CHEMISTRY MAJOR (B.A., B.S.)

Program Director: Lee Friedman, Ph.D.

The study of molecular and atomic properties and interactions that encompass Chemistry and Biochemistry are central to many scientific disciplines including biology, geology, astronomy, environmental science, materials science and numerous others.

The Department of Chemistry and Biochemistry offers two options for undergraduate degrees in chemistry.

The traditional Bachelor of Science (BS) option provides in-depth instruction in quantitative methods and experimental design. This plan can be used to obtain an American Chemical Society (ACS) approved degree. The BS option is therefore strongly recommended for students who are seeking careers as practicing scientists or who intend to pursue graduate studies in Chemistry and related areas.

The Bachelor of Arts (BA) option provides sound, foundational instruction in all of the sub-disciplines of Chemistry including analytical, inorganic, organic, and physical chemistry as well as a biochemistry, but it provides more flexibility in upper level coursework, allowing students to pursue interdisciplinary studies. The BA track is recommended for students who intend to (1) obtain K12 teaching certification, (2) double major, minor, or earn certificates in outside areas such as business, public policy, data science, or public health.

Chemistry and Biochemistry majors continue to graduate or professional school, and obtain employment as educators and technical scientists. Courses offered by this department may be found under the following acronyms: BCHM, CHEM.

Admission to the Major

Chemistry and Biochemistry are part of a Limited Enrollment program (LEP) within the College of Computer, Mathematical, and Natural Sciences (CMNS). Current UMCP students who wish to declare in CHEM or BCHM must complete a series of gateway courses (CHEM146/CHEM177 (or CHEM131/CHEM132), CHEM237 (or CHEM231/CHEM232), and MATH140 and MATH141 (or MATH 135 and MATH 136 for BA major)) prior to applying to the program. Information is available at: http://lep.umd.edu.

Placement in Courses

The Department of Chemistry and Biochemistry rigorously enforces all of its prerequisites. Enrollment in CHEM131/CHEM132 or CHEM146/CHEM177 requires placement in calculus (MATH120 or MATH130 or MATH140).

Program Learning Outcomes

1. Students should demonstrate mastery of a body of knowledge represented by the curricula in Chemistry and Biochemistry. Students should have mastered the critical knowledge in each level in the curriculum that is necessary to move on to the next level in the curriculum.
2. The ability to read, evaluate and interpret chemical and numerical information for a novel problem using their foundational knowledge in science.
3. Students should have knowledge of appropriate safe-handling procedures and disposal of chemicals.
4. Students at lower level should demonstrate an ability to carry out key experimental techniques used in the chemical and life sciences disciplines.
5. Students at upper level should be able to design experiments to test specific hypotheses, carry out these experiments using appropriate instrumentation, and analyze the results.
6. Students should demonstrate the ability to use the broader scientific literature to select appropriate information to support their work.
7. Students should effectively communicate, both verbally and in writing, the processes of science and the results of scientific inquiry using appropriate language and models of chemistry (i.e. equations, symbolism, etc).
8. Students should understand the importance of good ethical practices in scientific research.
9. Students should continue their career in science through gainful employment or entrance into a graduate or professional school.

REQUIREMENTS

Requirements for the Bachelor of Science In Chemistry (B.S.)

All required chemistry courses must be passed with a minimum grade of "C-". Required supporting courses, including BSCI170 and (BSCI180 or BSCI171), must be passed with a 2.0 grade point average.

Course	Title	Credits
Lower-Level CHEM Courses		
CHEM146 & CHEM177	Principles of General Chemistry and Introduction to Laboratory Practices and Research in the Chemical Sciences	5
CHEM237	Principles of Organic Chemistry I	4
CHEM247	Principles of Organic Chemistry II	4
CHEM276 & CHEM277	General Chemistry and Energetics - Majors and Fundamentals of Analytical and Bioanalytical Chemistry Laboratory	5
Supporting Courses		
BSCI170	Principles of Molecular & Cellular Biology	3
BSCI180	Principles Biology Laboratory	1
or BSCI171	Principles of Molecular & Cellular Biology Laboratory	
PHYS161	General Physics: Mechanics and Particle Dynamics	3
PHYS260 & PHYS261	General Physics: Electricity, Magnetism and Thermodynamics and General Physics: Mechanics, Vibrations, Waves, Heat (Laboratory)	4
MATH140	Calculus I	4
MATH141	Calculus II	4
MATH241	Calculus III	4
Required Upper-Level CHEM Courses		
CHEM395	Professional Issues in Chemistry and Biochemistry	1
CHEM425	Instrumental Methods of Analysis	4
CHEM481 & CHEM483	Physical Chemistry I and Physical Chemistry Laboratory I [1]	5
CHEM401	Inorganic Chemistry	3

CHEM482 & CHEM484	Physical Chemistry II and Physical Chemistry Laboratory II	5
ELECT UL	6 credits of approved upper level CHEM/BCHM courses	6
Total Credits		**65**

In order to meet requirements for a degree approved by the American Chemical Society (ACS), students must complete a specific set of courses in addition to this curriculum. Information about ACS certification can be obtained in the undergraduate office.

Requirements for the Bachelor of Arts in Chemistry (B.A.)

All required chemistry courses must be passed with a minimum grade of "C-". Required supporting courses, must be passed with a 2.0 grade point average.

Course	Title	Credits
Lower-Level CHEM Courses		
CHEM146 & CHEM177	Principles of General Chemistry and Introduction to Laboratory Practices and Research in the Chemical Sciences	5
CHEM237	Principles of Organic Chemistry I	4
CHEM247	Principles of Organic Chemistry II	4
CHEM276 & CHEM272	General Chemistry and Energetics - Majors and General Bioanalytical Chemistry Laboratory	4
Supporting Courses		
MATH135	Discrete Mathematics for Life Sciences	4
MATH136	Calculus for Life Sciences	4
PHYS131	Fundamentals of Physics for Life Sciences I	4
PHYS132	Fundamentals of Physics for Life Sciences II	4
BSCI170	Principles of Molecular & Cellular Biology	3
Required Upper-Level CHEM Courses		
CHEM395	Professional Issues in Chemistry and Biochemistry	1
CHEM401	Inorganic Chemistry	3
BCHM461	Biochemistry I	3
CHEM480	Principles of Physical Chemistry	3
ELECT UL	3 credits of approved upper level CHEM/BCHM courses	3
Required Upper Level Lab Course (Select one from the following)		**3**
CHEM425	Instrumental Methods of Analysis	4
BCHM464	Biochemistry Laboratory	3
BCHM477	Biomolecular Measurement and Data Analysis	3
Total Credits		**62**

Information about and requirements for the Chemistry major can be found at: http://chem.umd.edu/undergraduate/current-majors/advising-and-registration/.

GRADUATION PLANS

Click here (https://cmns.umd.edu/undergraduate/advising-academic-planning/academic-planning/four-year-plans/four-year-plans-gened/) for roadmaps for graduation plans in the College of Computer, Mathematical, and Natural Sciences.

Additional information on developing a graduation plan can be found on the following pages:

- http://4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/#success) section of this catalog