

# BACHELOR OF SCIENCE IN BIOINFORMATICS

Science is becoming increasingly dependent on computers and the field of biology is no exception. Advances in the field are often impeded by the glut of ever expanding data sets and by the lack of dedicated software and algorithms, requiring skilled biologists capable of handling massive amounts of information, performing in-depth statistical analyses, and programming.

Bioinformatics is an essential discipline at the interface between biology, computation sciences, and mathematics. Bioinformaticians, also referred as computational biologists, are experts at problem solving. The best bioinformaticians are adaptable jack-of-all-trades, for the problems to solve are many, broad in scope, and often cross canonical field delimitations. According to the Bureau of Labor Statistics, approximately 62% of the future expected growth in science jobs until 2020 is in computational fields. Fields that rely heavily on bioinformaticians are research, the health and pharmaceutical industries, and software design and engineering.

At the core of the bioinformatics program is a significant science component, with a large emphasis on computation sciences, mathematics, and physics, in addition to biology. Throughout this program, students will learn scientific rigor, creativity, and a breadth of highly-demanded adaptable skills giving them both versatility and efficiency. Students will learn to communicate effectively across disciplines and to lead large scale projects.

The applied bioinformatics track will provide students with a thorough computational background enabling them to pursue programming-driven endeavors whereas the computational biology track will emphasize computer-driven problem solving towards answering key biological questions.

## Required Courses

<b>Biology Requirements</b>		(29-35)
BIOL 100	Introduction to the Profession	2
BIOL 104	Linux and Perl Programming	3
BIOL 107	General Biology Lectures	3
BIOL 115	Human Biology	3
BIOL 210	Microbiology	3
BIOL 214	Genetics	3
BIOL 225	Microbiology Laboratory	2
BIOL 310	Genomes, Transcriptomes, and Proteomes	3
BIOL 403	Biochemistry	4
BIOL 451	Biological Literature	2
BIOL 495	Biology Colloquium	1
For the Computational Biology track:		
BIOL 445 & BIOL 446	Cell Biology and Cell Biology Laboratory <sup>1</sup>	0-6
<b>Chemistry Requirements</b>		(12)
CHEM 124	Principles of Chemistry I with Laboratory	4
CHEM 125	Principles of Chemistry II with Laboratory	4
CHEM 237	Organic Chemistry I	4
<b>Physics Requirements</b>		(11)
PHYS 123	General Physics I: Mechanics	4
PHYS 221	General Physics II: Electricity and Magnetism	4
PHYS 224	General Physics III for Engineers	3
<b>Mathematics Requirements</b>		(23-24)
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate and Vector Calculus	4
MATH 475	Probability	3
MATH 476	Statistics	3
Choose the appropriate track option:		3-4
For the Computational Biology track:		
MATH 252	Introduction to Differential Equations <sup>1</sup>	4
For the Applied Bioinformatics track:		

MATH 332	Elementary Linear Algebra <sup>2</sup>	3
<b>Computer Science Requirements</b>		(12-18)
CS 105	Introduction to Computer Programming	2
CS 115	Object-Oriented Programming I	2
CS 116	Object-Oriented Programming II	2
CS 330	Discrete Structures	3
or MATH 230	Introduction to Discrete Math	
CS 331	Data Structures and Algorithms	3
For the Applied Bioinformatics track:		
CS 422	Data Mining	0-6
& CS 425	and Database Organization <sup>2</sup>	
<b>Technical Electives</b>		(9)
Select 9 credit hours		9
<b>Interprofessional Projects (IPRO)</b>		(6)
See IIT Core Curriculum, section E		6
<b>Humanities and Social Science Requirements</b>		(21)
See IIT Core Curriculum, sections B and C		21

**Minimum degree credits required: 129-130**

<sup>1</sup> Computational Biology specialization: Select these courses for the maximum displayed credit hours.

<sup>2</sup> Applied Bioinformatics specialization: Select these courses for the maximum displayed credit hours.

## Bachelor of Science in Bioinformatics Curriculum

		<b>Year 1</b>	
<b>Semester 1</b>	<b>Credit Hours</b>	<b>Semester 2</b>	<b>Credit Hours</b>
BIOL 100	2	BIOL 115	3
BIOL 104	3	CHEM 125	4
BIOL 107	3	MATH 152	5
CHEM 124	4	CS 105	2
MATH 151	5	Social Sciences Elective	3
		17	17
		<b>Year 2</b>	
<b>Semester 1</b>	<b>Credit Hours</b>	<b>Semester 2</b>	<b>Credit Hours</b>
PHYS 123	4	PHYS 221	4
CHEM 237	4	BIOL 210	3
CS 115	2	BIOL 225	2
MATH 251	4	CS 116	2
BIOL 214	3	Humanities or Social Sciences Elective	3
		Humanities 200-level Course	3
		17	17
		<b>Year 3</b>	
<b>Semester 1</b>	<b>Credit Hours</b>	<b>Semester 2</b>	<b>Credit Hours</b>
CS 330 or MATH 230	3	BIOL 310	3
PHYS 224	3	I PRO Elective I	3
CS 331	3	Technical Elective	3
Technical Elective	3	Social Sciences Elective (300+)	3
Specialization Course <sup>1</sup>	3-4	Humanities Elective (300+)	3
		15-16	15
		<b>Year 4</b>	
<b>Semester 1</b>	<b>Credit Hours</b>	<b>Semester 2</b>	<b>Credit Hours</b>
BIOL 403	4	BIOL 451	2
MATH 475	3	BIOL 495	1
Social Sciences Elective (300+)	3	MATH 476	3
Specialization Course <sup>2</sup>	3	I PRO Elective II	3
Specialization Course <sup>2</sup>	3	Technical Elective	3
		Humanities Elective (300+)	3
		16	15

Total Credit Hours: 129-130

<sup>1</sup> For the Applied Bioinformatics specialization, select MATH 332. For the Computational Biology specialization, select MATH 252.

<sup>2</sup> For the Applied Bioinformatics specialization, select CS 442 and CS 425. For the Computational Biology specialization, select BIOL 445 and BIOL 446.