

BIOINFORMATICS, MASTER OF SCIENCE

MS in Bioinformatics

Joint Offering with the Whiting School of Engineering for Professionals

bioinformatics.jhu.edu (<https://bioinformatics.jhu.edu>)

Johns Hopkins University offers an innovative graduate program that prepares professionals for success in bioinformatics. Drawing from the strengths of the Krieger School of Arts and Sciences and the Whiting School of Engineering, this program fully integrates the computer science, bioscience, and bioinformatics needed to pursue a career in this dynamic field.

The MS in Bioinformatics is designed for working adults, but can be completed full-time. All classes are offered in the evening, on Saturdays, or online. Please note that not every course is available at all on-site locations. The degree can be completed online.

Admissions Criteria for all Advanced Academic Programs (<http://e-catalog.jhu.edu/arts-sciences/advanced-academic-programs/enrollment-services/admission/>)

Program Specific Requirements

- An undergraduate degree in the biological sciences or in engineering with at least a 3.0 on a 4.0 scale. All the prerequisites listed below can be taken from the existing Master of Science in Computer Science or the Master of Science in Biotechnology program. Students who have not completed all the prerequisites may be admitted provisionally to complete the admission requirements.
 - Two semesters of organic chemistry (or AS.410.302 Bio-Organic Chemistry)
 - One semester of biochemistry (or AS.410.601 Biochemistry)
 - Introduction to programming using Java, C++, or C (or EN.605.201 Intro to Programming Using Java)
 - Data structures (or EN.605.202 Data Structures)
 - One course in probability and statistics (or AS.410.645 Biostatistics)
 - Calculus
- The Admissions Committee reserves the right to request additional information from applicants, such as GRE or letters of recommendation, if needed, to assess their candidacy for admission.

Program Requirements

Students take 11 courses to complete the degree—five core courses, four concentration courses, an elective from bioscience, and an elective from computer science. After completion of the core and concentration courses, students may choose an independent study project (optional). Students have up to five years to complete the program.

Code	Title	Credits
Core Courses		
AS.410.602	Molecular Biology	4
AS.410.610	Epigenetics, Gene Organization & Expression	4
AS.410.633	Introduction to Bioinformatics	4

or EN.605.652	Biological Databases and Database Tools	
AS.410.634	Practical Computer Concepts for Bioinformatics	4
or EN.605.641	Principles of Database Systems	

Concentration Courses

Select four of the following: 16

AS.410.635	Bioinformatics: Tools for Genome Analysis	
AS.410.639	Protein Bioinformatics	
AS.410.640	Molecular Phylogenetic Techniques	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.698	Bioperl	
AS.410.712	Advanced Practical Computer Concepts for Bioinformatics	
AS.410.713	Advanced Genomics and Genetics Analyses	
AS.410.734	Practical Introduction to Metagenomics	
AS.410.736	Genomic and Personalized Medicine	

EN.605.643	Linked Data and the Semantic Web	3
EN.605.649	Introduction to Machine Learning	3
EN.605.651	Principles of Bioinformatics	3
EN.605.653	Computational Genomics	3
EN.605.656	Computational Drug Discovery, Dev	3
EN.605.657	Statistics for Bioinformatics	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.751	Algorithms for Structural Bioinformatics	3
EN.605.754	Analysis of Gene Expression and High-Content Biological Data	3
EN.605.755	Systems Biology	3

Electives

Computer Science

Select one of the following:		4
EN.605.601	Foundations of Software Engineering	3
EN.605.644	XML Design Paradigms	3
EN.605.662	Data Visualization	3
EN.605.681	Principles of Enterprise Web Development	3
EN.605.684	Agile Development with Ruby on Rails	3
EN.605.686	Mobile Application Development for the Android Platform	3
EN.605.701	Software Systems Engineering	3
EN.605.741	Large-Scale Database Systems	3
EN.605.746	Advanced Machine Learning	3
EN.605.747	Evolutionary Computation	3
EN.605.759	Independent Project in Bioinformatics	3
EN.605.788	Big Data Processing Using Hadoop	3

Biotechnology

Select one of the following:		4
AS.410.603	Advanced Cell Biology I	
AS.410.604	Advanced Cell Biology II	
AS.410.612	Human Molecular Genetics	
AS.410.613	Principles of Immunology	
AS.410.615	Microbiology	
AS.410.616	Virology	
AS.410.622	Molecular Basis of Pharmacology	
AS.410.629	Genes & Disease	

AS.410.630	Gene Therapy
AS.410.632	Emerging Infectious Diseases
AS.410.638	Cancer Biology
AS.410.641	Clinical & Molecular Diagnostics
AS.410.648	Clinical Trial Design and Conduct
AS.410.656	Recombinant DNA Laboratory
AS.410.752	High Throughput Screening & Automation Lab
AS.410.800	Independent Research in Biotechnology
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Total Credits	106

MS in Bioinformatics with Thesis Option

Students interested in pursuing the MS in Bioinformatics with the thesis are required to take 12 courses. The thesis requires a two-semester research project. Students complete AS.410.800 Independent Research in Biotechnology first and AS.410.801 Biotechnology Thesis the following semester. Students interested in this option should consult with the program advisor.