

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

Learning outcomes

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

- Demonstrate broad and core science proficiency
- 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

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 29 to 33 credits in foundation science and mathematics courses and 35 to 39 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.

Grade requirements

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

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:

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 B.S. in Science (concentration in professional science)

General education requirements

University Core Education Curriculum (minimum 21 credits)

UNIV 111 Play course video for Focused Inquiry I	Focused Inquiry I	3
UNIV 112 Play course video for Focused Inquiry II	Focused Inquiry II	3
UNIV 200	Inquiry and the Craft of Argument	3
Approved humanities/fine arts		3
Approved natural/physical sciences		3-4
Approved quantitative literacy		3-4
Approved social/behavioral sciences		3-4
Total Hours		21-24

Additional College of Humanities and Sciences requirements (11-23 credits)

HUMS 202	Choices in a Consumer Society	1
Approved H&S diverse and global communities		3
Approved H&S human, social and political behavior (fulfills University Core social/behavioral sciences)		
Approved H&S literature and civilization (fulfills University Core humanities/fine arts)		
Approved H&S science and technology (fulfills University Core natural/physical sciences)		
Approved H&S general education electives		6-8
Experiential fine arts ¹		1-3
Foreign language through the 102 level (by course or placement)		0-8
Total Hours		11-23

¹ Course offered by the School of the Arts

Major requirements

Foundational courses

Select one of the following:		4
BIOL 151 & BIOZ 151	Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I	
BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	
BIOL 341/ANTH 301	Human Evolution (or upper-level natural science elective from list below)	3
Select one of the following:		4
CHEM 101 & CHEZ 101	General Chemistry I and General Chemistry Laboratory I	
CHEM 102 & CHEZ 102	General Chemistry II and General Chemistry Laboratory II	
Select one of the following:		3
INSC 300	Experiencing Science	
ENVS/ENGL 368	Nature Writing	

Or upper-level natural science elective from list below		
MATH 151	Precalculus Mathematics (or placement)	4
STAT 208 or STAT 210	Statistical Thinking Basic Practice of Statistics	3
Select one of the following:		3-4
MATH 200	Calculus with Analytic Geometry	
SCMA 212	Differential Calculus and Optimization for Business	
STAT 314	Applications of Statistics	
INSC 490	Capstone Research Experience in Interdisciplinary Science (or an approved capstone from another natural science major from list below)	1-3
Select one of the following:		4-5
PHYS 201	General Physics I	
PHYS 202	General Physics II	
PHYS 207	University Physics I	
PHYS 208	University Physics II	
Supplemental courses		
Select one of the following:		3
BIOL 317	Ecology	
BIOL 332/ ENVS 330	Environmental Pollution	
ENVS/PHYS 315	Energy and the Environment	
Or upper-level natural science elective from list below		
Select one of the following:		3
ENVS 301	Introduction to Meteorology	
ENVS 401	Meteorology and Climatology	
Or upper-level natural science elective from list below		
Select one of the following:		3
ENVS 310	Introduction to Oceanography	
ENVS 411	Oceanography	
Or upper-level natural science elective from list below		
Select one of the following:		4
PHYS 101 & PHYZ 101	Foundations of Physics and Foundations of Physics Laboratory	
PHYS 107	Wonders of Technology	
ENVS 105 & URSZ 204	Physical Geology and Physical Geography Laboratory: Geomorphology and Soils	
URSP 204 & URSZ 204	Physical Geography: Geomorphology and Soils and Physical Geography Laboratory: Geomorphology and Soils	
Or a 200-level or higher natural science elective and a 200-level or higher natural science laboratory elective from the list below		
Select one of the following:		3-4
PHYS 103	Elementary Astronomy	
BIOL 101 & BIOZ 101	Biological Concepts and Biological Concepts Laboratory	
BIOL/ENVS 103	Environmental Science	
CHEM 110	Chemistry and Society	

Or a 200-level or higher natural science elective and a 200-level or higher natural science laboratory elective from the list below		
Select a second introductory foundation course (with laboratory) in two of the following three areas: biology, chemistry or physics		8-10
BIOL 151 & BIOZ 151	Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I	
BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	
CHEM 101 & CHEZ 101	General Chemistry I and General Chemistry Laboratory I	
CHEM 102 & CHEZ 102	General Chemistry II and General Chemistry Laboratory II	
PHYS 201	General Physics I	
PHYS 202	General Physics II	
PHYS 207	University Physics I	
PHYS 208	University Physics II	
Select an ethics or upper-level health-related science elective from either of the lists below.		3
Select research, internship, co-op (see research experience electives list) or upper-level service-learning experience (to equal a minimum of three credits alone or in combination with other upper-level natural or health science electives).		3
Select two additional courses at the 200-level or higher in mathematics, science, teaching mathematics and/or science with adviser's approval. Choose from the following:		5-6
EDUS 300	Foundations of Education (may be used if student is preparing for teaching)	
EDUS 301	Human Development and Learning (may be used if student is preparing for teaching)	
LFSC/RELS 401	Faith and Life Sciences	
MATH or STAT: 200-level or higher		
Or a 200-level or higher natural or health science elective from list below		
Total Hours		64-72

Open electives

Select two-24 open elective credits	2-24
Total Hours	2-24

Total minimum requirement 120 credits

Natural science electives

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	Communicating Research	

BIOL 490	Presenting Research	
BIOL 492	Independent Study	
BIOL 493	Biology Internship	
BIOL 495	Research and Thesis	
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

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
URSZ 203	Physical Geography Laboratory: Weather, Climate and Biogeography	1

¹ Courses have a combined lecture and lab and will satisfy both natural science lecture and laboratory requirements.

Health science electives

AFAM/ANTH/INTL/ GSWS 309	Global Women's Health	3
AFAM 310	Black Health Matters: Social Determinants of Health in the African American Community	3
AFAM 401	African-Americans and the U.S. Health Care System	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	History of Medicine and Public Health: ____	3
SOCY 445	Medical Sociology	3
GSWS 392	Women's Health Care Across the Life Span	3

Ethics electives

LFSC/RELS 401	Faith and Life Sciences	3
PHIL 201	Critical Thinking About Moral Problems	3
PHIL 211	History of Ethics	3
PHIL 212	Ethics and Applications	3
PHIL 213	Ethics and Health Care	3
PHIL 214	Ethics and Business	3
RELS 340/INTL 341	Global Ethics and the World's Religions	3
SOCY 445	Medical Sociology	3

Research, internship, co-op experience electives

AFAM 399	Interdisciplinary Research Methods	3
ANTH 303	Archaeological Methods and Research Design	3
BIOL 490	Presenting Research	1
BIOL 492	Independent Study	1-4
BIOL 493	Biology Internship	1-3
CHEM 492	Independent Study	1-4

CHEM 493	Chemistry Internship	1-3
COOP 298	Cooperative Education Experience	0
COOP 398	Cooperative Education Experience	0
FRSC 492	Forensic Science Independent Study	1-3
FRSC 493	Forensic Science Internship	3
PHYS 492	Independent Study	1-3
PSYC 317	Experimental Methods	3
SOCY 320	Research Methods in Political Science	3

Natural science approved capstone courses

BIOL 475	Biology Capstone Seminar. ____	1-3
BIOL 477	Biology Capstone Experience (in conjunction with BIOL 492, BIOL 493, BIOL 495 or BIOL 497, as specified and approved by the biology department)	0
BIOZ 476	Molecular Capstone Laboratory	2
BNFO 420	Applications in Bioinformatics	3
CHEM 398	Professional Practices and Perspectives Seminar	1
CLSE 402 & CLSE 403	Senior Design Studio I (Laboratory/Project Time) and Senior Design Studio II (Laboratory/Project Time)	4
EGRB 402	Biomedical Engineering Senior Design Studio	3
ENVS 490	Research Seminar in Environmental Studies	3
FRSC 490	Professional Practices in Forensic Science	3
PHYS 490	Seminar in Conceptual Physics	1

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.

Freshman year

Fall semester		Hours
Select one of the following CHEM sequences:		3-4
CHEM 101 & CHEZ 101	General Chemistry I and General Chemistry Laboratory I	-
CHEM 110	Chemistry and Society	-
MATH 151	Precalculus Mathematics (or placement)	4
STAT 208 or STAT 210	Statistical Thinking or Basic Practice of Statistics	3
UNIV 101	Introduction to the University	1
UNIV 111	Focused Inquiry I	3
Play course video for Focused Inquiry I		
Term Hours:		14-15

Spring semester

Select one of the following sequences:		4-5
BIOL 101 & BIOZ 101	Biological Concepts and Biological Concepts Laboratory	-

BIOL 103 or ENVS 103	Environmental Science or Environmental Science	-
BIOL 151 & BIOZ 151	Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I	-
BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	-
CHEM 102 & CHEZ 102	General Chemistry II and General Chemistry Laboratory II	-
PHYS 101 & PHYZ 101	Foundations of Physics and Foundations of Physics Laboratory	-
PHYS 107	Wonders of Technology	-
PHYS 201	General Physics I	-
PHYS 207	University Physics I	-
HUMS 202	Choices in a Consumer Society	1
MATH 200 or SCMA 212 or STAT 314	Calculus with Analytic Geometry or Differential Calculus and Optimization for Business or Applications of Statistics	3-4
UNIV 112	Focused Inquiry II	3
Play course video for Focused Inquiry II		
Approved diverse and global communities		3
Term Hours:		14-16

Sophomore year

Fall semester

Select one of the following BIOL sequences:		4
BIOL 101 & BIOZ 101	Biological Concepts and Biological Concepts Laboratory	-
BIOL 103 or ENVS 103	Environmental Science or Environmental Science	-
BIOL 151 & BIOZ 151	Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I	-
BIOL 152 & BIOZ 152	Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II	-
Select one of the following PHYS sequences:		4-5
PHYS 101 & PHYZ 101	Foundations of Physics and Foundations of Physics Laboratory	-
PHYS 107	Wonders of Technology	-
PHYS 202	General Physics II	-
PHYS 208	University Physics II	-
UNIV 200	Inquiry and the Craft of Argument	3
Approved General Education elective		3
Approved human, social and political behavior		3
Term Hours:		17-18

Spring semester

Select one of the following combinations or a 200-level science with laboratory.		4
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ENVS 105 & URSZ 204	Physical Geology and Physical Geography Laboratory: Geomorphology and Soils	-
URSP 204 & URSZ 204	Physical Geography: Geomorphology and Soils and Physical Geography Laboratory: Geomorphology and Soils	-
	Select a second introductory foundation course (with laboratory) in one of the following three areas: biology, chemistry or physics	4
	Approved literature and civilization	3
	Approved science and technology (BIOL/Z 101, BIOL/ Z 103, CHEM 110 and PHYS/Z 103 also fulfill major requirements)	4
	Experiential fine arts (SPCH 321, ARTE 301 or other upper- level option recommended)	1-3
	Term Hours:	16-18

Junior year

Fall semester

	Select one of the following or upper-level science:	3
INSC 300	Experiencing Science	-
ENVS 368 or ENGL 368	Nature Writing or Nature Writing	-
PHYS 103	Elementary Astronomy	3
PHYZ 103	Elementary Astronomy Laboratory (or Introduction to Pre-Health topics course, or a 200-level science with laboratory)	1
	Approved General Education elective	3-4
	Ethics or other health-related science	3
	Foreign language (101), upper-level open elective or minor elective	3-4
	Term Hours:	16-18

Spring semester

	Select one of the following:	3
BIOL 317	Ecology	-
BIOL 332 or ENVS 330	Environmental Pollution or Environmental Pollution	-
ENVS 315 or PHYS 315	Energy and the Environment or Energy and the Environment	-
ENVS 310 or ENVS 411	Introduction to Oceanography or Oceanography	3
	Additional course at the 200-level or higher in mathematics, science, teaching mathematics and/or science with adviser's approval	3
	Foreign language (102), upper-level open elective or minor elective	3-4
	Upper-level open elective or minor elective	3
	Term Hours:	15-16

Senior year

Fall semester

BIOL 341 or ANTH 301	Human Evolution or Human Evolution	3
ENVS 301 or ENVS 401	Introduction to Meteorology or Meteorology and Climatology	3
	Additional course at the 200-level or higher in mathematics, science, teaching mathematics and/or science with adviser's approval	3
	Select a second introductory foundation course (with laboratory) in a second of the following three areas: biology, chemistry or physics	4
	Upper-level open elective or minor elective	1-2
	Term Hours:	14-15

Spring semester

	Select one of the following:	1-3
INSC 490	Capstone Research Experience in Interdisciplinary Science	-
	Or approved capstone from another science major (biology, chemistry or physics)	-
	Research, internship, co-op or upper-level service-learning experience	3
	Upper-level open electives or minor electives	10-11
	Term Hours:	14-17
	Total Hours:	120-133