

SCIENCE, BACHELOR OF SCIENCE (B.S.) WITH A CONCENTRATION IN BIOLOGY

Student learning outcomes

Upon completing this program, students will know and know how to do the following:

Interdisciplinary science core learning outcomes

- Demonstrate competency in at least two sciences or in a non-science area
- Apply learning to selection and pursuit of professional or graduate career objective
- Demonstrate proficiency in communication of scientific or research findings
- Demonstrate ability to apply the scientific method/approach to professional problems
- Demonstrate appreciation of the interrelation of core sciences to interdisciplinary problems

Biology concentration-specific learning outcome:

- Demonstrate broad science proficiency, with special emphasis on the core discipline of biology

Special requirements

The Bachelor of Science in Science requires a minimum of 120 credits.

Along with the general education requirements of the undergraduate programs and the College of Humanities and Sciences for a Bachelor of Science degree, this curriculum requires 28 to 33 credits in foundation science and mathematics courses and 36 to 38 credits in supplemental courses in the concentration. In preparation for the required mathematical sciences courses, all students must take the Mathematics Placement Test. Science majors are strongly encouraged to select a minor in an area different from their area of concentration that will complement their career interests and contribute additional upper-level credits to their curriculum.

Science majors declaring the biology concentration may not simultaneously declare a major or minor in biology.

Grade requirements

A minimum grade of C is required in each prerequisite course:

Course	Title	Hours
CHEM 100	Introductory Chemistry (if required through placement test)	3
CHEM 101	General Chemistry I	3
CHEM 102	General Chemistry II	3
CHEM 301	Organic Chemistry	3
CHEM 302	Organic Chemistry	3

A minimum grade of C is required in the following courses before enrollment in advanced BIOL courses:

Course	Title	Hours
BIOL 151 & BIOZ 151	Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I	4
BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	4
BIOL 300	Cellular and Molecular Biology	3

Degree requirements for Science, Bachelor of Science (B.S.) with a concentration in biology

Course	Title	Hours
General education (https://bulletin.vcu.edu/undergraduate/undergraduate-study/general-education-curriculum/)		
Select 30 credits of general education courses in consultation with an adviser.		30
Major requirements		
• Major core requirements		
INSC 490	Capstone Research Experience in Interdisciplinary Science	3
• Additional major requirements		
CHEM 102 & CHEZ 102	General Chemistry II and General Chemistry Laboratory II	4
ENVS 301	Introduction to Meteorology (or upper-level natural or health science elective from list below)	3
ENVS 310	Introduction to Oceanography (or upper-level natural or health science elective from list below)	3
PHYS 202 or PHYS 208	General Physics II or University Physics II	4-5
Select one of the following:		4
ENVS 105 & URSZ 204	Physical Geology and Physical Geography Laboratory	
URSP 204 & URSZ 204	Physical Geography and Physical Geography Laboratory	
Or a 200-level or higher natural science elective and a 200-level or higher natural science laboratory elective from the list below		
• Concentration requirements		
BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	4
BIOL 300	Cellular and Molecular Biology	3
BIOL 310	Genetics	3
BIOZ 310	Laboratory in Genetics (or other upper-level biology laboratory)	2
BIOL 317	Ecology	3
• Major electives		
Select one upper-level animal or one upper-level plant course, with laboratory, from list below		4
Select two upper-level biology electives		6
Ancillary requirements		
BIOL 151	Introduction to Biological Sciences I	3

BIOZ 151	Introduction to Biological Science Laboratory I	1
CHEM 101 & CHEZ 101	General Chemistry I and General Chemistry Laboratory I (CHEM 101 satisfies general education BOK for natural sciences and AOI for scientific and logical reasoning)	4
HUMS 202	Choices in a Consumer Society	1
MATH 151	Precalculus Mathematics (or placement; satisfies general education quantitative foundations)	4
MATH 200 or SCMA 212 or STAT 314	Calculus with Analytic Geometry I Differential Calculus and Optimization for Business Applications of Statistics	3-4
PHYS 201 or PHYS 207	General Physics I (either satisfies general education BOK for natural sciences and AOI for scientific and logical reasoning) University Physics I	4-5
STAT 208 or STAT 210	Statistical Thinking Basic Practice of Statistics	3
Experiential fine arts ¹		1-3
Foreign language through the 102 level (by course or placement)		0-6
Open electives		
Select any course.		21-34
Total Hours		120

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Course offered by the School of the Arts

The minimum number of credit hours required for this degree is 120.

Animal and plant courses

Course	Title	Hours
Animal group		
BIOL 309	Entomology ¹	4
BIOL 312	Invertebrate Zoology	3
BIOZ 312	Invertebrate Zoology Laboratory	1
BIOL 313	Vertebrate Natural History	3
BIOZ 313	Vertebrate Natural History Laboratory	1
BIOL 391	Topics in Biology (as approved)	1-4
BIOZ 391	Topics in Biology Laboratory (as approved)	1-4
BIOL 402	Comparative Vertebrate Anatomy	5
BIOL 416	Ornithology	3
BIOZ 416	Ornithology Laboratory	2
BIOL 417	Mammalogy ¹	4
BIOL 435	Herpetology ¹	3
BIOL 445	Neurobiology and Behavior ¹	4
BIOL 503	Fish Biology ¹	4
Plant group		
BIOL 320	Biology of the Seed Plant ¹	4
BIOL 321	Plant Development	3

BIOZ 321	Plant Development Laboratory	2
BIOL 322	Plants, People and Culture	3
BIOL 391	Topics in Biology (as approved)	1-4
BIOZ 391	Topics in Biology Laboratory (as approved)	1-4

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These courses include laboratory hours and may be used to satisfy laboratory requirements.

Natural science electives

Course	Title	Hours
LFSC 301	Integrative Life Sciences Research	3
LFSC 401	Faith and Life Sciences	3
PHTX 400	Drugs and Their Actions	3
Any 200-level or higher BIOL, BNFO, CHEM, CLSE, EGRB, ENVS, FRSC, INSC or PHYS course, except:		
BIOL 392	Introduction to Research	
BIOL 475	Biology Capstone Seminar: ____	
BIOL 477	Biology Capstone Experience	
BIOL 489	Research Writing	
BIOL 490	Presenting Research	
BIOL 492	Undergraduate Research	
BIOL 493	Biology Internship	
BIOL 495	Research and Thesis II	
BIOL 496	Biology Preceptorship: ____	
BNFO 292	Independent Study	
BNFO 492	Independent Study	
BNFO 496	Undergraduate Teaching Assistantship in Bioinformatics	
CHEM 392	Directed Study	
CHEM 492	Independent Study	
CHEM 493	Chemistry Internship	
ENGR 490	Engineering Seminar	
ENGR 492	Independent Study in Engineering	
ENVS 490	Research Seminar in Environmental Studies	
ENVS 492	Independent Study	
ENVS 493	Environmental Studies Internship	
FRSC 490	Professional Practices in Forensic Science	
FRSC 492	Forensic Science Independent Study	
FRSC 493	Forensic Science Internship	
INSC 490	Capstone Research Experience in Interdisciplinary Science	
PHYS 490	Seminar in Conceptual Physics	
PHYS 492	Independent Study	

Natural science laboratory electives

Course	Title	Hours
BIOL 205	Basic Human Anatomy ¹	4
BIOL 309	Entomology ¹	4
BIOL 320	Biology of the Seed Plant ¹	4
BIOL 402	Comparative Vertebrate Anatomy ¹	5

BIOL 417	Mammalogy ¹	4
BIOL 435	Herpetology ¹	3
BIOL 445	Neurobiology and Behavior ¹	4
BIOL 503	Fish Biology ¹	4
BIOZ: any 200-level or higher course		
BNFO 380	Introduction to Mathematical Biology ¹	4
BNFO 420	Applications in Bioinformatics ¹	3
BNFO 440	Computational Methods in Bioinformatics ¹	3
CHEZ: any 200-level or higher course		
EGRB 307	Biomedical Instrumentation ¹	4
EGRB 308	Biomedical Signal Processing ¹	4
EGRB 310	Biomechanics ¹	4
ENVZ 335	Environmental Geology Laboratory	1
FRSZ: any 200-level or higher course		
PHIZ 206	Human Physiology Laboratory	1
PHYS 202	General Physics II ¹	4
PHYS 208	University Physics II ¹	5
PHYZ 320	Modern Physics Laboratory	1

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Courses have a combined lecture and lab and will satisfy both natural science lecture and laboratory requirements.

Health science electives

Course	Title	Hours
AFAM/ANTH/INTL/ GSWS 309	Gender and Global Health	3
AFAM 310	Black Health Matters: Social Determinants of Health in the African American Community	3
GSWS 392	Gender and Health Across the Life Span	3
HPEX 325	Pathology and Pharmacology in Athletic Training	3
HPEX 345	Nutrition for Health and Disease	3
HPEX 350	Nutrition	3
HPEX 353	Disease Trends, Prevention and Control	3
HPEX 373	Structural Kinesiology	3
HPEX 374	Musculoskeletal Structure and Movement	4
HPEX 375	Physiology of Exercise	3
HPEX 440	Chronic Disease and Exercise Management	3
PSYC 401	Physiological Psychology	3
PSYC 412	Health Psychology	3
PSYC/GSWS 414	Psychology of Women's Health	3
SCTS 300	Introduction to Science and Technology Studies	3
SCTS 301	Illness Narratives	3
SCTS 392	Revolutions in Science I	3
SCTS 393	Revolutions in Science II	3
SCTS 397	Genetics and Society: 1865 to the Present	3

SCTS 398	Medicine and Public Health: ____	3
SOCY 344	Medical Sociology	3

What follows is a sample plan that meets the prescribed requirements within a four-year course of study at VCU. Please contact your adviser before beginning course work toward a degree.

Recommended course sequence/plan of study

Freshman year		Hours
Fall semester		
MATH 151	Precalculus Mathematics (or placement) (satisfies general education quantitative foundations)	4
STAT 208 or STAT 210	Statistical Thinking or Basic Practice of Statistics	3
UNIV 101	Introduction to the University	1
UNIV 111 Play course video for Introduction to Focused Inquiry: Investigation and Communicatio	Introduction to Focused Inquiry: Investigation and Communication (satisfies general education UNIV foundations)	3
General education course		3
Term Hours:		14
Spring semester		
CHEM 101 & CHEZ 101	General Chemistry I and General Chemistry Laboratory I (CHEM 101 satisfies general education BOK for natural sciences and AOI for scientific and logical reasoning)	4
HUMS 202	Choices in a Consumer Society	1
MATH 200 or SCMA 212 or STAT 314	Calculus with Analytic Geometry I or Differential Calculus and Optimization for Business or Applications of Statistics	3-4
UNIV 112 Play course video for Focused Inquiry II	Focused Inquiry II (satisfies general education UNIV foundations)	3
General education course (select BOK to satisfy breadth of knowledge requirement and AOI for diversities in the human experience)		3
Term Hours:		14-15
Sophomore year		
Fall semester		
BIOL 151 & BIOZ 151	Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I	4
CHEM 102 & CHEZ 102	General Chemistry II and General Chemistry Laboratory II	4

PHYS 201 or PHYS 207	General Physics I (satisfies general education AOI for scientific and logical reasoning) or University Physics I	4-5
UNIV 200	Advanced Focused Inquiry: Literacies, Research and Communication (satisfies general education UNIV foundations)	3
Experiential fine arts (SPCH 321 or other upper-level option recommended)		1-3
Term Hours:		16-19

Spring semester

BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	4
PHYS 202 or PHYS 208	General Physics II or University Physics II	4-5
General education course (select BOK to satisfy breadth of knowledge requirement and AOI for creativity, innovation and aesthetic inquiry)		3
Open elective		3
Term Hours:		14-15

Junior year**Fall semester**

BIOL 300	Cellular and Molecular Biology	3
BIOL 317	Ecology	3
ENVS 105 or URSP 204	Physical Geology (or 200-level science) or Physical Geography	3
URSZ 204	Physical Geography Laboratory	1
Foreign language 101 or upper-level minor elective		3
Open elective or upper-level minor elective		2-3
Term Hours:		15-16

Spring semester

BIOL 310	Genetics	3
ENVS 301	Introduction to Meteorology (or upper-level science elective)	3
BIOZ 310	Laboratory in Genetics (or other upper-level biology laboratory)	2
Foreign language 102 or upper-level minor elective		3
Open elective or upper-level minor elective		3
Open elective		3
Term Hours:		17

Senior year**Fall semester**

ENVS 310	Introduction to Oceanography (or upper-level science elective)	3
One upper-level animal or upper-level plant course, with laboratory		4
Open electives or upper-level minor electives		9
Term Hours:		16

Spring semester

INSC 490	Capstone Research Experience in Interdisciplinary Science	3
Open electives or upper-level minor electives, as needed		5-6

Upper-level biology electives	6
Term Hours:	14-15
Total Hours:	120-127

The minimum number of credit hours required for this degree is 120.