

Bachelor of Science - Bioinformatics and Computational Biology Requirements (BINF)

89-92 credits
(updated March 2007)

Biology (23 credits)	Pre-Requisites	Credits	Semesters Offered	Sem Taken	Grade
BIOL 100 - Concepts of Biology [^]	None	4	FSZ		
BIOL 100L - Concepts of Bio Lab	100 (pre- or co-req)	2	FSZ		
BIOL 302 - Molecular & General Genetics [^]	100, CHEM 101, CHEM 102 (pre- or co-req) sophomore standing	4	FSZ		
BIOL 303 - Cell Biology	302, CHEM 102	3	FS		
BIOL 302L - Genetics Lab or BIOL 303L - Cell Biology Lab	100L, 302 100L; 303	2	FS F		
BIOL 430 - Biological Chemistry	303, CHEM 352	4	FS		
BIOL 495 - Seminar in Bioinformatics	430 and CMSC 341recommended	4	FS		
Chemistry (16 credits)					
CHEM 101- Principles of Chemistry I [^]	None	4	FSZ		
CHEM 102 - Principles of Chemistry II [^]	CHEM 101	4	FSZ		
CHEM 102L - Introductory Chemistry Lab I	CHEM 101; 102 (pre- or co-)	2	FSZ		
CHEM 351 - Organic Chemistry I	CHEM 102	3	FS		
CHEM 352 - Organic Chemistry II	CHEM 351	3	SZ		
Physics and Math (23 credits)					
PHYS 121 - Introductory Physics I	MATH 151	4	FSZ		
PHYS 122 - Introductory Physics II	PHYS 121, MATH 152	4	FSZ		
MATH 151 - Calculus & Analytical Geom I [^]	MATH 150	4	FSZ		
MATH 152 - Calculus II	MATH 151	4	FSZ		
MATH 221 - Linear Algebra	MATH 151	3	FSZ		
STAT 355 - Intro to Prob/Stat for Sci/Eng	MATH 152	4	FSZ		
Computer Science (18 credits)					
CMSC 201 - Computer Sci I for Majors [^]	MATH 150	4	FS		
CMSC 202 - Computer Sci II for Majors	CMSC 201, MATH 151	4	FS		
CMSC 203 - Discrete Structures	CMSC 201	3	FSZ		
CMSC 341 - Data Structures	CMSC 202, 203	3	FS		
CMSC 461 - Database Management Syst [†]	CMSC 341	3	FSZ		
Electives (9-12 credits) see reverse for options					
List A Elective 1 -					
List A Elective 2 -					
List B Elective -					

- 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.

F = Fall, S = Spring, Z = Possible Summer **There is no guarantee that "Z" courses will be offered every year.**

† = This course is not required for students who declared the BINF major prior to Fall 2006. These students may use the course as a List B Elective

Bioinformatics & Computational Biology Gateway

Effective Fall 2006, the UMBC Undergraduate Council has approved a "gateway" for undergraduate Bioinformatics majors at UMBC. This gateway is a series of academic standards that must be met or exceeded for a student to declare themselves a Bioinformatics major. The gateway was established with the idea that the undergraduate program in Bioinformatics is best considered a preparation for graduate school, and students who are unable to meet the following requirements are likely to struggle in finding a graduate school placement.

Students are required to complete the courses listed below with a combined Grade Point Average (GPA) of 3.0, with no grade of less than "C" in any course. At least three of these courses must be completed at UMBC. A course may be repeated once in order to meet gateway requirements. However, both grades earned in the course will be used in the calculation of the gateway GPA. (For example, a student receiving a grade of "B" in all six gateway courses with one enrollment in each course will have a gateway GPA of 3.0. A student receiving an initial grade of "C" and a repeated grade of "B" in CHEM 101, with a "B" in all other gateway courses, will have a gateway GPA of 2.86)

Required Gateway Courses	Credits	Semester Taken	Grade	Quality Points
BIOL 100 - Concepts of Biology	4			
BIOL 302 - Molecular & General Genetics	4			
CHEM 101- Principles of Chemistry I	4			
CHEM 102 - Principles of Chemistry II	4			
MATH 151 - Calculus & Analytical Geometry I	4			
CMSC 201 - Computer Science I for Majors	4			
Total Credits for Gateway Completion		Gateway GPA		

Students who do not meet the above criteria (e.g. transfer students who transfer in more than three of the above courses) may petition the BINF steering committee for admission to the program.

Approved Bioinformatics & Computational Biology Electives

List A - Choose two (2) courses from:	List B - Choose one (1) course from:
<p>Any BIOL 4xx course that has been approved for the Biological Sciences BS OR Any CHEM 4xx course that has been approved for the Biochemistry & Molecular Biology BS OR No more than one (1) 3-credit Biological Sciences BS core course (either BIOL301, BIOL304, BIOL305, or BIOL442) OR One Physical Chemistry course (CHEM301 or CHEM303) OR CHEM438*</p> <p>※Upon successful completion of the CHEM437/438 sequence, CHEM437 may be used as a substitute for BIOL430 and CHEM438 used as a List A elective. CHEM437 taken alone will not serve as a substitute for BIOL430</p>	<p>BIOL 428 - Computer Applications in Molecular Biology† CHEM 420 - Computer Applications in Chemistry CHEM 444 - Molecular Modeling CMSC441 - Design and Analysis of Algorithms CMSC 442 - Information and Coding Theory CMSC 455 - Numerical Computations CMSC 475 Introduction to Neural Networks MATH 301 - Introduction to Mathematical Analysis MATH 341 - Computational Methods MATH 385 - Introduction to Mathematical Modeling* MATH 441 - Introduction to Mathematical Analysis* MATH 481 - Mathematical Modeling* STAT 451 - Introduction to Probability Theory* IS 420 Database Application Development* IS 427 - Artificial Intelligence* IS 498B - Programming for Biomedical Informatics*</p> <p style="text-align: center;">Additional courses may be submitted to the Bioinformatics Undergraduate Program Committee Chair for approval as List B electives.</p> <p>†= Also applicable as a List A elective, but may only used to satisfy one elective requirement * = courses with pre-requisites that are not included in the BINF major</p>