Introduction to Human Anatomy 5	
Electives		0-3
If needed to reach a total of 30 credits, select from the following courses:		
BIOL 508	Selected Topics in Animal Biology 6	
BIOL 568	Advanced Topics in Molecular Genetics	
BIOL 693	Directed Studies in Biology 4	
or BINF 795	Bioinformatics Internship	
BIOS 741	Genomics	
	Any additional course listed in the Core Courses section	
	Other relevant graduate-level coursework may be selected in consultation with the advisor	
Total Credits:		30

1

For students concurrently enrolled in the Advanced Biomedical Sciences Graduate Certificate, contact your advisor for details regarding:

- BMED course credit that may be counted towards this concentration
- Meeting the requirements for graduate certificates and for master's degrees

2

When the topic is "Research and Development in a Biotechnology Company," "Biology of Obesity and Weight Loss," or "Medical Biochemistry".

3

When the topic is "Genomics/Proteomics/Bioinformatics".

4

- No more than 3 credits of directed study or internship can be applied to this concentration.
- Topics should be relevant to the concentration and should be approved by the program director.

5

Course is only available for students enrolled in the Advanced Biomedical Sciences Graduate Certificate.

6

When the topic is "Research and Development in a Biotechnology Company".

Retroactive Requirements Updates:

Plan of Study:

Honors Information:

Accelerated Description/Dual Degree Description:

INTO-Mason Requirements:

College Requirements & Policies:

Department / Academic Unit Requirements & Policies:

Program Outcomes

Additional Program Information

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

Courses offered via distance (if applicable):

Indicate whether students are able

What is the primary delivery	Both Face-to-Face and Distance

format for the program?

Does any portion of this program occur off-campus?

No

Off-campus details:

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

No

Please explain:

Related Departments

Department
Health & Human Services

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

No

Please explain:

Are you adding or removing a licensure component?

No

Please explain:

Additional SCHEV & SACSCOC Information

Is the content of the new program closely related to that of an existing approved program at the same instructional level (i.e., baccalaureate, master's, doctoral)?

Which existing approved program(s)?

Is this new program considered to be "advancing the degree level of a currently approved program" (i.e. existing content is at lower degree level, new content is at the higher degree level)?

Which existing approved program(s)?

Is this new program considered to be "lowering the degree level of a currently approved program" (i.e existing content is at higher degree level, new content is at the lower degree level)?

Which existing approved program(s)?

Is this a re-opening of a program that was closed to admission within the last five years?

Date of Program Closure

What are the methods of delivery for the program?

Does this program include a course/credit-based competency-based education delivery option?

Is this change a simple retitling of an existing program, with no other changes, to any existing program content, curriculum requirements, etc?

No

Does this change represent a repackaging of content in an existing approved degree/certificate program at the same instructional level (i.e., baccalaureate, master's, or doctoral)?

No

Which existing approved program(s)?

Percentage of total credits containing new course content. ("New course content" is defined by SACSCOC as content that is not currently included in an existing approved degree/certificate program at the same instructional level. Do not exclude gen ed credits in calculations for undergraduate programs.)

0%-24%

Does this change include the addition of a distance education or face-to-face method of delivery for this program?

No

What is the new method of delivery?

Does this change include the addition of a course/credit-based competency-based education delivery option?

No

Will any additional equipment/facilities be needed?

No

Description of institutional impact:

Will any additional faculty be required?

No

Description of institutional impact:

Will any additional financial resources be needed?

No

Description of institutional impact:

Additional library/learning resources needed?

No

Description of institutional impact:

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Green Leaf Program Designation

Is this a Green Leaf program? No

Green Leaf Designation

Sustainability-focused academic programs require at least one green leaf course. Either that course is itself sustainability-focused or else the program requires a set of sustainability-related courses with aggregated

Relationship to Existing Courses

Relationship to Existing Programs

List sustainability-focused courses currently required in the degree

Sustainability-related academic programs either require at least one sustainability-related course or else offer any green leaf course as an option or elective. *

List sustainability-related courses currently required in the degree

Does this program cover material which crosses into another department?

No

Impacted Departments

Additional Attachments

SCHEV Proposal

Executive Summary

Reviewer Comments

Additional Comments

Is this course required of all students in this degree program?

%wi_required.eschtml%

Attached Document

Key: 418