M.S. in Bioinformatics

Master of Science in Bioinformatics

The M.S. in Bioinformatics (https://cs.njit.edu/academics/graduate/ms-bioinf/) addresses the growing need for professionals with an educational background that blends biology with computer science and mathematics. This combination of skills is needed both in the pharmaceutical and biotechnology industries, as well as in biomedical research.

Prerequisites

Applicants should have a bachelor's degree from an accredited University, in Biology or Computing/STEM. Applicants with relevant professional experience may also be accepted. Further information can be found in the program's webpage (https://cs.njit.edu/academics/graduate/ms-bioinf/).

Degree Requirements

The program requires the completion of 30 credits. The requirement is satisfied by taking 10 courses.

Students who want to pursue research can earn up to 6 of the 30 required credits by taking the CS 700B Master's Project possibly followed by CS 701B Master's Thesis. These have special requirements described in the section 'Master's Project and Thesis Policies'.

Code	Title	Credits
Core Courses		
CS 636	Data Analytics with R Program	
MATH 663	Introduction to Biostatistics	
Core Electives		
At least three courses from this list:		
CS 506	Foundations of Computer Science [&1]	
DS 637	Python and Mathematics for Machine Learning [&1]	
CS/DS 644	Introduction to Big Data	
CS/DS 675	Machine Learning	
MATH 615	Approaches to Quantitative Analysis in the Life Sciences	
MATH 678	Statistical Methods in Data Science	
MATH 680	Advanced Statistical Learning	
BIOL 605	Prin of Bioscience Processing	
BIOL 630	Critical Thinking for the Life Sciences	
R120 512	Cell Biology: Methods & Appl	
R120 515	Molecular Bio Of Eukaryotes	
R120 524	Cell Molec Dev	
Other NJIT Electives		
BIOL 672	Computational Systems Biology	
BME 661	Neural Engineering	
BME 671	Biomechanics of Human Structure and Motion	
CHEM 658	Advanced Physical Chemistry	
CHEM 673	Biochemistry	
CS 631	Data Management System Design	
CS 632	Advanced Database System Design	
CS 659	Image Processing and Analysis	
CS 634	Data Mining	
CS 670	Artificial Intelligence	
CS/DS 677	Deep Learning	
CS 681	Computer Vision	
CS 731	Applications of Database Systems	
CS 732	Advanced Machine Learning	
CS 744	Data Mining and Management in Bioinformatics	
CS 782	Pattern Recognition and Applications	
IS 634	Information Retrieval	

ECE 640	Digital Signal and Data Processing
ECE 673	Random Signal Analysis
MATH 635	Analytical Computational Neuroscience
MATH 636	Systems Computational Neuroscience
MATH 637	Foundations of Mathematical Biology
MATH 644	Regression Analysis Methods
MATH 654	Clinical Trials Design and Analysis
MATH 659	Survival Analysis
MATH 662	Probability Distributions
MATH 665	Statistical Inference
YWCC 691	Graduate Capstone Project [&2]
Rutgers-Newark Electives	
R120 512	Cell Biology: Methods & Appl
R120 515	Molecular Bio Of Eukaryotes
R120 516	Microbial Ecology
R120 526	Topics in Cell Biology
R120 548	Biology Of Cancer
R120 573	Pharmacology
UMD 5002	Genom Proteomics & Bioinformat
UMD 5200	Intro To Biomedical Sciences
MS Project and Thesis	
CS 700B	Master's Project
CS 701B	Master's Thesis

&	1. CS 506 and DS 637 are introductory-level graduate courses recommended to students who want to build background in fundamental topics and introductory programming.
	2. Counting YWCC 691 towards the elective credits requires the program director's prior approval. In addition, it needs to be completed either with an external partner (industry, lab, or government), or with a faculty only if the same faculty is not the student's MS project or MS thesis advisor.

Master's Project and Thesis Policies

The contents of this section apply only to students who elect to do a Master's Project (CS 700B) or a Master's Thesis (CS 701B).

Students must first identify a research advisor holding an appointment at the ranks of Assistant Professor, Associate Professor, Professor, or Distinguished Professor.

In order to identify a research advisor, students are encouraged to directly contact professors. Professors may not always have availability for conducting an MS project/thesis. Students are therefore encouraged to start looking for an advisor as early as possible, especially if they are considering pursuing a Master's Thesis that takes two semesters.

The students must be in close coordination with their research advisor who will determine the topic of the Project/Thesis and guide them to take specific elective courses that will prepare them for the research.

The Project or Thesis must be related to Bioinformatics.

Registration

- **Master's Project:** With permission of their research advisor students must register in the CS 700BMaster's Project course. To register for a Master's Project, students must have completed at least 9 credits and must be in good standing.

- **Master's Thesis:** With permission of their research advisor, students must first register in the CS 700B Master's Project course. They must receive a satisfactory (S) grade in CS 700B before CS 701B Master's Thesis registration in the immediately following semester, with the same advisor. The MS topic should be continuation of the work done in CS 700B.

Thesis Requirements

- An MS Thesis Committee must be formed, according to these requirements (https://www5.njit.edu/graduatestudies/composition- master%E2%80%99s-thesis-committee/) set forth by the Office of Graduate Studies.

- A written thesis must be submitted. The thesis must adhere to the style requirements (https://www5.njit.edu/graduatestudies/composition- master%E2%80%99s-thesis-committee/) set forth by the Office of Graduate Studies.
- An oral defense is required. The defense must take place before the last day of the Examination period.