

# Bioinformatics

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**Director:** Lisa Petrella, Ph.D.

Bioinformatics is a field that lies at the intersection of biology, statistics and computer science and is focused on the analysis of large biological datasets. This interdisciplinary major gives students training of sufficient depth in both biology and computer science that they are competent to approach problems in bioinformatics from the perspective of both parent fields.

## Bioinformatics Major

The major consists of nine required courses in Biological Sciences (26-27 credit hours), six required courses in Computer Science (20 credit hours) three required courses in Math and Statistics (10 credit hours) and the required Bioinformatics capstone (3 credits) for a total of 59-60 credit hours as well as three required cognate courses in Chemistry (12 credit hours).

Code	Title	Hours
<b>Required Courses</b>		
Biology courses:		
BIOL 1001	General Biology 1	3
BIOL 1002	General Biology 2	3
BIOL 3101	Biochemistry and the Molecular Basis of Biology	3
BIOL 3201	Genetics	3
BIOL 3301	Cell Biology	3
BIOL 4201	Genomics and Bioinformatics	3
Upper division BIOL course		3
BIOL lab courses: choose two from the following:		6
BIOL 1101	Foundations in Biological Inquiry	
BIOL 4102	Experimental Molecular Biology	
BIOL 4202	Experimental Genetics	
BIOL 4302	Experimental Cell Biology	
Computer Science courses:		
COSC 1010	Introduction to Software Development	4
COSC 1020	Object-Oriented Software Design	4
COSC 2100	Data Structures	3
COSC 3090	Bioinformatics Algorithms	3
COSC 4610	Data Mining	3
COSC 4800	Principles of Database Systems	3
Mathematics and Statistics courses:		
MATH 1450	Calculus 1	4
MATH 4740 or MATH 4720	Biostatistical Methods and Models Statistical Methods	3
MATH 2100 or MATH 2350	Discrete Mathematics Foundations of Mathematics	3
Capstone:		
INBI 4997	Capstone in Bioinformatics	3

**Total Credit Hours:** **60**

Code	Title	Hours
<b>Required Cognate Courses:</b>		
CHEM 1001 or CHEM 1013	General Chemistry 1 General Chemistry 1 for Majors	4
CHEM 1002 or CHEM 1014	General Chemistry 2 General Chemistry 2 for Majors	4
CHEM 2111	Organic Chemistry 1	4

or CHEM 2113

Organic Chemistry for Majors 1

**Total Credit Hours:****12****Typical Program for Bioinformatics Majors****Freshman**

First Term	Hours	Second Term	Hours
ARSC 1953		1 BIOL 1002	3
BIOL 1001		3 BIOL 1101 or ELECTIVE <sup>1</sup>	3
COSC 1010		4 COSC 1020	4
MATH 1450		4 MATH 2100 or 2350	3
ENGL 1001 or ESSV1 (MCC)		3 ENGL 1001 or ESSV1 (MCC)	3
	<b>15</b>		<b>16</b>

**Sophomore**

First Term	Hours	Second Term	Hours
BIOL 3301		3 BIOL 3201	3
CHEM 1001 or 1013		4 CHEM 1002 or 1014	4
MATH 4740		3 COSC 2100	3
CORE 1929 (MCC)		3 PHIL 1001 or THEO 1001 (MCC)	3
PHIL 1001 or THEO 1001 (MCC)		3 DSCV (MCC) <sup>3,4</sup>	3
	<b>16</b>		<b>16</b>

**Junior**

First Term	Hours	Second Term	Hours
BIOL 3101		3 COSC 4610	3
COSC 3090		3 BIOL upper division elective	3
COSC 4800		3 BIOL lab course	3
CHEM 2111 or 2113		4 DSCV (MCC) <sup>3,4</sup>	3
DSCV (MCC) <sup>3,4</sup>		3 Elective <sup>5</sup>	3
	<b>16</b>		<b>15</b>

**Senior**

First Term	Hours	Second Term	Hours
BIOL 4201		3 INBI 4997	3
BIOL lab course or elective <sup>5</sup>		3 CORE 4929 (MCC) or elective	3
CORE 4929 (MCC) or elective		3 Electives	7
DSCV (MCC) <sup>3,4</sup>		3	
Elective		3	
	<b>15</b>		<b>13</b>

**Total Credit Hours: 122**

<sup>1</sup> BIOL 1101 Foundations in Biological Inquiry is a recommended lab course and, if taken, should be taken in this term.

<sup>2</sup> For students intending to apply to medical school: PSYC 1001 General Psychology is recommended as a general elective and SOCI 1001 Principles of Sociology is recommended as the ESSV1 course.

- 3 The four courses in the Discovery Tier (DSCV) of the MCC must be completed in the same theme and include the following content areas: Humanities (HUM), Social Science (SSC), Natural Science and Mathematics (NSM) and one elective (ELE), which is an additional course from any of the three content areas. A maximum of two courses in the Discovery Tier can apply towards a primary major.
- 4 Students must also complete the Writing Intensive (WRIT) and Engaging Social System and Values 2 (ESSV2) requirements of the MCC. These requirements can be fulfilled through designated courses in the Discovery Tier or other degree requirements.
- 5 Possible electives include COSC 4600 Fundamentals of Artificial Intelligence, MATH 3100 Linear Algebra and Matrix Theory, MATH 4780 Regression Analysis, BIOL 4601 Animal Development, BIOL 4501 Cellular Neurobiology, BIOL 4406 Plant Biology, CHEM 2112 Organic Chemistry 2 or CHEM 2114 Organic Chemistry for Majors 2, and Introductory Physics.