

# BIOINFORMATICS AND COMPUTATIONAL BIOLOGY, PHD

**Banner Code:** SC-PHD-BCB

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In the field of bioinformatics and computational biology, specialists collect, store, analyze, and present complex biological data. Through this work, critical contributions are made to disease detection, drug design, forensics, agriculture, and environmental sciences through the combination of biological analysis and high-performance computing. The main objective of this doctorate is to educate the next generation of computational biologists for careers in academia, industry, and government. The program provides students with interdisciplinary academic training that includes fundamental bioscience courses as well as core and advanced courses in bioinformatics. Courses are designed to be completed in approximately two years. Completion of coursework, the comprehensive exam, and a successful dissertation proposal results in advancement to candidacy status. In the final phase, students focus on research that culminates in a dissertation.

The program is structured to be accessible for full and part-time students. Many of the courses are offered in a distance-learning format, allowing students to participate in class without having to travel to campus; visit Mason Online (<http://masononline.gmu.edu>) for details.

## Admissions & Policies

### 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 (<https://www2.gmu.edu/admissions-aid/apply-now>).

### Eligibility

Applicants should have a bachelor's degree in biology, computer science, or a related field, with a minimum GPA of 3.25 in the last earned degree. Applicants should have taken courses in molecular biology, cell biology, biochemistry, genetics, calculus, physical chemistry, computer programming and data structures, and probability and statistics. Students with deficiencies in one or more of these areas may be admitted provisionally and required to take additional courses, some of which may not be applicable to the degree's course total. Students whose undergraduate record does not include basic biochemistry will be required to take a basic course prior to BINF 701 Systems Biology.

### Application Requirements

To apply, prospective students should submit the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now>), two copies of official transcripts from each college and graduate institution attended, a current résumé, and an expanded

goals statement. Applicants should also include three letters of recommendation and an official report of scores obtained on the GRE general exam. Scores should be in the 45th percentile or above. The GRE requirement for admission to the doctoral program will be waived if the student holds a master's degree from a regionally accredited U.S. institution. TOEFL or IELTS scores are required of all international applicants.

### 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 a regionally accredited institution, the number of required credits may be reduced up to 30 credits, subject to approval of the program director and the college's associate dean for student affairs. See AP.6.5.2 Reduction of Credits for more information.

## Requirements

### Degree Requirements

Total credits: 72

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

### Doctoral Coursework

Code	Title	Credits
<b>Fundamental Bioscience Courses</b>		
BINF 701	Systems Biology	3
BINF 702	Biological Data Analysis	3
<b>Core Bioinformatics Courses</b>		
BINF 690	Numerical Methods for Bioinformatics	3
BINF 705	Research Ethics	1
BINF 730	Biological Sequence and Genome Analysis	3
BINF 731	Protein Structure Analysis	3
BINF 740	Introduction to Biophysics	3
<b>General Electives</b>		
Select 23-35 credits of approved general electives or independent research		23-35
<b>Lab Rotation</b>		
BINF 703	Bioinformatics Lab Rotation (taken three times)	3
<b>Colloquium</b>		
BINF 704	Colloquium in Bioinformatics (taken three times)	3
Total Credits		48-60

### Doctoral Committee and Advancement to Candidacy

By the end of the semester when coursework is completed, the student must form a doctoral committee made up of a minimum of three graduate faculty members and take a written comprehensive exam. The exam includes written and oral components. Upon passing the

comprehensive exam and submitting an acceptable dissertation proposal, the student is advanced to doctoral candidacy to begin the dissertation writing phase.

### **Dissertation Research**

A minimum of 12 and maximum of 24 combined credits from BINF 998 Doctoral Dissertation Proposal and BINF 999 Doctoral Dissertation may be applied toward satisfying doctoral degree requirements. Students must take at least 3 credits of BINF 999 Doctoral Dissertation.

<b>Code</b>	<b>Title</b>	<b>Credits</b>
Select 12-24 credits from the following:		12-24
BINF 998	Doctoral Dissertation Proposal	
BINF 999	Doctoral Dissertation	
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Total Credits		12-24

### **Doctoral Dissertation**

After advancing to doctoral candidacy, students work on their doctoral dissertation while enrolled in BINF 999 Doctoral Dissertation. The dissertation should represent a significant contribution that is suitable for publication in a refereed scientific journal. The dissertation must be defended in a public forum before the dissertation committee and other interested faculty.