

# BIOLOGY 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.

BIOL-220 & 220L	Cell Biology and Cell Biology Lab	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 1	4
MATH-265C or MATH-270C	Intro to Statistical Methods Health Professions Statistical Methods	3
PSCI-223C & 223CL or PSCI-130 & 130CL	Mechanics of Solids and Fluids and Mechanics of Solids and Fluids Lab Introduction to Physics I and General Physics I Lab	4
PSCI-225 & 225L or PSCI-131 & 131L	Electricity and Magnetism and Electricity and Magnetism Lab General Physics II and General Physics II Lab	4
Lower Division Biology Elective (Lecture/Lab)		4
<b>Upper Division:</b>		
BIOL-309 & 309L	Microbiology and Microbiology Laboratory	4
BIOL-311 & 311L	Genetics and Genetics Laboratory	4
BIOL-315 & 315L	General Ecology and Ecology Field and Lab Practicum	4
BIOL-485 or BIOL-488 or BIOL-450 or BIOL-406	Undergrad Biological Research Biology Senior Project UG Research or Internship Program Research Methods in Neurobiology	2
BIOL-499C	Capstone Seminar in Biology	2
CHEM-304 & 304L	Organic Chemistry I and Organic Chemistry Techniques I	4
Select four (4) upper division lecture/lab combinations <sup>2</sup>		16
<b>Total Units</b>		<b>75</b>

1

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

2

In consultation with your academic advisor, select four lecture/lab combinations that best align with your career goals. Additional course selections in Chemistry, Environmental Sciences, Engineering Physics and Psychology maybe approved on a case-by-case basis.

## Requirements

Code	Title	Units
Core Curriculum Requirements ( <a href="https://catalog.vanguard.edu/interdisciplinary-offerings/core-curriculum/">https://catalog.vanguard.edu/interdisciplinary-offerings/core-curriculum/</a> ) <sup>1</sup>		46
Biology Major Requirements		75
General Electives		0
<b>Total Units</b>		<b>121</b>

## Biology Major Requirements

Code	Title	Units
<b>Lower Division:</b>		
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

## 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.

Course	Title	Units
<b>Year 1 Term 1</b>		
CORE-100C	Cornerstone	1
BIOL-111	Principles of Cell and Molecular Biology	3
BIOL-111L	Principles of Biology Lab, Principles of Cell/ Molecular Biology Lab	1
CHEM-120	General Chemistry I	3
CHEM-120L	General Chemistry I Lab	1
NT-101C	New Testament Survey	3
ENGL-120C	Persuasive Writing	3
<b>Units</b>		<b>15</b>
<b>Year 1 Term 2</b>		
BIOL-112	Principles of Organismal Biology	3
BIOL-112L	Principles of Organismal Biology Lab	1
CHEM-121	General Chemistry II	3
CHEM-121L	General Chemistry II Lab	1
PSYC-103C	Introduction to Psychology	3
MATH-180C	Calculus 1	4
<b>Units</b>		<b>15</b>
<b>Year 2 Term 1</b>		
BIOL-220	Cell Biology	3
BIOL-220L	Cell Biology Lab	1
COMM-201C	Speech Composition and Presentation	3
THEO-PLHD	Theology Core Requirement	3
ENGL-220C	Researched Writing	3
KINE-148C	Lifetime Fitness and Wellness Lecture	3
<b>Units</b>		<b>16</b>
<b>Year 2 Term 2</b>		
BIOL-PLHD4	Biology Elective	4
FINA-PLCR	Fine Arts Core Curriculum Requirement	3
OT-201C	Old Testament Survey	3
BIOL-311	Genetics	3
BIOL-311L	Genetics Laboratory	1
BIOL-STATS	Statistics Option	3
<b>Units</b>		<b>17</b>
<b>Year 3 Term 1</b>		
PSCI-PLGP1	Physics 1 Requirement	4
CHEM-304	Organic Chemistry I	3

CHEM-304L	Organic Chemistry Techniques I	1
HIST-PLCR2	History Core Requirement (World Civ)	3
BIOL-309	Microbiology	3
BIOL-309L	Microbiology Laboratory	1
<b>Units</b>		<b>15</b>
<b>Year 3 Term 2</b>		
PSCI-PLGP2	Physics 2 Requirement	4
BIOL-315	General Ecology	3
BIOL-315L	Ecology Field and Lab Practicum	1
HIST-PLCR1	History Core Req (US Hist Or Democracy)	3
SOC-100C	Introduction to Sociology	3
<b>Units</b>		<b>14</b>
<b>Year 4 Term 1</b>		
THEO-300C	Developing a Christian World View	3
BIOL-488	Biology Senior Project	2
BIOL-PLHD8	Biology Elective 8 Units	8
<b>Units</b>		<b>13</b>
<b>Year 4 Term 2</b>		
BIOL-499C	Capstone Seminar in Biology	2
CHIS-400C	Christian Heritage	3
ENGL-230C	Literature and the Human Experience	3
BIOL-PLHD8	Biology Elective 8 Units	8
<b>Units</b>		<b>16</b>
<b>Total Units</b>		<b>121</b>

**Year 1 Term 1 Note:**

- Must pass the respective Chemistry and/or Math placement exam(s).

