Program Change Request

Date Submitted: 10/07/22 3:13 pm

Viewing: SC-PHD-BIOS : Biosciences, PhD

Last approved: 04/27/22 2:50 pm

Last edit: 11/22/22 11:51 am

Changes proposed by: jbazaz

Catalog Pages Using this Program

Biosciences, PhD

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

Yes

Requestor:

In Workflow

1. **SSB Program Chair**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Programs

Approval Path

1. 11/03/22 1:46 pm Iosif Vaisman (ivaisman): Approved for SSB Program Chair

History

1. Nov 16, 2017 by clmig-jwehrheim
2. Oct 19, 2018 by Jennifer Bazaz Gettys (jbazaz)
3. Mar 5, 2020 by jriemen
4. Feb 23, 2021 by jriemen
5. Feb 26, 2021 by jriemen
6. Jan 19, 2022 by Jennifer Bazaz Gettys (jbazaz)
7. Apr 27, 2022 by Jennifer Bazaz Gettys (jbazaz)

Name	Extension	Email
Diane St. Germain	4263	dstgerma

Effective Catalog: 2023-2024

Program Level: Graduate

Program Type: Doctoral

Degree Type: Doctor of Philosophy

Title: Biosciences, PhD

Banner Title: Biosciences, PhD

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	Cell and Molecular Biology	CMB
2	Microbiology and Infectious Disease	MID
3	Biocomplexity and Evolutionary Biology	BEB

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: School of Systems Biology

Jointly Owned Program? No

Justification

What: Adding additional electives to the concentrations.

Why: To ease student advising.

Total Credits Required:	Total credits: 72
Registrar's Office Use Only - Program Code:	SC-PHD-BIOS
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.
To apply for this program, please complete the George Mason University Admissions Application.

Application Requirements

The following are required of applicants to this program:

- Minimum 3.25 GPA in previous coursework with significant training in the biological sciences from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent. Applicants are to supply a copy of official transcripts from each college and graduate institution attended.
- Three letters of recommendation from faculty members or individuals who have firsthand knowledge of the applicant's academic or professional capabilities.
- An expanded goal statement consistent with the research interests of at least one faculty member in the program.
- A current resume.
- TOEFL or IELTS scores are required of international students.

An interview may also be required. Applications should be submitted by January 1st for fall admission. Under unusual circumstances, applications may be considered for spring admission if they are received by October 1st. Applications will be considered until positions are filled. Students are encouraged to meet application deadlines to be considered for scholarships and stipends.

Strong candidates who lack several prerequisites may be admitted to provisional status. Removal from provisional status and continuation in the program is contingent on earning a GPA of 3.25 in the program's fundamental courses, plus completion of missing prerequisites.

Students who have not taken a course in basic biochemistry will be required to complete one prior to BIOS 701 Systems Biology.

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.

Reduction of Credits

For students entering the doctoral program with a master's degree in a related field from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency or international equivalent, the number of required credits may be reduced up to 30 credits, subject to approval of the program faculty and the college's associate dean for student affairs.

Transfer of Credit

Graduate credits taken previously and not used toward another degree may be transferred, subject to the approval of the advisor, the program director, and the associate dean. See AP.6.5 Credit by Exam, Reduction or Transfer for more information.

Degree Requirements:

Students should refer to the Admissions & Policies tab for specific policies related to this program.
Students in the doctoral program are required to present two research papers at a meeting or conference any time before graduation.

Doctoral Coursework

Bioscience Core

BIOL 682	Advanced Eukaryotic Cell Biology	3
Six credits or two instances of		6
BIOS 703	Laboratory Rotation	
Three credits of		3
BIOS 704	Topics in Biosciences	
Total Credits		12

Concentration in Cell and Molecular Biology (CMB)

This concentration prepares students for significant contributions in an academic or industrial research career. Coursework covers microarray analysis of gene expression, proteome analysis, sequencing and analysis of gene polymorphisms, gene and genome evolution, molecular studies of disease mechanisms, mechanisms of toxicology and mutagenesis, developmental neuroscience, and biotechnological applications.

Select 12 credits from the following: [1]		12
BIOL 666	Human Genetics Concepts for Health Care	
BIOL 667	Signal Transduction in Cancer	
BIOL 689	Interdisciplinary Tools in the Biosciences	

BIOS 702	Research Methods	
BIOS 740	Laboratory Methods in Functional Genomics and Biotechnology	
BIOS 741	Genomics	
BIOS 742	Biotechnology	
BIOS 743	Genomics, Proteomics, and Bioinformatics	
BIOS 767	Molecular Evolution	
Total Credits		12

1 Students may take other courses as approved by their advisor.

Concentration in Microbiology and Infectious Disease (MID)

Students in this concentration will be prepared for employment in academia, government, or industry. By stressing mechanisms of pathogenicity, physiology, metabolism, and genomic and proteomic analysis of pathogens, students will have a firm foundation for future research in infectious disease. Students will also be introduced to advanced laboratory practices, such as animal research methodologies and biocontainment laboratory work.

Select 12-13 credits from the following:		12-13
BIOL 553	Advanced Topics in Immunology	
BIOL 563	Virology	
BIOL 583	General Biochemistry	
BIOL 669	Pathogenic Microbiology	
BIOL 689	Interdisciplinary Tools in the Biosciences	
BIOL 715	Microbial Physiology	
BIOS 702	Research Methods	
Total Credits		12-13

1 Students may take other courses as approved by their advisor.

Concentration in Biocomplexity and Evolutionary Biology (BEB)

This concentration prepares students for careers in academia, government or industry. Through this concentration students will learn laboratory and quantitative skills that will enable them to investigate evolutionary relationships among organisms at the population, species or ecosystem level. Students will be encouraged to explore a wide range of coursework in order to develop a broad background in evolutionary biology and a deep knowledge of relevant methodologies necessary to keep abreast in this rapidly changing field.

The science of evolutionary biology is fundamentally concerned with documenting not only genetic change, but also the processes that cause it. Evolutionary biology includes paleobiology, population genetics, evolutionary ecology and phylogenetics. Biocompexity is the study of living organisms, including their unique structural, chemical and genetic properties, their distribution and abundance in nature, and their evolutionary relationships to all other organisms. Given the fact that most of the earth's biodiversity is unknown, collecting, cataloging and studying organisms have always been and will continue to be one of the most challenging aspects of biology.

Select 12 credits from the following:		12
BIOL 502	Adaptation in Biosystems	
BIOL 574	Population Genetics	
BIOL 585	Eukaryotic Cell Biology Laboratory	

BIOL 689	Interdisciplinary Tools in the Biosciences	
BIOS 716	Methods in Evolutionary Biology	
BIOS 767	Molecular Evolution	
Total Credits		12

Electives

Select 23-36 credits from the following lists associated with the chosen concentration:		23-36
Cell and Molecular Biology & Microbiology and Infectious Disease Concentrations		
BIOL 564	Techniques in Virology	
BIOL 568	Advanced Topics in Molecular Genetics	
BIOL 579	Molecular Evolution and Conservation Genetics	
BIOL 580	Computer Applications for the Life Sciences	
BIOL 667	**Signal Transduction in Cancer**	
BIOL 685	Emerging Infectious Diseases	
BIOL 689	**Interdisciplinary Tools in the Biosciences**	
BIOL 718	Techniques in Microbial Pathogenesis	
BIOS 701	Systems Biology	
BIOS 702	Research Methods	
BIOS 710	Current Topics in Bioscience	
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 898	Directed Studies in Biosciences	
BIOS 899	Directed Research in Biosciences	
BINF 633	Molecular Biotechnology	
BINF 641	Biomolecular Modeling	
BINF 705	Research Ethics	
Biocomplexity and Evolutionary Biology Concentration 1		
BIOL 506	Selected Topics in Microbiology	
BIOL 507	Selected Topics in Ecology	
BIOL 508	Selected Topics in Animal Biology	
BIOL 518	Conservation Biology	
BIOL 527	**Conservation Medicine**	
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 561	Comparative Animal Physiology
BIOL 566	Cancer Genomics
BIOL 638	**Sensory Ecology**
BIOL 572	Human Genetics
BIOL 573	Developmental Genetics
BIOL 643	Microbial Ecology
BIOL 648	**Population Ecology**
BIOL 667	**Signal Transduction in Cancer**
BIOL 689	**Interdisciplinary Tools in the Biosciences**
BIOL 715	Microbial Physiology
BIOS 741	Genomics
BIOS 742	Biotechnology
BIOS 743	Genomics, Proteomics, and Bioinformatics
BIOS 744	Molecular Genetics
BIOS 898	Directed Studies in Biosciences
BIOS 899	Directed Research in Biosciences
EVPP 536	The Diversity of Fishes
GEOL 501	Selected Topics in Modern Geology (may be repeated once)
GEOL 534	Vertebrate Paleontology
Total Credits	23-36

1Students may take other courses related to their research topic if approved by their committee. Courses in Geographic Information Systems or Statistics are encouraged.

Dissertation Committee

Upon admission to the program, each student is assigned an advisor from the bioscience faculty. The advisor may be changed by mutual consent of student and advisor, or petition to the program director and associate dean. With their advisor, students adopt an individual program that focuses on a specific area of research.

By the end of the fourth semester of coursework, students assemble a dissertation committee of four graduate faculty members with representation from at least two academic departments. The faculty advisor and the program director approve the program of study.

Qualifying Examination

On nearing completion of course requirements, students take a qualifying exam with a written and an oral component. At the discretion of the committee, the written qualifying exam may be retaken once if the student's performance was deemed below satisfaction.

Advancement to Candidacy

Upon successful completion of the qualifying exam, the majority of all coursework, and an accepted dissertation proposal, students will be recommended for advancement to candidacy by the committee and the program director.

The semester after advancement to candidacy, students are eligible to enroll in dissertation research (BIOS 999 Doctoral Dissertation Research). Students must review their progress on the dissertation with their graduate committee on a regular basis until graduation.

Dissertation Research

No more than 24 combined credits from BIOS 998 Doctoral Dissertation Proposal and BIOS 999 Doctoral Dissertation Research may be applied toward satisfying doctoral degree requirements. Students register for a minimum of 3 credits of BIOS 999 Doctoral Dissertation Research in the first semester of advancement.

Select 12-24 credits from the following:		12-24
BIOS 998	Doctoral Dissertation Proposal	
BIOS 999	Doctoral Dissertation Research	
Total Credits		12-24

Doctoral Dissertation

After advancing to doctoral candidacy, students work with their dissertation committee to develop their dissertation proposal into a completed doctoral dissertation. The dissertation research should represent a significant contribution that is publishable in a refereed scientific journal. When the dissertation is complete, students will present their results to their graduate committee and defend their dissertation in a public forum.

Retroactive Requirements Updates:

Plan of Study:

Program Outcomes

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

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

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 instructiona 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

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

Will any additional faculty be required?

No

Will any additional financial resources be needed?

No

Additional library/learning resources needed?

No

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

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

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

%wi_required.eschtml%

Key: 420