Minor in Bioinformatics and Computational Biology

36-37 credits

Course	Name	Pre-requirement	Credits
Biology			15
BIOL 141	Foundations of Biology I	MATH 150†	4
BIOL 142	Foundations of Biology II	MATH 150†, BIOL 141	4
BIOL 313	Introduction to Bioinformatics	MATH 151, BIOL 141 or CMSC 104*	3
Statistics			4
STAT 350 or STAT 355	Intro to Prob & Stats	MATH 150† / MATH 152	4
Computer Science			14
CMSC 201**	Computer Science I for Majors	MATH 150†	4
CMSC 202	Computer Science II for Majors	CMSC 201/H, MATH 150†	4
CMSC 203	Discrete Structures	MATH 151/140	3
CMSC 341	Data Structures	CMSC 202 & CMSC 203	3
Capstone and Elective			4
BIOL 495 or BIOL 415 or BIOL 428**,***	Seminar in Bioinformatics Systems Biology Computer Applications in Molecular Biology	(See Catalog)	4
CMSC/BIOL/STAT/CHEM	(see List)	(see Catalog)	3-4
Total			36-37

☒ All required courses must be completed with a grade of C or better
☒ All courses taken as pre-requisites for other courses must be passed with a C or better
☒ Courses taken on a P/F basis will not count towards the minor
☒ A simple majority of the courses for the minor must be completed in residence at UMBC
☒ The CMSC/BIOL/STAT/CHEM elective course cannot be used to meet major requirements

† MATH 150 or higher or placement in MATH151

[CR] Co-Requirement

* CMSC 201 or equivalent can be used, instead of CMSC 104, to meet the pre-requirement.

** The sequence IS 147 + IS 247 can be used in place of CMSC 201 to satisfy the prerequisite for CMSC 202 and the co-requisite for CMSC 203 by Information System (IS) majors.

*** The capstone bioinformatics courses (BIOL 495/BIOL 415/BIOL 428) are recommended to satisfy elective List A requirement, but the same course cannot satisfy capstone and elective requirements.

*** The BIOL 302/303 course pre-requirements for the BINF minor capstone course will be waived for students in the minor.

Approved Bioinformatics & Computational Biology Minor Electives

Approved BIOL electives

BIOL 411 - Bacterial Physiology
BIOL 412 - Microbial Systems and Synthetic Biology
BIOL 414 - Eukaryotic Genetics and Molecular Biology
BIOL 415 - Systems Biology
BIOL 418 - Human Molecular Biology
BIOL 426 - Approaches to Molecular Biology
BIOL 428 - Computer Applications in Molecular Biology
BIOL 434 - Microbial Molecular Genetics
BIOL 442 - Developmental Biology
BIOL 444 - Development and Cancer
BIOL 466 - Population and Quantitative Genetics
BIOL 483 - Evolution: From Genes to Genomes
BIOL 486 - Genome Science
BIOL 495 - Seminar Bioinformatics

For non-BIOL/BIOC majors also:

BIOL 302 - Molecular & General Genetics
BIOL 303 - Cell Biology
BIOL 304 - Plant Biology
BIOL 305 - Comparative Animal Physiology

Approved MATH/STAT electives

STAT 419 - Introduction to Biostatistics
STAT 420 - Statistics for Bioinformatics
STAT 432 – Stat. Comp. Packages and Applications
STAT 433 - Statistical Computing
STAT 451 - Introduction to Probability Theory
STAT 453 - Introduction to Mathematical Statistics
STAT 454 - Applied Statistics
STAT 614 - Environmental Statistics

For non-MATH/STAT majors also:

MATH 301 - Intro. to Mathematical Analysis I
MATH 302 - Intro. to Mathematical Analysis II
MATH 341 - Computational Methods

Approved CMSC electives

CMSC433 - Scripting Languages
CMSC436 - Data Visualization
CMSC437 - Graphical User Interface Programming
CMSC441 - Design and Analysis of Algorithms
CMSC446 - Introduction to Design Patterns
CMSC461 - Database Management Systems
CMSC471 - Introduction to Artificial Intelligence
CMSC476 - Information Retrieval
CMSC478 - Introduction to Machine Learning

Approved CHEM electives

CHEM 420 - Comp. Appl. in Chem.
CHEM 431 - Chemistry of Proteins
CHEM 432 - Advanced Biochemistry
CHEM 433 - Biochemistry of Nucleic Acids
CHEM 437 - Comprehensive Biochemistry I
CHEM 438 - Comprehensive Biochemistry II
CHEM 444 - Molecular Modeling in Biochemistry

For non-CHEM majors also:

CHEM 301 - Physical Chemistry
CHEM 303 - Physical Chemistry for the Biochem.
CHEM 352 - Organic Chemistry II