

# BIOCHEMISTRY

The Wabash College Chemistry Department believes in a challenging curriculum, which thoroughly investigates all areas of modern chemistry and in a significant hands-on laboratory experience in which students become progressively more independent as they proceed through the curriculum. We believe that such an education prepares chemistry majors for a variety of career outcomes, including those in research, medicine, teaching, and industry. In recent years, three-fourths of our majors have gone to graduate school in chemistry/biochemistry or to medical school following graduation. Others have chosen to take jobs as chemists or high school teachers or to attend other professional schools (business, law, and physical therapy). We strive to provide chemistry minors and pre-medical students with the knowledge base they need to succeed in their chosen fields. We seek to involve all Wabash students in the study of chemistry through non-majors courses, CHE-101 Survey of Chemistry and CHE-106 Survey of Biochemistry. We attempt to teach all chemistry students about the relationship between chemistry and the world around them.

## Faculty Advisors

Majors are strongly urged to select an advisor from the Chemistry Department when they declare their major.

## ACS Certified Degree

To meet the certification requirements formulated by the American Chemical Society Committee on Professional Training (CPT) as a chemist and for adequate preparation for graduate school, additional classroom and laboratory work beyond the minimum nine-course major is required. The student should consult with the Chair of the Chemistry Department concerning ways in which the remaining requirements may be fulfilled.

## Advanced Placement

Please refer to the Credit by Examination and Advanced Placement Credit guidelines in the Course Share, Transfer Credit, and Credit by Exam (<https://bulletin.wabash.edu/academic-policies/transfer-credit/>) page of the Bulletin. Potential biochemistry majors who wish to claim advanced placement credit should discuss placement options with the Department Chair. A placement examination will determine if students are eligible to being coursework beyond CHE-111 General Chemistry.

## Student Learning Goals

Students will acquire a broad-based knowledge of chemistry, biology, and biochemistry, and understand how these areas are interconnected.

Students will be able to connect theory with experimental work, including being able to design, execute, and analyze experiments, and to present their results effectively. Students will develop confidence and precision in their laboratory technique.

Students will have the ability to identify, comprehend, evaluate, and discuss primary, secondary, and general chemical literature.

Students will be able to effectively communicate chemical concepts to chemists, scientists and the general public.

Students will develop as scientists through research, internships, and in-depth course experiences.

Students will engage the chemical and biochemical communities at Wabash and beyond, fostering an inclusive and welcoming environment.

## Requirements for the Biochemistry Major

Code	Title	Credits
<b>Core Courses</b>		
CHE-111	General Chemistry	1
CHE-241	Inorganic Chemistry	1
CHE-221	Organic Chemistry I	1
CHE-321	Organic Chemistry II	1
CHE-331	Analytical Chemistry	1
	or CHE-351 Physical Chemistry	
CHE-361	Biochemistry	1
CHE-461	Advanced Biochemistry	0.5-1
CHE-462	Biochemistry II	0.5
<b>Electives</b>		
	Select one credit at the 300-400 level from the Chemistry Department. <sup>1</sup>	1
	Select one credit from the following courses from the Biology Department: <sup>2</sup>	1
BIO-311	Molecular Genetics	
BIO-314	Developmental Biology	
BIO-325	Microbiology	
BIO-371	Special Topics (with approval of the Chemistry department chair) <sup>3</sup>	
<b>Total Credits</b>		<b>9-9.5</b>

Code	Title	Credits
<b>Collateral Requirements</b>		
MAT-111	Calculus I	1
BIO-111	General Biology I	1
BIO-112	General Biology II	1
BIO-211	Genetics	1
BIO-212	Cell Biology	1
PHY-111	Physics I - Calculus	1
	or PHY-109 Physics I - Algebra	
For the CHE-351 option also take:		
MAT-112	Calculus II	
<b>Total Credits</b>		<b>6</b>

<sup>1</sup> No more than one-half course credit of independent study may be used to construct the minimum nine-course major. This includes CHE-487, CHE-488, and CHE-388.

<sup>2</sup> This course may not be counted towards a Biology major or minor.

<sup>3</sup> Only approved topics may count towards the Biochemistry major.

**The mathematics courses are best taken in the freshman year (e.g. MAT-100 and MAT-111 or MAT-111 Calculus I and MAT-112 Calculus II), and the physics sequence is best in the sophomore year if the physical chemistry option is selected.** Biochemistry majors who intend to pursue a graduate degree are **strongly encouraged** to take the CHE-351 option and the collateral requirement MAT-112, along with PHY-111 and PHY-112.

A Biochemistry major is permitted to have a minor in Biology, but not Chemistry.

## Suggested order of courses for the biochemistry major

There are many possible routes through the Biochemistry major; please consult with the department chair for special circumstances.

Course	Title	Credits
<b>Freshman</b>		
<b>Fall Semester</b>		
CHE-111	General Chemistry	1
MAT-111	Calculus I	1
<b>Credits</b>		<b>2</b>
<b>Spring Semester</b>		
CHE-241	Inorganic Chemistry	1
Students selecting the CHE-351 option should take MAT-112 this semester.		
<b>Credits</b>		<b>1</b>
<b>Sophomore</b>		
<b>Fall Semester</b>		
CHE-221	Organic Chemistry I	1
BIO-111	General Biology I	1
PHY-111	Physics I - Calculus or PHY-109 or Physics I - Algebra	1
We recommend that students pursuing a graduate degree take PHY-111 this semester.		
<b>Credits</b>		<b>3</b>
<b>Spring Semester</b>		
CHE-321	Organic Chemistry II	1
BIO-112	General Biology II	1
We recommend that students pursuing a graduate degree take PHY-112 this semester.		
<b>Credits</b>		<b>2</b>
<b>Junior</b>		
BIO-211	Genetics	1
CHE-351	Physical Chemistry or CHE-331 or Analytical Chemistry	1
CHE-361	Biochemistry	1
BIO-212	Cell Biology	1
<b>Credits</b>		<b>4</b>
<b>Senior</b>		
CHE Elective		1
BIO Elective		1
CHE-461 & CHE-462	Advanced Biochemistry and Biochemistry II	1
<b>Credits</b>		<b>3</b>
<b>Total Credits</b>		<b>15</b>

Or

Course	Title	Credits
<b>Freshman</b>		
<b>Fall Semester</b>		
BIO-111	General Biology I	1
MAT-111	Calculus I	1
<b>Credits</b>		<b>2</b>

## Spring Semester

BIO-112	General Biology II	1
Students selecting the CHE-351 option should take MAT-112 this semester.		
<b>Credits</b>		<b>1</b>

## Sophomore

<b>Fall Semester</b>		
BIO-211	Genetics	1
CHE-111	General Chemistry	1
PHY-111	Physics I - Calculus or PHY-109 or Physics I - Algebra	1
We recommend that students pursuing a graduate degree take PHY-111 this semester.		
<b>Credits</b>		<b>3</b>

## Spring Semester

BIO-212	Cell Biology	1
CHE-241	Inorganic Chemistry	1
We recommend that students pursuing a graduate degree take PHY-112 this semester.		
<b>Credits</b>		<b>2</b>

## Junior

CHE-221	Organic Chemistry I	1
CHE-351	Physical Chemistry or CHE-331 or Analytical Chemistry	1
CHE-321	Organic Chemistry II	1
CHE-361	Biochemistry	1
<b>Credits</b>		<b>4</b>

## Senior

CHE-461 & CHE-462	Advanced Biochemistry and Biochemistry II	1
CHE Elective		1
BIO Elective		1
<b>Credits</b>		<b>3</b>
<b>Total Credits</b>		<b>15</b>

Biochemistry majors who wish to transfer chemistry credits from another institution as part of their major must have prior approval of the Department Chair to do so.

## Comprehensive Exams

The written comprehensive examination for senior majors emphasizes both knowledge of basic chemical concepts and the ability to apply these concepts to new problems. The exam includes written questions over material from courses, a laboratory practical, a literature component, and an experimental design essay. Students that fail to complete their courses by the time of the written examination must petition the Department Chair for a special exam no later than the fall prior to their comprehensive examination.

## Biochemistry Faculty

Walter R.P. Novak, Chemistry  
Ann Taylor, Chemistry