

Biochemistry Major Courses

Fall Freshman Year (15 or 16 Credits)		Spring Freshman Year (15 Credits)		Professional Opportunities
CHEM 146 (3 credits) Principles of General Chemistry	Prerequisite: Must have math eligibility of MATH140 or higher. Corequisite: CHEM177. Three hours of lecture and one hour of discussion per week. The Periodic Table, inorganic substances, ionic and covalent bonding, bulk properties of materials, chemical equilibrium, and quantitative chemistry.	CHEM 237 (4 credits) Principles of Organic Chemistry I	Three hours of lecture, four hours of laboratory and one hour of discussion per week. The chemistry of carbons: aliphatic compounds, aromatic compounds, stereochemistry arenes, halides, alcohols, esters, and spectroscopy.	
CHEM 177 (2 credits) Laboratory	Introduction to laboratory techniques, including safety practices, scientific ethics, and presentation of current research topics.			
ENGL 101 (3 credits) Introduction to Writing	An introductory course in expository writing.	BSCI 105 (4 credits) Principles of Biology	Three hours of lecture and three hours of laboratory per week. Prerequisite: placement in MATH 111 or higher. Basic principles of biology with special emphasis on cellular and molecular biology.	
MATH 140 (4 credits) Calculus I	Prerequisite: satisfactory score on the mathematics placement exam, or MATH 115 with a grade of C- or better. Introduction to calculus, including functions, limits, continuity, derivatives and applications of the derivative, sketching of graphs of functions, definite and indefinite integrals, and calculation of area.	MATH 141 (4 credits) Calculus II	Continuation of MATH 140, including techniques of integration, improper integrals, applications of integration (such as volumes, work, arc length, moments), inverse functions, exponential and logarithmic functions, sequences and series.	
CORE/GenEd (3 credits)		CORE/GenEd (3 credits)		
UNIV 100 (1 credit) The Student in the University or UNIV 101 (2 credits) The Student in the University and Introduction to Computer Resources	Two hours of lecture per week for 12 weeks. Introduces students to University life. Two hours of lecture per week. Introduces students to University life and current computer resources.			

Biochemistry Major, Fall Sophomore Year (15 Credits)		Biochemistry Major, Spring Sophomore Year (16 Credits)		Professional Opportunities
CHEM 247 (4 credits) Principles of Organic Chemistry II	Three hours of lecture, four hours of laboratory, and one hour of discussion per week. A continuation of CHEM 237 with emphasis on molecular structure, substitution reactions; carbonium ions; aromaticity; synthetic processes; macromolecules.	CHEM 276 (2 credits) General Chemistry and Energetics	Two hours of lecture and one hour of discussion/recitation per week. An introduction to the physical aspects of chemistry for BCHM and CHEM majors. Chemical kinetics, thermodynamics and electrochemistry in the context of current chemistry research.	Howard Hughes Medical Institute Fellowship Contact Dr. Kaci Thompson in the College of Chemical and Life Sciences at kaci@umd.edu .
BSCI LL (4 credits) BSCI 207, 222, 223 or 330		CHEM 277 (3 credits) Fundamentals of Analytical and Bio-analytical Chemistry Laboratory	One hour of lecture and 6 hours of lab per week. Quantitative analysis, inorganic analytical chemistry, and an introduction to bio-analytical instrumentation and techniques.	
PHYS 161 (3 credits) General Physics	Laws of motion, force, and energy; principles of mechanics, collisions, linear momentum, rotation, and gravitation. Must have completed or be concurrently enrolled in MATH141.	PHYS 260/261 (4 credits) General Physics	Vibrations, waves, fluids; heat, kinetic theory, and thermodynamics; electrostatics, circuits, and magnetism. PHYS260 and PHYS261 must be taken in the same semester and the grade for the courses will be combined into a single grade for both.	
CORE/GenEd (3 credits)		MATH 241 (4 credits) Calculus III Optional course. Could take CORE instead	Introduction to multivariable calculus, including vectors and vector-valued functions, partial derivatives and applications of partial derivatives (such as tangent planes and Lagrange multipliers), multiple integrals, volume, surface area, and the classical theorems of Green, Stokes and Gauss.	
		CORE/GenEd (3 credits)		

* Most biochemistry majors will elect to take BCHM 461 in semester 5.

Biochemistry Major, Fall Junior Year (13 Credits)		Biochemistry Major, Spring Junior Year (15 Credits)		Professional Opportunities
BCHM 461 (3 credits) Biochemistry I	First semester of a comprehensive introduction to modern biochemistry. Structure, chemical properties, and function of proteins and enzymes, carbohydrates, lipids, and nucleic acids. Basic enzyme kinetics and catalytic mechanisms.	BCHM 485 (3 credits) Physical Biochemistry Or CHEM 482	The application of physical chemistry to biological systems. Principal topics: quantum mechanics, biochemical spectroscopy, statistical mechanics, polymer dynamics, transport processes in liquid phase, chemical and biochemical kinetics, modeling and simulation. (Spring semester only/may take CHEM 482 instead.)	Howard Hughes Medical Institute Fellowship Contact Dr. Kaci Thompson in the College of Chemical and Life Sciences at kaci@umd.edu .
CHEM 481 (3 credits)	A course primarily for chemists and chemical engineers.	CHEM 483 (2 credits) Physical Chemistry Laboratory I	One hour lecture-recitation and one three-hour laboratory period per week. Pre/Corequisite: CHEM 481. An introduction to the principles and application of quantitative techniques in physical chemical measurements. Experiments will be coordinated with topics in CHEM 481.	
BSCI UL (4 credits) BSCI 341, 410, 411, 413, 421, 424, 426, 430, 432, 433, 434, 437, 440, 442, 443, 445, 447, 453, 471, 485, 490		ENGL 39X (3 credits) Junior English		
CORE/GenEd (3 credits)		CHEM 395 (1 credit) Professional Issues in Chemistry and Biochemistry	Junior standing. Seminar on professional issues. Professional responsibilities, ethics, interview techniques, career opportunities, graduate/professional school, race and gender issues. (Spring semester only.)	
		CORE/GenEd (6 credits)		

Biochemistry Major, Fall Senior Year (16 Credits)		Biochemistry Major, Spring Senior Year (15 Credits)		Professional Opportunities
BCHM 462 (3 credits) Biochemistry II	A continuation of BCHM 461. Metabolic pathways and metabolic regulation, energy transduction in biological systems, enzyme catalytic mechanisms.	BCHM 465 (3 credits) Biochemistry III CORE Capstone	An advanced course in biochemistry. Biochemical approach to cellular information processing. DNA and RNA structure. DNA replication, transcription, and repair. Translation of mRNA to make proteins.	<p>Honors Research and Thesis— The Chemistry Honors Program is open to CHEM or BCHM majors (or double majors) with >3.0 GPA who perform at least two semesters of chemical or biochemical research for a minimum of 3 credits total within the department (as CHEM 399) and then, in their final semester at the University, register for CHEM 398, which is the thesis-writing course. At the end of CHEM 398, a written thesis is submitted for judgment by the Honors and Awards Committee and a seminar is presented to the same group.</p> <p>On the basis of that research, thesis, and presentation, the student can graduate with Departmental High Honors, Honors or no honors.</p>
CHEM 425 (4 credits) Instrumental Methods of Analysis	Two hours of lecture and six hours of laboratory per week. Modern instrumentation in analytical chemistry. Electronics, spectroscopy, chromatography and electrochemistry.	BCHM 464 (3 credits) Biochemistry Lab	Biochemical and genetic methods for studying protein function. Site-directed mutagenesis and molecular cloning, protein purification, enzyme activity assays, computer modeling of protein structure.	
Adv CORE/GenEd (3 credits)		Electives (9 credits)		
Elective (6 credits)				