BIOLOGY

The biology program will produce biologists with the chemistry, mathematics, and physics background needed to solve biotechnological problems in the coming decades. Those students wishing to strengthen their engineering skills can earn the minor in biomedical engineering.

The twenty-first century will see unparalleled advances in the biological sciences that will greatly impact the way we live. The areas of functional genomics and proteomics will drive discoveries in molecular medicine, gene therapy, and tissue engineering. Drug discovery will be facilitated by the elucidation of new target molecules and many pharmaceutical compounds will be produced using biological processes. Environmental management, remediation, and restoration will also advance as a result of new techniques and perspectives that emerge from the century of biology. Biologists will be at the forefront of the advances that will drive progress in medical, agricultural, environmental, and related industries.

The biology program will equip biologists with the deep biological understanding along with chemistry, mathematics, and physics background needed to solve biotechnological problems in the coming decades. The program will prepare graduates for professional careers in government and industrial research laboratories, and in the biotechnology and health-related industries. Those wishing to continue their studies in graduate or health professions programs will be exceptionally well qualified to do so.

Requirements

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.

Math requirements in BIO can be satisfied via one of the following course sequences:

Sequence 1 (Probability and Statistics Focus)

Code	Title	Hours
MA 223	Engineering Statistics	4
MA 482	Biostatistics	4
MA 485	Applied Linear Regression	4
or MA 487	Design of Experiments	
Total Hours		**12**

Sequence 2 (Modeling Focus)

Code	Title	Hours
MA 221	Matrix Algebra & Differential Equations I	4
MA 222	Matrix Algebra & Differential Equations II	4
MA 223	Engineering Statistics	4
Total Hours		**12**

Summary

Code	Title	Hours
Required BIO courses		52
BIO electives		12
Free electives		8
Required CSSE		4
HSSA electives		24
Required HSSA		12
Required MA, CHEM, PH		59
RHIT 100	Foundations for Rose-Hulman Success (Required)	1
Sci/Tech electives		16
Total Hours		**188**

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		
BIO 130	Evolution & Diversity	4
MA 111	Calculus I	5
CHEM 111	General Chemistry I	3
CHEM 111L	General Chemistry I Lab	1
RHIT 100	Foundations for Rose-Hulman Success	1
	Hours	**14**
Winter		
BIO 110	Cell Structure and Function	4
MA 112	Calculus II	5
CHEM 113	General Chemistry II	3
CHEM 113L	General Chemistry II Laboratory	1
HUM H190	First-Year Writing Seminar	4
	Hours	**17**
Spring		
BIO 120	Comparative Anatomy & Physiology	4
CSSE 120	Introduction to Software Development	4
MA 113	Calculus III	5
HSSA Elective		4
	Hours	**17**
Sophomore		
Fall		
BIO 210	Mendelian & Molecular Genetics	4
CHEM 251	Organic Chemistry I	3
CHEM 251L	Organic Chemistry I Laboratory	1
PH 111	Physics I	4
MA 223	Engineering Statistics	4
	Hours	**16**
Winter		
BIO 220	Microbiology	4
CHEM 252	Organic Chemistry II	3
CHEM 252L	Organic Chemistry II Laboratory	1
PH 112	Physics II	4
ENGL H290	Technical & Professional Communication	4
	Hours	**16**
Spring		
BIO 230	Cell Biology	4
CHEM 330	Biochemistry I	4
Math Elective		4
HSSA Elective		4
	Hours	**16**

Junior		
Fall		
BIO 320	Ecology	4
BIO Elective		4
HSSA Elective		4
BIO 399	Practice of Science	4
	Hours	**16**
Winter		
BIO 330	Evolutionary Biology	4
BIO 496	Senior Thesis Research I	2
CHEM 331	Biochemistry II	4
Math Elective		4
	Hours	**14**
Spring		
BIO 310	Plant Structure & Function	4
BIO 497	Senior Thesis Research II	4
PHIL H201	Bioethics	4
HSSA Elective		4
	Hours	**16**
Senior		
Fall		
BIO 498	Senior Thesis Research III	4
Science/Technical Elective		4
Science/Technical Elective		4
Free Elective		4
	Hours	**16**
Winter		
BIO 499	Senior Thesis Research IV	2
Science/Technical Elective		4
BIO Elective		4
HSSA Elective		4
	Hours	**14**
Spring		
BIO Elective		4
Science/Technical Elective		4
HSSA Elective		4
HSSA Elective		4
	Hours	**16**
	Total Hours	**188**

Notes

A biology Science/Technical Elective is any Rose-Hulman course that does not have an HSSA Department course prefix or have the prefix AS, MS, or GRAD. At least two of these courses must be 300-level or above.

A BIO Elective is any Rose-Hulman course with a BIO prefix at 400-level or above or the following three BE courses: BE 314 Musculoskeletal Systems Physiology with Applications, BE 324 Neural and Endocrine Systems Physiology with Applications, and BE 334 Cardiovascular, Respiratory, and Renal Systems Physiology with Applications.

Learning Outcomes
Biology Learning Objectives

Upon graduation, Rose-Hulman Biology students will be able to

1. identify questions of interest to the scientific community.
2. develop and implement a strategy to answer open-ended questions or achieve a goal through scientific investigation or experimentation.
3. develop evidence-based conclusions through a process of informed evaluation and judgement.
4. communicate with a range of audiences through a variety of media.
5. demonstrate integrity with respect to ethical and professional responsibilities.
6. exhibit growth as a person and professional using appropriate learning strategies.
7. use examples from molecules to ecosystems to illustrate core concepts of biology.