

Minor in Bioinformatics and Computational Biology

36-37 credits

Course	Name	Pre-requirement	Credits
Biology			15
BIOL 140	Ecology & Evolution	MATH 150 [†]	4
BIOL 141	Cells, Energy, and Organisms	MATH 150 [†]	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/BIOL 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