

BIOTECHNOLOGY B.S.

Program Learning Outcomes

VU Biology graduates should be able to:

1. **Demonstrate** proficiency in *general biology concepts and theories*, as well as in self-selected biology sub-disciplines in order to succeed in careers and graduate programs.
2. **Illustrate** sufficient proficiency in *calculus, general chemistry, organic chemistry, and physics* in order to understand biological concepts involving these disciplines.
3. **Operate** basic *scientific instruments* necessary for biological investigations such as microscopes, centrifuges, spectrophotometers, electrophoresis equipment and pH meters thus demonstrating competency in *basic laboratory skills*, cell culture, and field techniques.
4. **Design** and conduct experiments –both individually and in small groups– using appropriate strategies such as: *collect, organize, analyze, interpret, and present quantitative & qualitative data and incorporate* them into the broader context of biological knowledge.
5. **Analyze and evaluate** various types of *scientific information* including primary research articles, mass media sources and world-wide web information.
6. **Disseminate** and *present biological data* with theoretical and historical perspectives –both in oral and written formats– to a diverse audience.
7. **Use critical and creative thinking to solve problems** by compiling and analyzing scientific information from library, electronic, and experimental sources. Effectively apply current technology and scientific methodologies for problem solving.
8. **Articulate** historical, current, and theoretical issues relating to biology and society within a Christ-centered worldview that allows for *evaluation of the relationship of scientific theories with ethical and religious perspectives*, particularly those common to Pentecostal Christians.

Requirements

| Code | Title | Units |
|---|-------|------------|
| Core Curriculum Requirements (https://catalog.vanguard.edu/interdisciplinary-offerings/core-curriculum/) ¹ | | 46 |
| Biotechnology Major Requirements | | 73 |
| General Electives | | 1 |
| Total Units | | 120 |

Biotechnology Major Requirements

| Code | Title | Units |
|------------------------|--|-------|
| Lower Division: | | |
| BIOL-111 & 111L | Principles of Cell and Molecular Biology and Principles of Biology Lab, Principles of Cell/Molecular Biology Lab | 4 |
| BIOL-112 & 112L | Principles of Organismal Biology and Principles of Organismal Biology Lab | 4 |

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|------------------------|--|-----------|
| BIOL-220 & 220L | Cell Biology and Cell Biology Lab | 4 |
| BIOT-200 & 200L | Introduction to Biotechnology and Introduction to Biotechnology Laboratory | 4 |
| CHEM-120 & 120L | General Chemistry I and General Chemistry I Lab | 4 |
| CHEM-121 & 121L | General Chemistry II and General Chemistry II Lab | 4 |
| MATH-180C | Calculus I | 4 |
| MATH-265C | Intro to Statistical Methods | 3 |
| | or MATH-270C Health Professions Statistical Methods | |
| PSCI-130C & 130CL | General Physics I and General Physics I Lab | 4 |
| PSCI-131 & 131L | General Physics II and General Physics II Lab | 4 |
| Upper Division: | | |
| BIOL-309 & 309L | Microbiology and Microbiology Laboratory | 4 |
| BIOT-403 | Adv. Research Methods in Biotechnology | 3 |
| BIOT-405 & 405L | Bioinformatics and Bioinformatics Laboratory | 4 |
| BIOL-440 & 440L | Molecular Biology and Techniques in Molecular Biology | 4 |
| BIOL-485 | Undergrad Biological Research | 2 |
| | or BIOL-488 Biology Senior Project | |
| | or BIOL-450 UG Research or Internship Program | |
| BIOL-499C | Capstone Seminar in Biology | 2 |
| BIOT-413 | Cell Culture Techniques | 3 |
| CHEM-304 & 304L | Organic Chemistry I and Organic Chemistry Techniques I | 4 |
| CHEM-305 & 305L | Organic Chemistry II and Organic Chemistry Technqs II | 4 |
| CHEM-430 & 430L | Biochemistry and Experimental Tech/Biochemistry | 4 |
| Total Units | | 73 |

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Number of units required from the Core Curriculum not included in the major requirements below.

Four Year Plan

Disclaimer: This *sample Four Year Plan* is provided as a guide for the recommended sequencing of courses. Vanguard University requires that students complete a minimum of 120 units of required course work as outlined on the Requirements tab in order to receive a Bachelor of Arts, Bachelor of Music, Bachelor of Science, or Bachelor of Science in Nursing degree. It is the student's responsibility to confirm with the department the course rotation before enrolling in courses. If applicable, please note the footnotes at the bottom of the page for additional information related to courses listed in a particular year and term. Questions, contact the Department of Biology.

Study Abroad Participation: Students interested in participating in the university's Study Abroad programs are encouraged



to reach out to the Global Education and Outreach Office (studyabroad@vanguard.edu) for more information and collaboration in their academic course planning. Students using Education and Training Benefits through the U.S. Department of Veteran Affairs are encouraged to also reach out to the School Certifying Official (veteranscertifyingofficial@vanguard.edu) for more information regarding how benefits can be applied.

