

Bioinformatics

Director: Serdar Bozdag, 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) and four required courses in Math and Statistics (13 credit hours) for a total of 59-60 credit hours as well as three required cognate courses in Chemistry (12 credit hours).

Required Courses

Biology courses:

BIOL 1001	General Biology 1	3
BIOL 1002	General Biology 2	3
BIOL 2301	Cell Biology	3
BIOL 2201	Genetics	3
BIOL 4101	Biochemistry and the Molecular Basis of Biology	3
BIOL 4201	Genomics and Bioinformatics	3

Upper division BIOL course 3

BIOL lab courses: choose two from the following: 5-6

BIOL 1101	Foundations in Biological Inquiry	
BIOL 3202	Experimental Genetics	
BIOL 3302	Experimental Cell Biology	
BIOL 4102	Experimental Molecular Biology	

Computer Science courses:

COSC 1010	Introduction to Computer Programming	4
COSC 1020	Object-Oriented Software Design	4
COSC 2100	Data Structures and Algorithms 1	3
COSC 4610	Data Mining	3
COSC 4800	Principles of Database Systems	3
COSC 3090	Bioinformatics Algorithms	3

Mathematics and Statistics courses:

INBI 4997	Capstone in Bioinformatics	3
MATH 1450	Calculus 1	4
MATH 4740	Biostatistical Methods and Models	3
or MATH 4720	Statistical Methods	
MATH 2100	Discrete Mathematics	3
or MATH 2350	Foundations of Mathematics	

Total Credit Hours 59-60

Required Cognate Courses:

CHEM 1001	General Chemistry 1	4
or CHEM 1013	General Chemistry 1 for Majors	
CHEM 1002	General Chemistry 2	4
or CHEM 1014	General Chemistry 2 for Majors	
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
BIOL 1001	3	BIOL 1002	3
COSC 1010	4	BIOL 1101 or elective ¹	2-3
MATH 1450	4	COSC 1020	4
ENGL 1001 or ESSV1 (MCC)	3	MATH 2100 or 2350	3
		ENGL 1001 or ESSV1 (MCC)	3
14		15-16	

Sophomore

First Term	Hours	Second Term	Hours
BIOL 2301	3	BIOL 2201	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) ^{3,4}	3
16		16	

Junior

First Term	Hours	Second Term	Hours
COSC 3090	3	COSC 4610	3
COSC 4800	3	BIOL upper division elective	3
BIOL 4101	3	BIOL lab course	3
CHEM 2111 or 2113	4	DSCV (MCC) ^{3,4}	3
DSCV (MCC) ^{3,4}	3	Elective ⁵	3
16		15	

Senior

First Term	Hours	Second Term	Hours
BIOL 4201	3	INBI 4997	3
BIOL lab course or elective ⁵	3	CORE 4929 (MCC) or elective	3
CORE 4929 (MCC) or elective	3	Electives	7
DSCV (MCC) ^{3,4}	3		
Elective	3		
15		13	

Total credit hours: 120-121

- ¹ BIOL 1101 Foundations in Biological Inquiry is a recommended lab course and, if taken, should be taken in this term.
- ² 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 3601 Animal Development, BIOL 3501 Cellular Neurobiology, BIOL 3406 Plant Biology, CHEM 2112 Organic Chemistry 2 or CHEM 2114 Organic Chemistry for Majors 2, and Introductory Physics.