BIOCHEMISTRY

Graduates with a degree in biochemistry will be well prepared for employment, graduate study in biochemistry or other chemistry-related fields, or professional school. Biochemists are employed in research, quality control, design, sales and management. Many graduates pursue masters and doctoral degrees in biochemistry, medicinal chemistry, and in other life science fields. A biochemistry degree is excellent preparation for medical school and related fields, and also for careers in business, law or education.

The curriculum at Rose-Hulman Institute of Technology provides a rigorous introduction to all subdisciplines of chemistry along with biochemistry and applied biology. Students have access to modern instrumentation along with a well-equipped biochemistry lab. Rose-Hulman students are introduced to modern computational methods beginning in the sophomore year. There are many opportunities for research or other individual projects, and students are encouraged to present their results at regional and national chemistry conferences. Close interaction with engineering departments provides students with a point of view not available at most other undergraduate institutions.

Requirements

List of Required Chemistry Courses

Code	Title	Hours
General Chemistry (12 credits):		
CHEM 111	General Chemistry I	3
CHEM 111L	General Chemistry I Lab	1
CHEM 113	General Chemistry II	3
CHEM 113L	General Chemistry II Laboratory	1
CHEM 115	General Chemistry III	3
CHEM 115L	General Chemistry III Laboratory	1
Organic Chemistry (12 credits):		
CHEM 251	Organic Chemistry I	3
CHEM 251L	Organic Chemistry I Laboratory	1
CHEM 252	Organic Chemistry II	3
CHEM 252L	Organic Chemistry II Laboratory	1
CHEM 253	Organic Chemistry III	3
CHEM 253L	Organic Chemistry III Laboratory	1
Analytical Chemistry (12 credits):		
CHEM 225	Analytical Chemistry	3
CHEM 225L	Analytical Chemistry Laboratory	1
CHEM 326	Bioanalytical Chemistry	4
CHEM 326L	Bioanalytical Chemistry Lab	0
CHEM 327	Advanced Analytical Chemistry	4
CHEM 327L	Analytical Chemistry III Lab	0
Physical Chemistry (12 credits):		
CHEM 361	Physical Chemistry I	4
CHEM 361L	Physical Chemistry Lab I	0
CHEM 362	Physical Chemistry II	4
CHEM 362L	Physical Chemistry II Lab	0
CHEM 463	Quantum Chemistry & Molecular Spectroscopy	4
Inorganic Chemistry (4 credits):		
CHEM 441	Inorganic Chemistry I	4
Biochemistry (13 credits):		
CHEM 330	Biochemistry I	4
CHEM 331	Biochemistry II	4
CHEM 430	Advanced Biochemistry	4
CHEM 433	Biochemistry Laboratory	1
Research (11 credits):		
CHEM 291	Introduction to Chemical Research	3
CHEM 395	Chemistry Seminar	0
CHEM 490	Chemical Research	2
CHEM 491	Senior Thesis	1
CHEM 495	Chemistry Seminar	0
CHEM 496	Chemistry Seminar	0
CHEM 497	Senior Presentation	1
Career Preparation (1 credit):		
CHEM 200	Career Preparation	1
Electives (11 credits):		11
Total Hours		**84**

Summary of Minimum Graduation Requirements

Course or Areas	Required	Elective	Total
Chemistry	77	11	88
Physics	12	0	12
Mathematics	19	0	19
Blology	16	0	16
Humanities, Social Sciences, and the Arts	8	28	36
Math/Science Elective	0	4	4
Electives	0	16	16
Foundations for Rose-Hulman Success	1	0	1
Total	133	59	192

Plan of Study

Below is a sample plan of study that illustrates one way to achieve the program requirements. Any given student's plan of study may differ based on a variety of factors (e.g., advanced credit, placement exams, adding a minor). Enrolled students will work with their academic advisor; utilize the degree audit/planner to create a specific plan of study.

Course	Title	Hours
Freshman		
Fall		
CHEM 111	General Chemistry I [1]	3
CHEM 111L	General Chemistry I Lab [1]	1
MA 111	Calculus I	5
RHIT 100	Foundations for Rose-Hulman Success	1
Select one of the following:		4
HUM H190	First-Year Writing Seminar	
HSSA Elective		
	Hours	**14**

Winter		
CHEM 113	General Chemistry II [1]	3
MA 112	Calculus II	5
PH 111	Physics I	4
PH 111L	Physics I Lab	0
BIO 110	Cell Structure and Function	4
	Hours	**16**
Spring		
CHEM 115	General Chemistry III	3
MA 113	Calculus III	5
PH 112	Physics II	4
PH 112L	Physics II Lab	0
HSSA Elective		4
	Hours	**16**
Sophomore		
Fall		
CHEM 251	Organic Chemistry I	3
CHEM 251L	Organic Chemistry I Laboratory	1
CHEM 225	Analytical Chemistry	3
MA 223 or MA 381	Engineering Statistics or Introduction to Probability with Applications to Statistics	4
BIO 210	Mendelian & Molecular Genetics	4
	Hours	**15**
Winter		
CHEM 200	Career Preparation	1
CHEM 252	Organic Chemistry II	3
CHEM 252L	Organic Chemistry II Laboratory	1
CHEM 291	Introduction to Chemical Research	3
Math/Science Elective [2]		4
BIO 220	Microbiology	4
	Hours	**16**
Spring		
CHEM 253	Organic Chemistry III	3
CHEM 253L	Organic Chemistry III Laboratory	1
HSSA Elective		4
BIO 230	Cell Biology	4
Select one of the following:		4
ENGL H290	Technical & Professional Communication	
HSSA Elective		
	Hours	**16**
Junior		
Fall		
PH 113	Physics III	4
PH 113L	Physics III Lab	0
CHEM 330	Biochemistry I	4
CHEM 361	Physical Chemistry I [3]	4
CHEM 395	Chemistry Seminar	0
CHEM 490	Chemical Research	2
HSSA Elective		4
	Hours	**18**
Winter		
CHEM 326	Bioanalytical Chemistry	4
CHEM 362	Physical Chemistry II [3]	4
CHEM 331	Biochemistry II	4
CHEM 490	Chemical Research	2
HSSA Elective		4
	Hours	**18**
Spring		
CHEM 463	Quantum Chemistry & Molecular Spectroscopy	4
CHEM 430	Advanced Biochemistry	4
CHEM 433	Biochemistry Laboratory	1
CHEM 490	Chemical Research	2
CHEM 327	Advanced Analytical Chemistry	4
	Hours	**15**
Senior		
Fall		
CHEM 441	Inorganic Chemistry I	4
CHEM 495	Chemistry Seminar	0
CHEM Advanced Chemistry Elective [4]		4
HSSA Elective		4
Free Elective		4
	Hours	**16**
Winter		
CHEM 496	Chemistry Seminar	0
CHEM Advanced Chemistry Elective [4]		3
Free Elective		4
HSSA Elective		4
Advanced Biology, Chemistry, Biochemistry Elective [5]		4
	Hours	**15**
Spring		
CHEM 491	Senior Thesis	1
CHEM 497	Senior Presentation	1
HSSA Elective		4
Free Elective		4
Free Elective		4
	Hours	**14**
	Total Hours	**189**

1. Subject to approval, CHEM 112 General Chemistry Honors may be substituted for CHEM 111 General Chemistry I and CHEM 113 General Chemistry II.
2. Math/ScienceElective defined as 200 level or above coursework with any of the following prefixes: BIO, BMTH, CSSE, GEOL, ECONS, MA, or PH
3. CHE 303 Chemical Engineering Thermodynamics, CHE 304 Multi-Component Thermodynamics and CHEM 360 Introduction to Physical Chemistry for Engineers may be substituted for CHEM 361 Physical Chemistry I and CHEM 362 Physical Chemistry II.
4. Advanced CHEM Elective defined as 300 level or above coursework with CHEM prefix.
5. Advanced BIO Elective defined as 300 level or above coursework with BIO prefix.

Notes

Two degree or double major programs in biochemistry and either chemistry or biochemistry and molecular biology is not allowed.

Students must complete at least 3 credits of CHEM 490 Chemical Research prior to the Spring quarter of their senior year.

Students may count up to 8 credits of research toward their electives, of which no more than 2 credits can come from CHEM 290 Chemical Research.

Learning Outcomes

Student Learning Outcomes

Student Outcomes are statements that describe what students are expected to have by the time of graduation.

1. An ability to design and conduct experiments as well as to analyze and interpret data.

2. An ability to recognize the professional and ethical responsibilities of a biochemist.
3. An ability to communicate effectively in presentations and reports.
4. An ability to recognize biochemistry practices outside of the academic environment.
5. An ability to operate safely and effecitvely in a biochemistry laboratory.