

Biotechnology

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Over the past 20 years, the emerging field of biotechnology has fundamentally changed the world we live in. It has led to breakthrough medical discoveries, greater understanding of the building blocks of life, advances in evolutionary biology, environmental remediation, agriculture, industrial processes, biomaterials, and even artificial intelligence. It has also spawned intense controversy. Public policy debates, ethical and religious concerns, legal and financial scandals, and questions of research integrity have all been a part of the biotechnology revolution.

Today the U.S. biotechnology industry is valued at \$360 billion, and directly employs roughly 180,000 people. Additionally, many more jobs have been created in research, government, law, finance, and other areas directly supporting the industry. The need for people trained to work in biotechnology is increasing at rates above the national average^{1,2}. People working in biotechnology are paid higher than average wages, making the field an attractive educational option for students. The opportunities for graduates with knowledge and skills in biotechnology are substantial.

At the core of a biotechnology curriculum is a strong foundation in biology, chemistry, mathematics, computer science, and laboratory expertise. It is the interconnection of these fields that creates opportunity. The Herbert W. Boyer School of Natural Sciences, Mathematics, and Computing is able to deliver an interdisciplinary curriculum while maintaining the intimacy of a small liberal arts college, allowing students to explore various interconnected subspecialties through one-on-one research experiences with faculty and industry.

Biotechnology, however, is more than just a discipline of science. It touches ethics, public policy, government, economics, business, education, and law. Saint Vincent College has a distinct advantage in educating and preparing students for careers in biotechnology that extend beyond the laboratory. With strong existing programs in these liberal arts areas, we are in a position to address the whole discipline of biotechnology.

Certification in Biotechnology

May be completed as a post-Baccalaureate Certificate (usually in one year), or concurrently with a traditional major course of study (may require an additional semester to complete).

(See *Core Curriculum requirements.*)

(See *Major requirements.*)

Certification Requirements

Prerequisites:

BL 150	General Biology I	3
BL 152	General Biology II	3
BL 151	General Biology Laboratory I	1
BL 153	General Biology Laboratory II	1
BL 208	Cell Biology	3
BL 209	Cell Biology Laboratory	1
BL 214	Molecular Genetics	3
BL 215	Molecular Genetics Laboratory	1
CH 101	General Chemistry I	3
CH 102	General Chemistry II	3
CH 103	General Chemistry Laboratory I	1
CH 104	General Chemistry Laboratory II	1
CH 221	Organic Chemistry I	3
CH 222	Organic Chemistry II	3
CH 223	Organic Chemistry Laboratory I	1
CH 224	Organic Chemistry Laboratory II	1
MA 109	Calculus I	4

Course Requirements (32 credits)

BIN 218	Bioinformatics, Genomics, and Proteomics	3
BL 216	Biotechnology	3
BL 217	Biotechnology Laboratory	1
BL 260	Biostatistics	3
CH 251	Proteins & Metabolism	3
CH 253	Proteins & Metabolism Laboratory	1
CH 252	Nucleic Acids and Membranes	3
CH 254	Nucleic Acids and Membranes Laboratory	1
PS 390	Environmental Law and Policy	3
PL 218	Bioethics	3
or		
TH 280	Catholic Bioethics	3

4 credits (course & laboratory) selected from:

BL 220	Comparative Vertebrate Anatomy	3
BL 221	Comparative Vertebrate Anatomy Laboratory	1
BL 222	Developmental Biology	3
BL 223	Developmental Biology Laboratory	1
BL 224	Mammalian Physiology	3
BL 225	Mammalian Physiology Laboratory	1

3 credits selected from:

BA 104	Introduction to Management	3
BA 230	Introduction to Entrepreneurship	3
PS 150	Government and Business	3
Internship/Research Experience & Portfolio Completion		1

The Certification in Biotechnology requires, in addition to coursework, an applied internship or research experience, either paid or unpaid (which can occur on or off campus, during the summer or during the school year), and the completion of an individualized portfolio.

The portfolio will be used to highlight a student's acquired and demonstrated skills in biotechnology laboratory techniques, as well as their broader understanding of the field from a regulatory, policy, business, ethical, legal, and societal perspective. It will also convey a student's communicative and presentation abilities.

At least 12 credits of the Certificate course requirements must be completed at Saint Vincent College.

Minor in Biotechnology

To be completed concurrently with a traditional major course of study.

Minor Requirements (21 Credits)

BIN 218	Bioinformatics, Genomics, and Proteomics	3
BL 214	Molecular Genetics*	3
BL 215	Molecular Genetics Laboratory	1
BL 216	Biotechnology*	3
BL 217	Biotechnology Laboratory	1
PS 390	Environmental Law and Policy	3
PL 218	Bioethics	3
or		
TH 280	Catholic Bioethics	3

3 credits selected from:

BA 104	Introduction to Management	3
BA 230	Introduction to Entrepreneurship	3
PS 150	Government and Business	3
Internship/Research Experience/Cumulative Paper		1

*These courses require the General Biology series (BL 150-153) as a prerequisite.

The minor in Biotechnology requires, in addition to coursework, an applied internship, research experience, or cumulative paper.

¹ *Biotechnology Industry Organization (BIO), 2009*

² *Pharma Industry News, 2007*