

# BIOINFORMATICS MANAGEMENT, PROFESSIONAL SCIENCE MASTER'S

Banner Code: SC-MSP-BNFM

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This Professional Science Master's (<https://www.professionalsciencemasters.org>) (PSM) degree addresses the growing demand for trained bioinformatics professionals with solid management skills able to assume leadership roles in biotechnology, pharmaceutical and health care sectors. The flexible degree structure allows students to custom design a curriculum that best suits their needs and allows a focus on the biological big data analysis, genomics, or bioinformatics software development and management. Students will receive advanced training in bioinformatics and management through coursework and an external internship. The curriculum was developed with active input from the Program Advisory Board consisting of recognized leaders in the field. Many courses are offered in a distance-learning format, allowing students to participate in class without having to travel to campus.

## 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>).

Applicants should have a bachelor's degree in biology, computer science, or a related field with a GPA of at least 3.00 in their last 60 credits of study. Applicants should have taken courses in molecular biology, computer science, calculus, physical chemistry, and statistics. Students with deficiencies in one or more of these areas may be required to take additional courses from the undergraduate curriculum. To apply, prospective students should submit the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now>), supply 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 official scores obtained on the GRE general exam. The GRE requirement will be waived if the student holds a master's degree from a 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.

## Requirements

### Degree Requirements

Total credits: 31

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

Due to the varied course options and their associated prerequisites, students are encouraged to create a program of study with their faculty advisor by the end of their first semester of studies.

### Bioinformatics Courses

BINF 630	Bioinformatics Methods	3
BINF 631	Molecular Cell Biology for Bioinformatics	3
BINF 702	Biological Data Analysis	3
Select two from the following or other BINF-prefixed courses in consultation with the faculty advisor:		6
BINF 633	Molecular Biotechnology	
BINF 634	Bioinformatics Programming	
BINF 650	Introduction to Bioinformatics Database Design	
BINF 731	Protein Structure Analysis	
BINF 732	Genomics	
BINF 740	Introduction to Biophysics	

Total Credits 15

### Professional Skills Courses

Please note: MBA-prefixed courses are offered on an alternative semester schedule (view the Schedule of Classes ([https://patriotweb.gmu.edu/pls/prod/bwckschd.p\\_disp\\_dyn\\_sched](https://patriotweb.gmu.edu/pls/prod/bwckschd.p_disp_dyn_sched)) for details). Considering this, it may be advisable to take these courses in one semester rather than over several.

BINF 705	Research Ethics	1
MBA 712	Project Management	3
or MBA 715	Advanced Project and Program Management	
Select one course from the following that hasn't previously been taken:		3
BIOL 508	Selected Topics in Animal Biology (when the topic is Research & Development in Biotechnology Companies)	
AIT 671	Information System Infrastructure Lifecycle Management	
COMM 641	Advanced Communication Skills for STEM	
GBUS 540	Analysis of Financial Decisions	
GBUS 550	Strategic Thinking	
MBA 712	Project Management	
MBA 715	Advanced Project and Program Management	

MBA 725	Leadership	
or GBUS 551	Leadership	
MBA 726	Negotiations	
MBA 730	Management of Technology and Innovation Processes	
MBA 738	Data Mining for Business Analytics	
PUAD 781	Information Management: Technology and Policy	
Or other courses in consultation with the faculty advisor		
Total Credits		7

## Scientific Electives

Close attention should be paid to each course's prerequisites.

Select 6 credits in courses that haven't previously been taken, tailored to suit interests and goals in consultation with the faculty advisor.

<b>Big Data Analysis:</b>		
CSI 695	Scientific Databases	
AIT 580	Analytics: Big Data to Information	
AIT 581	Problem Formation and Solving in Big Data	
AIT 622	Determining Needs for Complex Big Data Systems	
<b>Synthetic and Systems Biology:</b>		
BIOS 701	Systems Biology	
CHEM 665	Protein-Protein Interactions: Methods and Applications	
<b>Human Health and Personal Genomics:</b>		
BINF 732	Genomics	
BIOL 562	Personalized Medicine	
BIOL 566	Cancer Genomics	
BIOL 665	Environmental Hazards to Human Health	
BIOS 740	Laboratory Methods in Functional Genomics and Biotechnology	
BIOS 741	Genomics	
<b>Software Development and Analysis:</b>		
BINF 634	Bioinformatics Programming	
SWE 510	Object-Oriented Programming in Java	
SWE 619	Object-Oriented Software Specification and Construction	
SWE 621	Software Modeling and Architectural Design	
SWE 626	Software Project Laboratory	
SWE 637	Software Testing	
SWE 645	Component-Based Software Development	
SWE 760	Software Analysis and Design of Real-Time Systems	
<b>Colloquium:</b> <sup>1</sup>		
BINF 704	Colloquium in Bioinformatics (may be repeated for up to 3 credits)	
<b>Additional Internship Experience</b> <sup>2</sup>		
BINF 795	Bioinformatics Internship	
Total Credits		6

<sup>1</sup> If chosen, it is recommended that students take the colloquium course early in their studies so that they may be exposed to various possibilities and areas of research presented by the speakers.

<sup>2</sup> The maximum amount of internship credits that can be applied to the degree is 6 credits.

## Internship

The internship component is intended to provide students with the opportunity to put into practice all of the skills and knowledge accumulated throughout their studies in this program. Students must arrange an internship with a private company, a governmental agency, a non-governmental organization, or some other entity with an interest in bioinformatics *and* management. Students must identify a specific person within that outside entity who will be the contact and manager of the internship.

6 Internship credit is never given for work previously done, or for work that would have been done in any case due to an existing employment relationship.

The internship work must produce one or more products such as: a comprehensive report, a departmental presentation, a research project, or an article. Internship placement and product type must be approved by the student's faculty advisor.

Further details and procedures for completing the internship can be found with the faculty advisor.

Three credits of internship		3
BINF 795	Bioinformatics Internship	
Total Credits		3