

# COMPUTER SCIENCE MAJOR, CONCENTRATION IN BIOINFORMATICS

The purpose of this interdisciplinary concentration is to prepare Computer Science students to enter science-intensive fields of bioinformatics, computational biology, computational chemistry, and molecular modeling including genomics and proteomics. With the advent of the Human Genome Project, an explosion of genomics information has occurred and databases such as GenBank and EMBL have grown at a rate that now requires storage, organizing, and indexing of the information.

Questions of gene expression have led to computational biology, the process of analyzing genomic sequences and to the field of proteomics, the understanding of protein structure and function. The information obtained by computational biology and computational chemistry is used in the design of new drugs to treat a variety of diseases. Major drug and biotechnology companies are seeking people trained in bioinformatics.

## Requirements for the Major in Computer Science, Concentration in Bioinformatics

In addition to the requirements for the Major in Computer Science:

Code	Title	Credits
<b>Core Courses</b>		<b>(38 credits)</b>
CS-101	Basics of Computer Science	3
CS-140	Introduction to Programming	4
CS-155	Computer Networking and Security	3
CS-225	Discrete Structures I	3
CS-242	Data Structures	3
CS-248	Algorithm Analysis	3
CS-254	Computer Organization and Architecture	4
CS-282	Unix Systems Programming	3
CS-286	Database Design and Applications	3
CS-295	Discrete Structures II	3
CS-348	Software Process Management	3
CS-373	Operating Systems	3
<b>Elective Courses</b>		<b>(3 credits)</b>
Credits in Computer Science courses at the 300 level or above <sup>1</sup>		3
<b>Required CS Concentration</b>		<b>(9 credits)</b>
One of the CS Concentrations (Big Data Analytics or Software Development)		9
<b>Ancillary Requirements <sup>2</sup></b>		<b>(31 credits)</b>
CM-110	Public Speaking	3
EN-252	Technical Writing	3
UR-230	Technology, Public Policy and Urban Society	3
or PH-134	Computing Ethics	
MA-150	Statistics I <sup>3</sup>	3
or MA-302	Probability and Statistics	
MA-200	Calculus I	4
2 lab science courses		8
2 approved math or science course chosen from a department-approved list of courses <sup>4</sup>		7

<b>Concentration in Bioinformatics</b>		<b>(120 credits)</b>
BI-141	Intro to Cellular and Molecular Biology	4
BT-378	Bioinformatics	4
CH-120	General Chemistry I <sup>5</sup>	4
CH-121	General Chemistry II <sup>5</sup>	4
MA-201	Calculus II <sup>6</sup>	4
MA-303	Mathematical Modeling <sup>6</sup>	3
Select one of the following:		4
BI-203	Genetics	
BI-204	Microbiology	
BI-306	Developmental Biology <sup>7</sup>	
BI-371	Advanced Topics in Cell and Molecular Biology <sup>7</sup>	
BI-375	Virology <sup>7</sup>	
BI/CH-410	Biochemistry I <sup>7</sup>	
BT-376	Biotechnology	
<b>Total Credits</b>		<b>93</b>

<sup>1</sup> Up to 3 credits of Internship (CS-498) and up to 3 credits of Independent Study (CS-499) may be used to satisfy the major elective requirements.

<sup>2</sup> 31 credits (may apply to LASC requirements). These ancillary courses cannot be taken on a pass/fail basis

<sup>3</sup> Students planning a Mathematics minor or a Computer Science/Mathematics double major should take MA-302.

<sup>4</sup> Students planning a Mathematics minor or a Computer Science/Mathematics double major should take math courses required for the Mathematics minor/major.

<sup>5</sup> Count as the two Lab Science courses required in the CS major Ancillary requirements, but are not NSP.

<sup>6</sup> Counts as the additional Math/Science course from a department-approved list of courses. Required in the CS major Ancillary requirements.

<sup>7</sup> Requires additional prerequisite courses beyond those required for the major and concentration.