

Biology, Environmental Science, Public Health, and Sustainable Development

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The Department of Biology, Environmental Science, Public Health, and Sustainable Development equips and mentors students with practical scientific knowledge, ethical grounding, and professional skills to effectively minister to a world in need. The department offers majors in Biology Health Science, Biology Investigations and Applications, Biology Science Education, Environmental Science, Public Health, and Sustainable Development and minors in Biology, Environmental Science, Public Health, and Sustainability, all of which involve a deep concern for God's human and non-human creation.

Our programs include a deep understanding of the Christian foundation beneath a faith-based pursuit of knowledge and application in our courses. This approach, both inside and outside the classroom, is fundamental to our offering of foundational core courses for students completing other majors in the liberal arts as well as to students majoring in our department. Students pursuing one of the Biology majors are trained to model Christ to His created world as they engage in biology investigation and practice. Students majoring in Environmental Science, Public Health, and Sustainable Development are trained to live out their faith through integrating environmental stewardship, social justice, and sustainable living. All majors are required to complete a senior comprehensive requirement; Biology majors meet this requirement by passing the Biology Major Field Test during the Fall semester of their senior year.

Biology

The Biology program is a dynamic community of learning, leadership, and service. We equip and mentor students through faith-integrated scholarship and research in the exploration of diversity and processes of life. Students are prepared to model Christ to His created world as they engage in biology investigation and practice, and healthcare and science education professions. Biology graduates are prepared to enter diverse careers, such as biology research, healthcare (e.g., physicians, dentists, nurses, physical therapists, physician assistants), and science teaching. All majors are required to complete a senior comprehensive requirement; Biology majors meet this requirement by passing the biology Major Field Test taken during their senior year.

Biology Health Science (BA or BS)

The Biology Health Science major requires 83-90 hours in the major. A Bachelor of Arts degree requires two years of one foreign language. All major courses must be completed with a grade of C- or better and are included in the major GPA.

Foundational Requirements

BIO 201	4	Biology I: Foundations of Cell Biology and Genetics
BIO 202	4	Biology II: Organisms and Diversity
BIO 203	4	Principles of Genetics
BIO 493	4	Biology Senior Capstone
ENS 204	4	Principles of Ecology

Major Requirements

BIO 185	1	Biology Major Orientation
BIO 285	1	Biology Colloquium I
BIO 310	4	Human Anatomy and Physiology I
BIO 311	4	Human Anatomy and Physiology II
BIO 385	1	Biology Colloquium II
BIO 485	1	Biology Colloquium III
KIN 221	3	Exercise as Medicine

Concentrations – Students must select one of the following concentrations:

Pre-Allied Health Careers

BIO 210	3	Medical Terminology
BIO 471	4	Microbiology and Immunology
CHE 211	4	College Chemistry I
CHE 212	4	College Chemistry II
CHE 311	4	Organic Chemistry I
MAT 210	4	Introductory Statistics

Select one course from the following:

PSY 100	3	Introductory Psychology
PSY 250	3	Life Span Development

Select one course from the following:

SOC 100	3	Introduction to Sociology
SOC 210	3	Contemporary Social Issues
SOC 220	3	Ethnic and Minority Issues

Select at least 6 hours from the following:

BIO 306	3	Introduction to Bioinformatics
BIO 312	4	Cellular and Molecular Biology
BIO 393	2-4	Practicum
BIO 432	4	Developmental Biology
BIO 450	2-4	Directed Research
BIO 462	4	Molecular Genetics
BIO 472	4	Histology

Select at least an additional 6 hours from the following:

BIO 306	3	Introduction to Bioinformatics
BIO 312	4	Cellular and Molecular Biology
BIO 345	3	Evolution and the Nature of Science
BIO 393	2-4	Practicum
BIO 432	4	Developmental Biology
BIO 450	2-4	Directed Research
BIO 462	4	Molecular Genetics
BIO 472	4	Histology
EXS 306	3	Physiology of Exercise
EXS 316	3	Applied Nutrition
EXS 381	3	Kinesiology
HPH 310	3	Cardiorespiratory Physiology and Chronic Disease
HPH 315	3	Pathophysiology of Immunological and Metabolic Chronic Diseases
HPH 320	3	Neuromuscular Physiology and Chronic Disease
PBH 100	3	Introduction to Public Health
PBH 335	4	Environmental Health
PHI 311	3	Medical Ethics
SUS 315	4	Sustainable Food Systems and Health

Select an additional 8 hours from the following:

CHE 312	4	Organic Chemistry II
CHE 411	3	Biochemistry I
NAS 230	2	Health Education for Behavior Change
NAS_70	1	Special Topics (advisor approval)
PHY 203	4	General Physics I
PHY 204	4	General Physics II

Biology Health Science requirements continued on next page

Pre-Dental

CHE 211	4	College Chemistry I			
CHE 212	4	College Chemistry II			
CHE 311	4	Organic Chemistry I			
CHE 312	4	Organic Chemistry II			
CHE 411	3	Biochemistry I			
MAT 210	4	Introductory Statistics			
PHY 203	4	General Physics I			
PHY 204	4	General Physics II			
<i>Select one course from the following:</i>					
PSY 100	3	Introductory Psychology			
PSY 250	3	Life Span Development			
<i>Select one course from the following:</i>					
SOC 100	3	Introduction to Sociology			
SOC 210	3	Contemporary Social Issues			
SOC 220	3	Ethnic and Minority Issues			
<i>Select three courses from the following:</i>					
BIO 306	3	Introduction to Bioinformatics			
BIO 312	4	Cellular and Molecular Biology			
BIO 432	4	Developmental Biology			
BIO 462	4	Molecular Genetics			
BIO 471	4	Microbiology and Immunology			
BIO 472	4	Histology			
			<i>Select at least an additional 6 hours from the following:</i>		
			BIO 306	3	Introduction to Bioinformatics
			BIO 312	4	Cellular and Molecular Biology
			BIO 345	3	Evolution and the Nature of Science
			BIO 393	2-4	Practicum
			BIO 432	4	Developmental Biology
			BIO 450	2-4	Directed Research
			BIO 462	4	Molecular Genetics
			BIO 471	4	Microbiology and Immunology
			BIO 472	4	Histology
			EXS 306	3	Physiology of Exercise
			EXS 316	3	Applied Nutrition
			EXS 381	3	Kinesiology
			HPH 310	3	Cardiorespiratory Physiology and Chronic Disease
			HPH 315	3	Pathophysiology of Immunological and Metabolic Chronic Diseases
			HPH 320	3	Neuromuscular Physiology and Chronic Disease
			PBH 100	3	Introduction to Public Health
			PBH 335	4	Environmental Health
			PHI 311	3	Medical Ethics
			SUS 315	4	Sustainable Food Systems and Health
			<i>Recommended Courses</i>		
			BIO 210	3	Medical Terminology
			NAS 230	2	Health Education for Behavior Change
			NAS _70	1	Special Topics (advisor approval)

Pre-Medicine

CHE 211	4	College Chemistry I			
CHE 212	4	College Chemistry II			
CHE 311	4	Organic Chemistry I			
CHE 312	4	Organic Chemistry II			
CHE 411	3	Biochemistry I			
MAT 210	4	Introductory Statistics			
PHY 203	4	General Physics I			
PHY 204	4	General Physics II			
<i>Select one course from the following:</i>					
PSY 100	3	Introductory Psychology			
PSY 250	3	Life Span Development			
<i>Select one course from the following:</i>					
SOC 100	3	Introduction to Sociology			
SOC 210	3	Contemporary Social Issues			
SOC 220	3	Ethnic and Minority Issues			
<i>Select three courses from the following:</i>					
BIO 306	3	Introduction to Bioinformatics			
BIO 312	4	Cellular and Molecular Biology			
BIO 432	4	Developmental Biology			
BIO 462	4	Molecular Genetics			
BIO 471	4	Microbiology and Immunology			
BIO 472	4	Histology			
			<i>Select at least an additional 6 hours from the following:</i>		
			BIO 306	3	Introduction to Bioinformatics
			BIO 312	4	Cellular and Molecular Biology
			BIO 345	3	Evolution and the Nature of Science
			BIO 393	2-4	Practicum
			BIO 432	4	Developmental Biology
			BIO 450	2-4	Directed Research
			BIO 462	4	Molecular Genetics
			BIO 471	4	Microbiology and Immunology
			BIO 472	4	Histology
			EXS 306	3	Physiology of Exercise
			EXS 316	3	Applied Nutrition
			EXS 381	3	Kinesiology
			HPH 310	3	Cardiorespiratory Physiology and Chronic Disease
			HPH 315	3	Pathophysiology of Immunological and Metabolic Chronic Diseases
			HPH 320	3	Neuromuscular Physiology and Chronic Disease
			PBH 100	3	Introduction to Public Health
			PBH 335	4	Environmental Health
			PHI 311	3	Medical Ethics
			SUS 315	4	Sustainable Food Systems and Health
			<i>Recommended Courses</i>		
			BIO 210	3	Medical Terminology
			NAS 230	2	Health Education for Behavior Change
			NAS _70	1	Special Topics (advisor approval)

Pre-Optometry

BIO 210	3	Medical Terminology			
BIO 471	4	Microbiology and Immunology			
CHE 211	4	College Chemistry I			
CHE 212	4	College Chemistry II			
CHE 311	4	Organic Chemistry I			
CHE 411	3	Biochemistry I			
MAT 210	4	Introductory Statistics			
PHY 203	4	General Physics I			
PHY 204	4	General Physics II			
PSY 100	3	Introductory Psychology			
<i>Select one course from the following:</i>					
SOC 100	3	Introduction to Sociology			
SOC 210	3	Contemporary Social Issues			
SOC 220	3	Ethnic and Minority Issues			
<i>Select at least 6 hours from the following:</i>					
BIO 306	3	Introduction to Bioinformatics			
BIO 312	4	Cellular and Molecular Biology			
BIO 393	2-4	Practicum			
BIO 432	4	Developmental Biology			
BIO 450	2-4	Directed Research			
BIO 462	4	Molecular Genetics			
BIO 472	4	Histology			
			<i>Select at least an additional 6 hours from the following:</i>		
			BIO 306	3	Introduction to Bioinformatics
			BIO 312	4	Cellular and Molecular Biology
			BIO 345	3	Evolution and the Nature of Science
			BIO 393	2-4	Practicum
			BIO 432	4	Developmental Biology
			BIO 450	2-4	Directed Research
			BIO 462	4	Molecular Genetics
			BIO 472	4	Histology
			EXS 306	3	Physiology of Exercise
			EXS 316	3	Applied Nutrition
			EXS 381	3	Kinesiology
			HPH 310	3	Cardiorespiratory Physiology and Chronic Disease
			HPH 315	3	Pathophysiology of Immunological and Metabolic Chronic Diseases
			HPH 320	3	Neuromuscular Physiology and Chronic Disease
			PBH 100	3	Introduction to Public Health
			PBH 335	4	Environmental Health
			PHI 311	3	Medical Ethics
			SUS 315	4	Sustainable Food Systems and Health
			<i>Recommended Courses</i>		
			CHE 312	4	Organic Chemistry II
			NAS 230	2	Health Education for Behavior Change
			NAS _70	1	Special Topics (advisor approval)

Pre-Physician Assistant

BIO 210	3	Medical Terminology		
BIO 471	4	Microbiology and Immunology		
CHE 211	4	College Chemistry I		
CHE 212	4	College Chemistry II		
CHE 311	4	Organic Chemistry I		
CHE 312	4	Organic Chemistry II		
CHE 411	3	Biochemistry I		
MAT 210	4	Introductory Statistics		
PSY 250	3	Life Span Development		
<i>Select one course from the following:</i>				
SOC 100	3	Introduction to Sociology		
SOC 210	3	Contemporary Social Issues		
SOC 220	3	Ethnic and Minority Issues		
<i>Select at least 6 hours from the following:</i>				
BIO 306	3	Introduction to Bioinformatics		
BIO 312	4	Cellular and Molecular Biology		
BIO 393	2-4	Practicum		
BIO 432	4	Developmental Biology		
BIO 450	2-4	Directed Research		
BIO 462	4	Molecular Genetics		
BIO 472	4	Histology		
			<i>Select at least an additional 6 hours from the following:</i>	
BIO 306	3	Introduction to Bioinformatics		
BIO 312	4	Cellular and Molecular Biology		
BIO 345	3	Evolution and the Nature of Science		
BIO 393	2-4	Practicum		
BIO 432	4	Developmental Biology		
BIO 450	2-4	Directed Research		
BIO 462	4	Molecular Genetics		
BIO 472	4	Histology		
EXS 306	3	Physiology of Exercise		
EXS 316	3	Applied Nutrition		
EXS 381	3	Kinesiology		
HPH 310	3	Cardiorespiratory Physiology and Chronic Disease		
HPH 315	3	Pathophysiology of Immunological and Metabolic Chronic Diseases		
HPH 320	3	Neuromuscular Physiology and Chronic Disease		
PBH 100	3	Introduction to Public Health		
PBH 335	4	Environmental Health		
PHI 311	3	Medical Ethics		
SUS 315	4	Sustainable Food Systems and Health		
<i>Recommended Courses</i>				
NAS 230	2	Health Education for Behavior Change		
NAS_70	1	Special Topics (advisor approval)		
PHY 203	4	General Physics I		

Biology Investigations and Applications (BA or BS)

The Biology Investigations and Applications major requires 70 hours in the major. A Bachelor of Arts degree requires two years of one foreign language. All major courses must be completed with a grade of C- or better and are included in the major GPA.

Foundational Requirements

BIO 201	4	Biology I: Foundations of Cell Biology and Genetics
BIO 202	4	Biology II: Organisms and Diversity
BIO 203	4	Principles of Genetics
BIO 493	4	Biology Senior Capstone
ENS 204	4	Principles of Ecology

Major Requirements

BIO 185	1	Biology Major Orientation
BIO 285	1	Biology Colloquium I
BIO 381	3	Research Methods
BIO 385	1	Biology Colloquium II
BIO 440	1	Research Proposal
BIO 450	5	Directed Research
BIO 460	1	Research Communication
BIO 485	1	Biology Colloquium III

Additional Major Requirements

CHE 211	4	College Chemistry I
CHE 212	4	College Chemistry II
MAT 210	4	Introductory Statistics

Select 8 credits¹ from the following:

CHE 311	4	Organic Chemistry I
CHE 312	4	Organic Chemistry II
COS 120	4	Introduction to Computational Problem Solving
COS 121	4	Foundations of Computer Science
ENS 383	4	Environmental Ethics
MAT 311	3	Introduction to Data Science
MAT 382	3	Advanced Statistical Methods
NAS 370	1	Selected Topics*
NAS 480	1	Seminar
PHI 311	3	Medical Ethics
PHY 203	4	General Physics I
PHY 204	4	General Physics II
SUS 231	4	Environmental Science, Society, and Sustainability

¹Any additional course under the General Biology concentration not otherwise counting toward the major or concentration may count toward the 8 credits.

*Must be a course in Perspectives in Scientific Reasoning.

Concentrations – Students must select one of the following concentrations:

Anatomy and Physiology

BIO 310	4	Human Anatomy and Physiology I
BIO 311	4	Human Anatomy and Physiology II

Select 8 credits from the following:

BIO 312	4	Cellular and Molecular Biology
BIO 331	4	Comparative Anatomy
BIO 360	1-4	Independent Study (approved by advisor)
BIO 370	1-4	Selected Topics (approved by advisor)
BIO 452	4	Animal Physiology
BIO 472	4	Histology
EXS 316	3	Applied Nutrition
EXS 381	3	Kinesiology

Cellular and Molecular Biology

Select 12 credits from the following:

BIO 312	4	Cellular and Molecular Biology
BIO 360	1-4	Independent Study (approved by advisor)
BIO 370	1-4	Selected Topics (approved by advisor)
BIO 432	4	Developmental Biology
BIO 462	4	Molecular Genetics
BIO 471	4	Microbiology and Immunology
CHE 410L	2	Biochemistry Lab
CHE 411	3	Biochemistry I
CHE 412	3	Biochemistry II

Select 4 additional credits from any additional upper-division Biology course not otherwise counting toward major or concentration.

General Biology

Select 16 credits from the following:

BIO 301	4	Taxonomy of Vascular Plants
BIO 304	4	Field Natural History of the Black Hills
BIO 307	4	Vertebrate Natural History
BIO 310 [‡]	4	Human Anatomy and Physiology I
BIO 311 [‡]	4	Human Anatomy and Physiology II
BIO 312	4	Cellular and Molecular Biology
BIO 331 [‡]	4	Comparative Anatomy
BIO 345	3	Evolution and the Nature of Science
BIO 360	1-4	Independent Study (approved by advisor)
BIO 370	1-4	Selected Topics (approved by advisor)
BIO 432	4	Developmental Biology
BIO 452 [‡]	4	Animal Physiology
BIO 462	4	Molecular Genetics
BIO 471	4	Microbiology and Immunology
BIO 472	4	Histology
CHE 410L	2	Biochemistry Lab
CHE 411	3	Biochemistry I
CHE 412	3	Biochemistry II
ENS 375	4	Systems Ecology

[‡]A maximum of two courses may be taken from BIO 310, 311, 331, 452.

Biology Investigations and Applications requirements continued from previous page

Organisms and Systems Biology/Pre-Veterinary Medicine

Select 12 credits from the following:

BIO 301	4	Taxonomy of Vascular Plants
BIO 304	4	Field Natural History of the Black Hills
BIO 307	4	Vertebrate Natural History
BIO 331	4	Comparative Anatomy
BIO 345	3	Evolution and the Nature of Science
BIO 360	1-4	Independent Study (approved by advisor)
BIO 370	1-4	Selected Topics (approved by advisor)
BIO 452	4	Animal Physiology
ENS 375	4	Systems Ecology

Select 4 additional credits from any additional upper-division Biology course not otherwise counting toward major or concentration.

Biology Science Education (BA/BS)

The Biology Science Education major requires 61-65 hours plus education courses. Optional concentrations are available in SpEd Mild-Moderate P-12 Licensure, SpEd Intense P-12 Licensure, and TESOL P-12 Licensure. The Bachelor of Arts degree requires two years of one foreign language. All major courses, including education curriculum courses, must be completed with a grade of C- or better and are included in the major GPA.

Professional Education

EDU 150	3	Education in America
EDU 222	2	Reading in the Content Area for Secondary Teachers
EDU 260	3	Educational Psychology
EDU 307	2	Discipline and Classroom Management for Secondary Teachers
EDU 309	1	Methods of Instruction and Assessment in Secondary Education
EDU 332	2	The Junior High/Middle School
EDU 344	1	Educational Technology in Secondary Education
EDU 384	1	Perspectives on Diversity
EDU 431	17	Supervised Internship in Secondary Schools
NAS 309	2	Science Education Methods
SED 220	3	Exceptional Children

Additional Education Requirements

ENG 110	3	College Composition
PSY 340	3	Adolescent Psychology

Select one course from the following:

CAC 160	3	Integrative Communication
COM 210	3	Public Speaking

Foundational Requirements

BIO 185	1	Biology Major Orientation
BIO 201	4	Biology I: Foundations of Cell Biology and Genetics
BIO 202	4	Biology II: Organisms and Diversity
BIO 203	4	Principles of Genetics
BIO 345	3	Evolution and the Nature of Science
BIO 493	4	Biology Senior Capstone
ENS 204	4	Principles of Ecology

Science Core Courses

Select one of the following chemistry course combinations:

CHE 201	4	General, Organic, and Biochemistry I
CHE 202	4	General, Organic, and Biochemistry II

or

CHE 211	4	College Chemistry I
CHE 212	4	College Chemistry II

Select one course from the following:

PHY 203	4	General Physics I
PHY 211	4	University Physics I

Select one course from the following:

ENS 240	3	Introduction to Geology
ENS 241	4	Physical Geology
ENS 242	3	Geology of Indiana
PHY 204	4	General Physics II
PHY 212	5	University Physics II

Biology Electives

Select 4 hours in the summer field studies program[‡] from:

BIO 304	4	Field Natural History of the Black Hills
BIO 370	4	Selected Topics (approved by advisor)

[‡]Additional courses from Au Sable Institute may count toward this requirement with departmental approval. Courses from other institutions may count with departmental approval. See www.ausable.org or Dr. Regier for details.

Select one cell and molecular course from the following:

BIO 312	4	Cellular and Molecular Biology
BIO 432	4	Developmental Biology
BIO 462	4	Molecular Genetics
BIO 471	4	Microbiology and Immunology

Select two organismal biology courses from the following:

BIO 307	4	Vertebrate Natural History
BIO 310	4	Human Anatomy and Physiology I
BIO 311	4	Human Anatomy and Physiology II
BIO 331	4	Comparative Anatomy
BIO 452	4	Animal Physiology

Select one biology experience course from the following:

BIO 381	3	Research Methods
BIO 450	2-4	Directed Research

Select an additional 4 credits from a 300/400-level biology course*

*BIO 370, 393, and 450 may not meet this requirement.

Biology Minor

A minor in Biology requires 26 hours. All minor courses must be completed with a grade of C- or better and are included in the minor GPA.

Minor Requirements

BIO 201	4	Biology I: Foundations of Cell Biology and Genetics
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Select an additional 14 credits of 200-, 300-, and 400-level biology courses. A minimum of 6 credits must be upper-division (300/400).

Additional Minor Requirements

Select one course from the following:

MAT 151	4	Calculus I
MAT 210	4	Introductory Statistics
MAT 230	4	Calculus II

Select one course from the following:

CHE 201	4	General, Organic, and Biochemistry I
CHE 211	4	College Chemistry I

Environmental Science

In this major, students gain knowledge in natural sciences, principles of environmental ethics, law, and stewardship, and practical skills in problem-solving. With concentrations in Biology and Geology, students may focus on deep conceptual knowledge in the natural sciences which prepares them for a variety of environmental careers in government agencies, private consulting, non-profit organizations, and education institutions.

A mid-level, field-intensive course, Field Natural History of the Black Hills (in South Dakota) is required usually in Sophomore summer and is a favorite among students. To build professional skills and experience, a practicum is required, usually in the summer following the Sophomore or Junior year. Faculty-mentored student research is encouraged to build capacity for graduate school. As a result of this powerful combination of relevant theory and field experience, nearly 100% of our graduates find placement in either graduate programs or the workplace.

Environmental Science (BS)

The Bachelor of Science degree with a major in Environmental Science requires 77 hours. *Students may not double major with Sustainable Development. All major courses, including those in the concentration, must be completed with a grade of C- or better and are included in the major GPA.*

Core Requirements

BIO 304	4	Field Natural History of the Black Hills
ENS 302	4	Environmental Law and Policy
ENS 383	4	Environmental Ethics
ENS 393	2	Practicum
ENS 493	2	Environmental Science Capstone
MAT 210	4	Introductory Statistics
SUS 120	1	Environmental Stewardship and Sustainable Living
SUS 231	4	Environmental Science, Society, and Sustainability

Biology Requirements

BIO 202	4	Biology II: Organisms and Diversity
ENS 204	4	Principles of Ecology

Select two of the following courses:

BIO 301	4	Taxonomy of Vascular Plants
BIO 307	4	Vertebrate Natural History
ENS 375	4	Systems Ecology

Chemistry Requirements

CHE 201	4	General, Organic, and Biochemistry I
CHE 202	4	General, Organic, and Biochemistry II
CHE 320	4	Environmental Pollution and Toxicology

Geology Requirements

ENS 241	4	Physical Geology
ENS 355	4	Geospatial Analysis

Select two of the following courses:

ENS 319	4	Principles of Soil Science
ENS 361	4	Geomorphology
ENS 362	4	Hydrogeology

Concentrations

Select one of the following concentrations:

Biology

Select two courses not previously used from the following:

BIO 301	4	Taxonomy of Vascular Plants
BIO 307	4	Vertebrate Natural History
BIO 331	4	Comparative Anatomy
BIO 471	4	Microbiology and Immunology
ENS 375	4	Systems Ecology
SUS 315	4	Sustainable Food Systems and Health
SUS 325	4	Sustainable Development in Practice

Geology

Select two courses not previously used from the following:

ENS 319	4	Principles of Soil Science
ENS 341	4	Earth Materials
ENS 361	4	Geomorphology
ENS 362	4	Hydrogeology
ENS 364	4	Water Resources and Appropriate Technology

Environmental Science Minor

The minor in Environmental Science requires 18-20 hours. *Minor not open to Environmental Science, Sustainable Development, or Integrated majors. All major courses must be completed with a grade of C- or better and are included in the major GPA.*

Minor Requirements

ENS 383	4	Environmental Ethics
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Select one course from the following:

SUS 200	3	Environment and Society
SUS 231	4	Environmental Science, Society, and Sustainability

Select one course from the following:

ENS 240	3	Introduction to Geology
ENS 241	4	Physical Geology

Select one course from the following:

ENS 302	4	Environmental Law and Policy
SUS 315	4	Sustainable Food Systems and Health

Select one course from the following:

ENS 204	4	Principles of Ecology
ENS 319	4	Principles of Soil Science
ENS 341	4	Earth Materials
ENS 355	4	Geospatial Analysis
ENS 361	4	Geomorphology
ENS 362	4	Hydrogeology
ENS 364	4	Water Resources and Appropriate Technology
ENS 375	4	Systems Ecology
SUS 325	4	Sustainable Development in Practice

Public Health

The Public Health majors reflect the broad and interdisciplinary nature of the profession and prepare students to serve effectively to a world in need. While uncommon at the undergraduate level, there is a growing national appreciation for the value of teaching public health in liberal arts institutions, where students can be challenged to consider physical, social, economic, cultural, and biologic factors that impact the health of populations.

These majors offer a strong set of core courses along with great flexibility to focus elective courses in specific sub-areas of public health. Coursework is designed to be relevant, participatory, experiential, and grounded in a Biblical worldview with a commitment to joining in Christ's redemptive work for all of creation. Students complete a practicum experience that engages them with ongoing public health and community health development work in either the U.S. or abroad in communities experiencing public health problems. Innovative dual majors are encouraged.

Students will be prepared to compete for entrance into graduate programs in public health and related fields, and to effectively work in partnership with communities to address those conditions that produce poor health in populations. A minor in Public Health is also offered.

Public Health (BA)

The Bachelor of Arts degree with a major in Public Health requires two years of one foreign language and 53-55 hours in the major. *All major courses must be completed with a grade of C- or better and are included in the major GPA.*

Major Requirements

BIO 106	4	Human Biology
PBH 100	3	Introduction to Public Health
PBH 110	3	Global Health
PBH 210	3	Human Diseases
PBH 320	4	Epidemiology
PBH 330	3	Assessment for Program Planning
PBH 330L	1	Service Learning in Community Assessment
PBH 335	4	Environmental Health
PBH 350	3	Determinants of Health and Health Equity
PBH 393	2	Practicum
PBH 493	2	Public Health Senior Capstone
POS 331	3	Public Policy

Select one course from the following:

SUS 200	3	Environment and Society
SUS 231	4	Environmental Science, Society, and Sustainability

Select one course from the following:

MAT 210	4	Introductory Statistics
PSY 275	3	Introductory Statistics
SOC 355	3	Applied Social Statistics

Electives

Select 12 hours from any of the following courses. At least 2 hours must be upper-division (300/400 level).

Christian Ministries

CAC 340	3	Intercultural Communications
CMI 100	3	Introduction to Christian Educational Ministries
CMI 262	3	Personal Foundations of Ministry
REL 311	3	Foundations of Christian World Mission
REL 391	3	Preparation and Strategy for Christian World Mission
REL 432	3	World Missions Area Studies

Economics, Management, and Policy

ECO 201	3	Principles of Microeconomics
ECO 202	3	Principles of Macroeconomics
ECO 442	3	Economic Development
MGT 352	3	Management Analysis and Practice
MGT 442	3	Business Ethics
PPE 213	3	International Political Economics

Social and Behavioral Science

ANT 200	3	Cultural Anthropology
PSY 250	3	Life Span Development
PSY 272	3	Research Methods in Psychology
PSY 321	3	Social Psychology
PSY 340	3	Adolescent Psychology
PSY 357	3	Peace, Reconciliation, and Justice
PSY 395	3	Health Psychology
PSY 410	3	Motivation
SOC 220	3	Ethnic and Minority Issues
SOC 250	2	Principles of Research and Analysis
SOC 315	3	Social Inequality and Stratification
SOC 350	3	Social Research Methods
SOC 410	3	Community and Urban Affairs
SWK 320	3	Unleashing the Oppressed

Natural and Applied Science

BIO 203	4	Principles of Genetics
BIO 300	4	Human Medical Physiology
BIO 310	4	Human Anatomy and Physiology I
BIO 311	4	Human Anatomy and Physiology II
BIO 331	4	Comparative Anatomy
BIO 410	3	Bioethics
BIO 452	4	Animal Physiology
BIO 471	4	Microbiology and Immunology
CHE 201/211	4	General, Organic, and Biochemistry I/College Chemistry I
CHE 202/212	4	General, Organic, and Biochemistry II/College Chemistry II
CHE 320	4	Environmental Pollution and Toxicology
ENS 204	4	Principles of Ecology
ENS 355	4	Geospatial Analysis
ENS 364	4	Water Resources and Technology
ENS 383	4	Environmental Ethics
EXS 214	3	Health and Sexuality
EXS 215	2	Health, Exercise, and Aging
EXS 217	3	Health Promotion Program Planning
EXS 316	3	Applied Nutrition
KIN 355	3	Research Methods
PBH 213	2	Substance Education
PBH 340	4	Community Health Development in Practice
PBH 346	3	Community Health Education
SYS 101	3	Introduction to Systems

Public Health (BS)

The Bachelor of Science degree with a major in Public Health requires 59-62 hours in the major. *All major courses must be completed with a grade of C- or better and are included in the major GPA.*

Major Requirements

BIO 106	4	Human Biology
OVC 329	3	Monitoring and Evaluation 1: Data Collection
OVC 429	3	Monitoring and Evaluation 2: Data Analysis
PBH 100	3	Introduction to Public Health
PBH 110	3	Global Health
PBH 210	3	Human Diseases
PBH 320	4	Epidemiology
PBH 330	3	Assessment for Program Planning
PBH 330L	1	Service Learning in Community Assessment
PBH 335	4	Environmental Health
PBH 350	3	Determinants of Health and Health Equity
PBH 393	2	Practicum
PBH 493	2	Public Health Senior Capstone
POS 331	3	Public Policy

Select one course from the following:

SUS 200	3	Environment and Society
SUS 231	4	Environmental Science, Society, and Sustainability

Select one course from the following:

MAT 210	4	Introductory Statistics
PSY 275	3	Introductory Statistics
SOC 355	3	Applied Social Statistics

Select one course from the following:

BIO 410	3	Bioethics
ENS 383	4	Environmental Ethics
MGT 442	3	Business Ethics
PHI 311	3	Medical Ethics

Public Health requirements continued on next page

Public Health requirements continued from previous page

Electives

Select 2 credits from one of the following categories. Select an additional 3 credits from any category below.

Economics, Management, and Policy Electives

ECO 201	3	Principles of Microeconomics
ECO 202	3	Principles of Macroeconomics
ECO 442	3	Economic Development
MGT 352	3	Management Analysis and Practice
PPE 213	3	International Political Economics

Social and Behavioral Science Electives

ANT 200	3	Cultural Anthropology
PSY 250	3	Life Span Development
PSY 272	3	Research Methods in Psychology
PSY 321	3	Social Psychology
PSY 340	3	Adolescent Psychology
PSY 357	3	Peace, Reconciliation, and Justice
PSY 395	3	Health Psychology
PSY 410	3	Motivation
SOC 220	3	Ethnic and Minority Issues
SOC 250	2	Principles of Research and Analysis
SOC 315	3	Social Inequality and Stratification
SOC 350	3	Social Research Methods
SOC 410	3	Community and Urban Affairs
SWK 320	3	Unleashing the Oppressed

Natural and Applied Science Electives

BIO 203	4	Principles of Genetics
BIO 300	4	Human Medical Physiology
BIO 310	4	Human Anatomy and Physiology I
BIO 311	4	Human Anatomy and Physiology II
BIO 331	4	Comparative Anatomy
BIO 452	4	Animal Physiology
BIO 471	4	Microbiology and Immunology
CHE 201/211	4	General, Organic, and Biochemistry I/College Chemistry I
CHE 202/212	4	General, Organic, and Biochemistry II/College Chemistry II
CHE 320	4	Environmental Pollution and Toxicology
ENS 355	4	Geospatial Analysis
ENS 362	4	Hydrogeology
ENS 364	4	Water Resources and Technology
EXS 214	3	Health and Sexuality
EXS 215	2	Health, Exercise, and Aging
EXS 217	3	Health Promotion Program Planning
EXS 316	3	Applied Nutrition
KIN 355	3	Research Methods
PBH 213	2	Substance Education
PBH 340	4	Community Health Development in Practice
PBH 346	3	Community Health Education
SUS 435	4	Environmental and Sustainability Planning and Assessment

Public Health Minor

A minor in Public Health consists of 25-27 hours. All major courses must be completed with a grade of C- or better and are included in the major GPA.

Major Requirements

PBH 100	3	Introduction to Public Health
PBH 110	3	Global Health
PBH 210	3	Human Diseases
PBH 320	4	Epidemiology
PBH 330	3	Assessment for Program Planning
POS 331	3	Public Policy

Select one course from the following:

SUS 200	3	Environment and Society
SUS 231	4	Environmental Science, Society, and Sustainability

Select one course from the following:

MAT 210	4	Introductory Statistics
PSY 275	3	Introductory Statistics
SOC 355	3	Applied Social Statistics

Sustainable Development

Sustainable Development, established in 2015, provides interdisciplinary training for solving global sustainability problems in U.S. and international settings. Students build a broad foundational understanding of the interactions of the three spheres of sustainability—environment, economics, and society. By studying at the nexus of these subjects, students develop a holistic understanding of key issues facing humanity and the environment.

In this program, students take core courses in sustainability, environmental science, sociology, public health, and economics and gain depth in a specific area by choosing elective courses that connect their passion for studies with their desire to help people. An international, field-based course during January interterm enables students to experience and apply what they have been learning. Near the end of the curriculum each student participates in a field-based development project through a required practicum and a senior capstone experience involving a research project on a local, real-world issue.

Sustainable Development (BS)

The Bachelor of Science degree with a major in Sustainable Development requires 66 hours. Students may not double major with Environmental Science. All major courses must be completed with a grade of C- or better and are included in the major GPA.

Core Requirements

ANT 200	3	Cultural Anthropology
ECO 201	3	Principle of Microeconomics
ENS 204	4	Principles of Ecology
ENS 241	4	Physical Geology
ENS 302	4	Environmental Law and Policy
ENS 355	4	Geospatial Analysis
ENS 383	4	Environmental Ethics
OVC 329	3	Monitoring and Evaluation I: Data Collection
PBH 110	3	Global Health
PBH 330	3	Assessment for Program Planning
PBH 330L	1	Service Learning in Community Assessment
SUS 120	1	Environmental Stewardship and Sustainable Living
SUS 231	4	Environmental Science, Society, and Sustainability
SUS 310	3	Poverty and Sustainable Development
SUS 310L	1	Poverty and Sustainable Development Lab
SUS 325	4	Sustainable Development in Practice
SUS 393	2	Practicum
SUS 493	2	Sustainable Development Capstone

Select one of the following:

SOC 100	3	Introduction to Sociology
SOC 110	3	Introduction to Global Societies (recommended)

Electives

Select 10 additional credits from the following:

Public and Environmental Health

PBH 320	4	Epidemiology
PBH 335	4	Environmental Health
PBH 350	3	Determinants of Health and Health Equity

Sustainable Agriculture

BIO 301	4	Taxonomy of Vascular Plants
ENS 319	4	Principles of Soil Science
SUS 211	4	Crops and Society
SUS 315	4	Sustainable Food Systems and Health

Urban Sustainability

PBH 335	4	Environmental Health
SOC 220	3	Ethnic and Minority Issues
SOC 410	3	Community and Urban Affairs

Water Resources

ENS 362	4	Hydrogeology
ENS 364	4	Water Resources and Appropriate Technology

Additional Electives

CAC 340	3	Intercultural Communication
ENT 381	3	Global Entrepreneurship and Business as Missions
IAS 310	3	Philanthropy and Grant-Writing
ITB 375	3	International Business
POS 327	3	International Law and Justice
REL 311	3	Foundations of Christian World Mission
REL 391	3	Preparation and Strategy for Christian World Mission

Sustainability Minor

The minor in Sustainability requires 20-23 hours. *Minor not open to Environmental Science or Public Health majors. All major courses must be completed with a grade of C- or better and are included in the major GPA.*

Minor Requirements

SUS 120	1	Environmental Stewardship and Sustainable Living
SUS 310	3	Poverty and Sustainable Development
SUS 310L	1	Poverty and Sustainable Development Lab

Select one of the following:

SUS 200	3	Environment and Society
SUS 231	4	Environmental Science, Society, and Sustainability

Select one of the following:

ENS 302	4	Environmental Law and Policy
ENS 383	4	Environmental Ethics
PBH 335	4	Environmental Health
PBH 345	3	International Humanitarian Response
SUS 315	4	Sustainable Food Systems and Health

Select one of the following:

ENS 355	4	Geospatial Analysis
OVC 329	3	Monitoring and Evaluation I: Data Collection
PBH 320	4	Epidemiology
PBH 330	3	Assessment for Program Planning
PBH 340	4	Community Health Development in Practice
SUS 325	4	Sustainable Development in Practice

Electives

Select an additional two courses from two areas.

Business and Economics

ECO _____	3	Any 200/300/400-level elective
ENT _____	3	Any 200/300/400-level elective
FIN _____	3	Any 200/300/400-level elective
MGT _____	3	Any 200/300/400-level elective
MKT _____	3	Any 200/300/400-level elective

Public Health

PBH _____	3	Any 100-level elective
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Social Sciences

GBS _____	3	Any 200/300/400-level elective
OVC _____	3	Any 200/300/400-level elective
POS _____	3	Any 200/300/400-level elective
SOC _____	3	Any 200/300/400-level elective
SWK _____	3	Any 200/300/400-level elective

Biology Courses

BIO 100 4 hours

General Biology

Concepts and principles are studied to provide basic knowledge that assists students to meet the obligations of an informed citizen. The Spring semester of General Biology is intended for elementary education majors as a content course that emphasizes instructional methodologies in science education. *Three hours of lecture and two hours of laboratory per week. Meets foundational core life science requirement; not available to biology majors.*

BIO 102 4 hours

Biology for Educators

Introductory principles of biology taught with materials appropriate for future teachers. Topics include cell biology, inheritance, diversity, evolution, and ecology. *Three hours of lecture and two hours of laboratory per week. Meets foundational core life science requirement; not available to biology majors.*

BIO 104 3 hours

Animal Biology

A foundational core course designed to provide a broad look at life science through the study of the Kingdom Animalia. Includes a consideration of tissues, anatomy, ecology, natural history, and human interaction with representative vertebrates and invertebrates. *Two hours lecture and two hours laboratory per week. Meets foundational core life science requirement. Offered Fall semester of even years.*

BIO 106 4 hours

Human Biology

This course is designed as a one semester anatomy and physiology course covering all body organ systems and the interrelatedness of human health and lifestyle, environment, etc. *Three hours lecture and two hours of laboratory per week. Meets foundational core life science requirements. Offered Fall semester. Preference given to Social Work majors.*

BIO 107 4 hours

Introduction to Wildlife

This course looks at the wide range of adaptations, behavior, life history, and geographical distribution of vertebrates from fishes to mammals. Labs focus on observation (and sometimes capture) of vertebrates in their natural habitat and involve several outdoor sessions. *Three hours of lecture and two to three hours of lab per week. Meets foundational core life science requirement. Not available to biology majors. Offered Spring semester.*

BIO 112 3 hours

Topics in Biology

A study of some areas of biology most relevant to today's students with an emphasis on concepts and principles that will best assist students to meet the obligations of an informed citizen. Topics to be considered include process of science, structure and function of plants and animals, the relationship of organisms to one another and their environment, genetics, microbiology, biotechnology, bioethics, and evolution. *Two hours of lecture and two hours of laboratory per week. Meets foundational core life science requirement.*

BIO 113 3 hours

Botany for Beginners

An introductory course designed for the non-science major to provide a basic understanding of the processes through which plants function, the role of plants in the environment, and to equip students with skills that will allow them to continue to enjoy plants long after the course is over. Topics covered will range from subcellular processes to ecological roles. Plant adaptation, diversity, ecological interactions, basic plant identification, plant propagation, and plants of economic importance are included. *Two hours of lecture and two hours of laboratory per week. Meets foundational core life science requirements.*

BIO 170 1-4 hours

Selected Topics

A course offered on a subject of interest but not listed as a regular course offering.

BIO 185 1 hour

Biology Major Orientation

This course is required for all new biology majors and will provide students with the opportunity to explore the field of biology and begin to develop their professional portfolio. Information will be shared through guest, faculty and student presentations, discussions, and writing assignments. *Open to biology majors only. Offered second half of Fall semester.*

BIO 201 4 hours

Biology I: Foundations of Cell Biology and Genetics

Study of cellular structures and metabolism emphasizing form and function on structure; the cellular pathways of energy and matter transformation; the information flow, exchange, and storage; and the molecular, mitotic, and meiotic mechanism of inheritance. *Three hours of lecture and two hours of laboratory per week. Meets foundational core life science requirement. Open to Biology majors only in the Fall; open to all majors and minors requiring BIO 201 in the Spring.*

BIO 202 4 hours

Biology II: Organisms and Diversity

This course is the second of the two-course sequence for freshman biology majors. In this course we will examine the diversity of organisms, including algae, protozoa, fungi, plants, and animals, as they appear through the fossil record from the Paleozoic Era to the present time. *Majors/Minors only. Prerequisite: BIO 201.*

BIO 203 4 hours

Principles of Genetics

Fundamental principles of Mendelian inheritance, introduction to molecular genetics, along with quantitative and evolutionary genetics will be examined. *Three hours of lecture and two hours of laboratory per week. Meets foundational core life science requirement. Prerequisite: BIO 201.*

BIO 210 3 hours

Medical Terminology

This course is designed to assist students in learning medical terminology, as well as to provide instruction in word-building skills so that words can be identified by their parts. It provides a solid vocabulary foundation for those individuals who anticipate taking the MCAT or plan to enter an area of allied health studies.

BIO 270 1-4 hours

Selected Topics

A course offered on a subject of interest but not listed as a regular course offering.

BIO 285 1 hour

Biology Colloquium I

This course is for sophomore biology majors and will provide students with the opportunity to explore the field of biology, to begin developing professional skills, and to add artifacts to their professional portfolio. The course will be delivered via seminar format with guest, faculty and student presentations, class discussions, and writing assignments. *Prerequisite: BIO 185. Offered first half of Fall semester.*

BIO 300 4 hours

Human Medical Physiology

Human Medical Physiology is an advanced study of human physiology as it examines the functional processes of the organ systems. The course covers human physiology in a clinical setting as well as laboratory experiences. Class is approached from a pathology problems based curriculum with laboratories in the university hospital. *The course is part of the Global Engagement Centre program.*

- BIO 301** 4 hours
Taxonomy of Vascular Plants
Identification, classification, and systematics of vascular plants are studied. Topics include basic population genetics, the process of speciation, phylogeny reconstruction, and molecular patterns of diversification. Laboratory emphasis is on local flora, plant family characteristics, and modern systematic techniques. *Two hours of lecture and four hours of laboratory per week. Prerequisite: BIO 202; BIO 203 is recommended. Offered Fall semester of odd years.*
- BIO 304** 4 hours
Field Natural History of the Black Hills
Field Course: Introduction to basic field and lab methods used in field natural history. Includes basic nomenclature of spring flora and fauna in terrestrial as well as aquatic systems. Examines the principles of geology/paleontology, ecosystems, communities, and wildlife as exhibited in the Black Hills region of South Dakota, including Mt. Rushmore, Badlands National Park, Custer State Park, Devils Tower National Monument, the Black Hills National Forest, and Yellowstone and Grand Teton National Parks. *Prerequisites: BIO 202 and ENS 204 or permission of instructor. Offered Summer at the Wheaton College Science Station, Black Hills South Dakota.*
- BIO 306** 3 hours
Introduction to Bioinformatics
This course is designed to introduce students to concepts of bioinformatics, as well as basic bioinformatics skills, using the R programming language. The course will explore methods and datasets spanning from the level of DNA (genomics) up to the organismal and ecosystem level. Bioinformatics is an interdisciplinary field combining concepts of biology, computer science, and statistics to analyze and interpret biological datasets and solve complex questions. *Two hours of lecture and one hour of one hour of coding/data analysis in a computer lab per week. Prerequisite: BIO 203 or instructor permission. Offered Fall semester of even years.*
- BIO 307** 4 hours
Vertebrate Natural History
This course looks at the adaptive anatomy, feeding relationships, behavior, life history, and geographical distribution of vertebrates from fishes to mammals. Labs focus on methods currently employed for study and observation of vertebrates in the field and involve several outdoor sessions. *Three hours of lecture and three hours of lab per week. Prerequisite: BIO 202 or permission of the instructor; ENS 204 is recommended. Offered Spring semester.*
- BIO 309** 4 hours
Directed Field Experience
Investigative learning involving closely directed field research or field experience. *Instructor permission required.*
- BIO 310** 4 hours
Human Anatomy and Physiology I
The lecture portion focuses on structure and function of the skeletal, muscular, nervous and endocrine systems, and examines core concept of homeostasis and feedback loops. The lab portion of the course consists of detailed laboratory dissections of the dogfish shark and domestic cat, serving as models of human anatomy, coupled to computer aided examination of human anatomy and some histology. *Three hours lecture and three hours of laboratory per week. Meets foundational core life science requirement. Prerequisites: BIO 201 or CHE 201 or CHE 211. Offered Fall semester.*
- BIO 311** 4 hours
Human Anatomy and Physiology II
A continuation of BIO 310, the lecture focuses on the respiratory, cardiovascular, urinary, and digestive systems, and examines several core concepts demonstrated by these systems. The lab portion of the course focuses on common experimental techniques and physiological measures relevant to respiratory, cardiovascular, and urinary systems. *Three hours of lecture and two hours of lab per week. Prerequisite: BIO 310. Offered Spring semester.*
- BIO 312** 4 hours
Cellular and Molecular Biology
Analysis of the eukaryotic cell with regard to its molecular and biochemical characteristics, including bioenergetics, protein kinesis, cell signaling, cell-division cycle, cell junctions and extracellular matrix, cancer, stem cells and tissue renewal, and the adaptive immune system. *Three hours lecture and three hours of lab per week. Prerequisites: BIO 201; BIO 203; CHE 201 or CHE 211; CHE 202 or CHE 212; and minimum junior status or permission of the instructor.*
- BIO 331** 4 hours
Comparative Anatomy
Classification, characteristics, and comparison of typical chordate animals with emphasis on the vertebrates. Lab contains detailed dissection of representative vertebrates. *Three hours of lecture and three hours laboratory per week. Prerequisite: BIO 202 or permission of instructor. Offered Fall semester of odd years and Summer at discretion of faculty.*
- BIO 345** 3 hours
Evolution and the Nature of Science
This course introduces the conceptual and theoretical foundations of evolution and the nature of science. Students will be introduced to the longer-term processes of change. Evaluation of theories of species dynamics will be understood within the framework of the nature of science. *Prerequisite: Junior standing as a biology major or instructor permission.*
- BIO 360** 1-4 hours
Independent Study
An individualized, directed study involving a specified topic.
- BIO 370** 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.
- BIO 381** 3 hours
Research Methods
Research Methods will introduce students to essential components of experimental design and the research process in Biology. The goal is to prepare students to critically interpret the research of others and to undertake research projects in course-based labs, through independent or summer research projects, and post-graduation research programs. Class topics will include defining a research question, hypothesis formulation, experimental design (correlation vs. necessity or sufficiency), controls, power and the role of statistics, interpreting results, and presenting and publishing results. The course will also include a series of instructor and student led seminars on articles and techniques relevant to a targeted research field. *Prerequisites: BIO 201; and BIO 202 or BIO 203.*
- BIO 385** 1 hour
Biology Colloquium II
This course is for junior biology majors. Students will have the opportunity to prepare for employment and graduate school, to continue developing professional skills, and to add artifacts to their professional portfolio. The course will be delivered via seminar format with guest, faculty and student presentations, class discussions, and writing assignments. *Prerequisite: BIO 285. Offered Spring semester.*
- BIO 393** 1-4 hours
Practicum
Supervised learning involving a first-hand field experience or a project. Generally, one hour of credit is awarded for a minimum of 40 hours of practicum experience. *Offered primarily during Summer.*
- BIO 410** 3 hours
Bioethics
An introduction to bioethics, comprising an overview of ethical theory, uniquely Christian contributions to ethical theory, and a consideration of specific bioethical problems. The interaction of bioethics in the worlds of ideologies, politics, and economics, and the unique contribution a Christian bioethical perspective brings to the public square, will also be foci of the course. Designed for upper level biology students, but open to any upper division student willing and able to acquire the necessary biological competence to knowledgeably deal with the biology of the course material.
- BIO 432** 4 hours
Developmental Biology
A study of development at the molecular, cellular, and organismal levels. The class sessions focus on current concepts in developmental biology. The lab utilizes living model organisms (e.g. urchin, fly, chick) to conduct inquiry-based projects. *Three hours of lecture and three hours of laboratory per week. Prerequisites: BIO 201; BIO 203; and BIO 312 or BIO 462 recommended. Offered Fall semester.*
- BIO 440** 1 hour
Research Proposal
Research Proposal prepares students to complete their research project by guiding them through the literature review and research proposal process. Students will work with the course instructor and intended research supervisor to prepare a written research proposal. *Prerequisite: BIO 381.*
- BIO 450** 1-4 hours
Directed Research
Investigative learning involving closely directed research and the use of such facilities as the library or laboratory. *The student must accumulate 42 hours of experience (e.g., research, class/group meetings, assignments) per credit hour earned. Departmental approval required.*
- BIO 455** 0 hours
Supervised Summer Research
This course is a student-initiated alternative to BIO 450 Directed Research, to be completed during the summer months. The research project, approved in advance by the department and supervised by a formal research advisor (eg. a professor on- or off-campus), must include applied, hands-on learning and must involve a minimum of 300 documented hours. *Prerequisite: BIO 381. Prerequisite or Corequisite: BIO 440.*
- BIO 452** 4 hours
Animal Physiology
A study of the physiological nature of living organisms with special consideration of the functions of vertebrate organ systems. Practical experience is given in working with live animals and the instrumentation used to examine the functional processes of various systems. *Three hours of lecture and three hours of laboratory per week. Prerequisites: BIO 331; CHE 201 or CHE 211; and CHE 202 or CHE 212. Offered Spring semester.*
- BIO 460** 1 hour
Research Communication
Research Communication will be taken following the student's research experience (BIO 450 or BIO 455). Each student will use the semester to write a formal report of his or her research findings and prepare a poster or oral presentation of his or her research. Students will present their research to the class and possibly in an on- or off-campus venue. *Prerequisites: BIO 440; and BIO 450 or BIO 455; or instructor permission.*

BIO 462 4 hours
Molecular Genetics
The current understanding of what a gene is, how it functions, and how it is regulated, particularly from a molecular perspective, is the essence of this course. Viral, prokaryotic, and eukaryotic systems are studied. Current scientific literature as well as a published textbook serve as sources. *Three hours lecture and one four-hour laboratory per week. Prerequisites: BIO 201, BIO 203, and two courses in chemistry; BIO 471 is recommended. Offered Fall semester of even years.*

BIO 471 4 hours
Microbiology and Immunology
An introduction to general microbiology and to the human immune response. Included are microbial growth and control, diversity and taxonomy, the ecological role of microorganisms, and medical microbiology. The laboratory provides basic bacterial culture techniques, including the identification of unknowns. *Three hours lecture and three hours of laboratory per week. Prerequisites: BIO 201 and BIO 203. Two courses in chemistry are recommended. Offered Spring semester.*

BIO 472 4 hours
Histology
The study of minute structure, composition, and function of tissue. Lectures and laboratories help expose students to both the normal tissue formation found in animal tissues (chiefly mammalian) and many of the abnormal tissue developments associated with pathological dysfunctions. *Prerequisites: Completion of the biology core courses before enrolling or permission of the instructor.*

BIO 480 1-4 hours
Seminar
A limited-enrollment course designed especially for upper-class majors with emphasis on directed readings and discussion.

BIO 485 1 hour
Biology Colloquium III
This course is for junior biology majors. Students will have the opportunity to prepare for employment and graduate school, to continue developing professional skills, and to add artifacts to their professional portfolio. The course will be delivered via seminar format with guest, faculty and student presentations, class discussions, and writing assignments. *Prerequisite: BIO 385. Offered Spring semester.*

BIO 490 1-2 hours
Honors
Individualized study or research of an advanced topic within a student's major. *Open to students with at least a 3.00 GPA in the major field.*

BIO 493 4 hours
Biology Senior Capstone
An integrative, senior-level course in which major themes from within the biology major and from the Taylor foundational core program are intentionally revisited at a depth appropriate to college seniors. Such themes include the nature of biology as a natural science, the historical and philosophical foundations of the natural sciences, and the interaction and integration of biology with the Christian faith. Students will also actively engage in the process of doing current biological science, as well as consider several ethical issues that arise from current biology. *Prerequisite: Senior standing as a biology major. Offered January interterm.*

Environmental Science Courses

ENS 170 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

ENS 201 4 hours
Introduction to Geology in the Field
Introduction to earth's materials, processes, and history as discovered through field observations of minerals, rocks, fossils, strata, caves, rivers, canyons, and mountains. Emphasis is placed on field experiences and observations, complemented by study of maps, laboratory work, and discussions. *Offered during select Summers at the Black Hills Science Station near Rapid City, South Dakota.*

ENS 204 4 hours
Principles of Ecology
An introduction to the relationships existing between organisms and their environment. Lectures focus on the structural and functional aspects of populations, communities, and ecosystems in the context of the major North American biomes. *Three hours lecture and two hours laboratory per week. Meets foundational core life science requirement. Prerequisite: Four hours of BIO or ENS or permission of the instructor.*

ENS 240 3 hours
Introduction to Geology
Basic course dealing with the fundamental concepts of physical and historical geology. *Three hours of lecture and two hours of lab per week. Meets the foundational core earth science requirement.*

ENS 241 4 hours
Physical Geology
A general introduction to the earth's internal and external physical, dynamic systems. Topics include occurrence and formation of minerals and rocks, processes that shape the earth's surface, and the internal structure and dynamics that lead to plate tectonics and crustal deformation. Special emphasis is placed on the environmental aspects of humans' interaction with the earth. *Three hours of lecture and two hours of lab per week. Meets foundational core earth science requirement.*

ENS 242 3 hours
Geology of Indiana
An introduction to the concepts of physical and historical geology in the context of Indiana. Topics include rocks, fossils, structure, landforms, and earth and environmental resources of the state. Offered during Summer session and includes a required field trip to several regions of Indiana for field observation and collection of mineral, rock, and fossil specimens. *Meets foundational core earth science requirement.*

ENS 270 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

ENS 302 4 hours
Environmental Law and Policy
Lectures introduce the major elements of U.S. environmental law: NEPA, EIS, CAA, CWA, RCRA, CERCLA, TSCA, FIFRA and CRTK. The administrative process, cost/benefit analysis and the role of litigation in enforcement are also discussed. Presentation techniques and debate skills are introduced. *Three hours of lecture and a discussion section per week. Prerequisite: Senior environmental science majors and minors or permission from the instructor.*

ENS 319 4 hours
Principles of Soil Science
An introduction to soil science with an emphasis on soil formation and taxonomy in the context of the landscape. Soil physical properties, water relations, and chemistry and biological properties will be the central focus. Special emphasis is placed on human interaction with the soil resource. Agricultural and current environmental issues as they relate to the soil resource are addressed. Lab exercises focus on the analysis of basic soil physical and chemical properties. Soil fertility and conservation are additional lab topics. *Prerequisite: SUS 200 or SUS 231.*

ENS 341 4 hours
Earth Materials
Basic principles of mineralogy and petrology, with emphasis placed on description, identification, classification, and interpretation of rock-forming minerals and the igneous, sedimentary, and metamorphic rocks they comprise. Also includes origin and occurrence of earth materials and their uses in economic and environmental contexts. Lab emphasizes observation of hand specimens and some thin-sections. *Three hours of lecture and the equivalent of two hours of lab per week, including field trips to selected locations throughout the state. Prerequisite: ENS 241 or permission from the instructor.*

ENS 355 4 hours
Geospatial Analysis
An introduction to methods of collection, management and analysis of geospatial data. Topics include basic map properties, preparation and interpretation of thematic and topographic maps, analysis of aerial photographs, surveying by traditional and global positioning systems (GPS) techniques, and acquisition of remotely-sensed satellite data. Special emphasis is placed on methods and applications of geographic information systems (GIS) in geospatial analysis. *Prerequisite: ENS 241 or SUS 200 or SUS 231.*

ENS 360 1-4 hours
Independent Study
An individualized, directed study involving a specified topic.

ENS 361 4 hours
Geomorphology
An applied approach to the study of earth surface processes and the landforms they produce. Topics include processes and landforms associated with weathering, mass wasting, rivers, karst, tectonics, glaciers, shorelines, and wind. Emphasis placed on environmental and land-use applications. Field and lab assignments include qualitative descriptions and quantitative measurements from fieldwork, topographic and geologic maps, and aerial photographs. *Three hours of lecture and three hours of lab per week. Prerequisite: ENS 241 or permission from the instructor.*

ENS 362 4 hours
Hydrogeology
Basic processes and measurement of the hydrologic cycle, including precipitation, evaporation, surface runoff, stream flow, soil moisture, and groundwater. Emphasis placed on groundwater, including aquifer characteristics, principles of flow, conceptual models of regional flow, geology of occurrence, well hydraulics, chemistry and quality, detection of pollutants, contaminant transport and remediation, and resource development. *Three hours of lecture and three hours of lab per week. Prerequisite: ENS 241 or permission from the instructor.*

ENS 364 4 hours
Water Resources and Appropriate Technology
Concepts and practices of water resource development and appropriate technology in the context of environmental resources in a developing country. Students participate in a service-learning project of design and implementation of water resource related appropriate technology (such as well-drilling, water quality protection, hygiene training, and sanitation system design) as part of a holistic ministry toward transformational development. Students develop a perspective on the role of appropriate technology in the responsibility of individuals in cross-cultural service, in issues of cross-cultural communication and interactions, and in God's purposes in missions and the worldwide church. *Prerequisite: IAS 120.*

ENS 370 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

ENS 375 4 hours
Systems Ecology
The principles of systems theory are introduced in an integrated study of the development, dynamics, and disruption of natural ecosystems. Theoretical, analytical, and experimental aspects of ecosystems are explored. Students are introduced to the use of microcomputers as a tool in ecosystem modeling. *Prerequisites: ENS 204 and one course in college-level mathematics or computer science.*

ENS 383 4 hours
Environmental Ethics
An in-depth discussion of the ethical implications of major environmental problems, such as world population and food supply, inequities in land and resource distribution, animal rights, materialism and personal life styles, and exploitation versus stewardship of the environment. *Three hours of lecture and a discussion section per week. Prerequisite: Junior or senior standing as an environmental science major or permission from the instructor.*

Public Health Courses

PBH 100 3 hours
Introduction to Public Health
This course is a foundational course for the major and an elective for students wishing only to be introduced to the field. The course is built upon a population perspective and ecological perspective on disease causation and prevention. As a general overview of the field, Introduction to Public Health provides an historical perspective on the role that public health has played in improving the health status of populations, both in the US and globally. Moving beyond the biologic mechanisms of disease causation, students will gain an understanding of the environmental, social and behavioral determinants of health for populations, and factors that contribute to disparities in health between subpopulations. Students will be introduced to the core functions and essential services of public health in the US and how these are met in less economically developed societies. The core disciplines of public health will be defined and described, including epidemiology, biostatistics, environmental health, policy and administration, and the social and behavioral sciences. Students will examine current public health challenges in the US and globally.

PBH 110 3 hours
Global Health
This course provides an overview of the determinants of health, burden of disease, risk factors, health systems, and key measures to address the burden of disease in populations for both industrialized and less developed nations. The course will have a global perspective, paying particular attention to links between health and development, environment, human rights, and culture.

PBH 170 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

PBH 210 3 hours
Human Diseases
Introduction to biomedical concepts associated with human diseases. Emphasis is on understanding the etiology, pathogenesis, diagnosis, treatment, and risk factors of diseases affecting public health and how this impacts the prevention and control of those diseases. *Offered Fall semester. Prerequisites: PBH 100 or PBH 110.*

PBH 213 2 hours
Substance Education
The course is designed to prepare professionals for drug education. The scope of the course is wide and includes the following basic areas: drug terminology, pharmacology, psychodynamics, legal and law enforcement perspectives, social and cultural determinants, ethical and moral alternatives, behavioral aspects, and educational strategies. A strong emphasis is placed on developing guidelines for decision making in our society. The purpose is to exchange the best amount of information on drug use, misuse, and abuse available. *Offered Spring semester of even years.*

ENS 393 1-4 hours
Practicum
Supervised learning involving a first-hand field experience or a project. Generally, one hour of credit is awarded for a minimum of 40 hours of practicum experience. *Offered primarily during Summer.*

ENS 450 1-4 hours
Directed Research
Investigative learning involving closely directed research and the use of such facilities as the library or laboratory.

ENS 480 1-4 hours
Seminar
A limited-enrollment course designed especially for upper-class majors with emphasis on directed readings and discussion.

ENS 490 1-2 hours
Honors
Individualized study or research of an advanced topic within a student's major. *Open to students with at least a 3.00 GPA in the major field.*

ENS 493 2 hours
Environmental Science Capstone
An integrative, junior/senior-level course in which major themes from within the environmental science major and from the Taylor foundational core curriculum are intentionally revisited at a depth appropriate to college seniors. *Offered in the Fall semester of every other year. Prerequisite: Junior or senior standing as an environmental science major.*

PBH 224 2 hours
Healthy Aging
This course will provide an overview of issues related to public health and aging. Topics such as demography and epidemiology of aging, perceptions of aging as viewed in society today, myths and stereotypes of aging, and challenges faced by elders will be addressed. The course will support health promotion for older adults and highlight the roles played by families, government, health care providers, and advocates.

PBH 244 3 hours
Health and Human Sexuality
The course examines the basic foundations of human sexuality and incorporates topical issues of interest and importance. In addition to the dissemination of cognitive information, a strong emphasis of the course is placed on the psychosocial aspects of human sexuality and its impact on individuals and society. Students are encouraged to develop and maintain a personal philosophy concerning sexual decision-making and behavior. The broad goals of the course include an increased knowledge of the biological, developmental, and scientific aspects of human sexuality, in addition to developing a greater awareness of self and others.

PBH 270 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

PBH 320 4 hours
Epidemiology
Study of the distribution and determinants of disease occurrence, including core concepts such as incidence, prevalence, risk, risk factors, relative risk, attributable risk, sensitivity, specificity, and different types of epidemiologic study designs. Students will use data from epidemiologic case studies to calculate odds ratios, relative risk, and confidence intervals as well as calculate sensitivity and specificity of screening tests. *Offered Spring semester. Prerequisites: PBH 100; MAT 210 or SOC 355 or PSY 275.*

PBH 330 3 hours
Assessment for Program Planning
This course will examine intervention approaches in public health for the prevention of infectious disease, chronic disease, injury and disability, and the promotion of community health and wellbeing. Intervention approaches through environmental change, policy and systems change, social change, and behavioral change approaches will be studied. Case studies of interventions will be examined. *Offered Fall semester. Prerequisites: PBH 100.*

PBH 330L 1 hour
Service Learning in Community Assessment
Students will participate in a neighborhood assessment and mapping project in a local community in partnership with a community organization. This will include neighborhood observations, neighborhood survey interviews, and participation in neighborhood events. *Offered Fall semester. Prerequisite: PBH 100.*

PBH 335 4 hours
Environmental Health
This course will explore how both the natural and built environment affect human health by looking at the impact of physical, chemical, biological, and socioeconomic factors external to humans. Environmental health is an interdisciplinary field that focuses on the theory and practice of recognizing, assessing, controlling, and preventing environmental and occupational hazards that may adversely affect the health of the present and future generations. *Prerequisites: PBH 100; SUS 200 or SUS 231.*

PBH 340 4 hours
Community Health Development in Practice
The course will examine the theory and practice of community health development as it is practiced by organizations doing this work internationally. The course will be offered in partnership with a non-governmental organization doing transformational development in one of the countries where they are working. The course will include a service component and discussions of those experiences will emphasize intercultural competencies. *Offered Interterm of odd years. Prerequisites: PBH 100 or PBH 110; PBH 330.*

PBH 345 3 hours
International Humanitarian Response
This course examines the international humanitarian response to disasters from a Christian and public health perspective. Current crises from around the world will be discussed, including causes; effects on population health; problems associated with population displacement; public health responses; and challenges to international collaboration between governments, international organizations, and non-governmental organizations.

PBH 346 3 hours
Community Health Education
This course illustrates how the health of populations is promoted and protected by organized public health practice. Students are acquainted with current evolving concepts and performance of these practices and are introduced to essential public health services. The problem-solving approach is emphasized through small-group interaction, case-study method, and critical thinking skills. *Meets foundational core civic engagement or general social science requirement. Offered Spring semester.*

PBH 347 3 hours
Health Policy and Law in National and Global Contexts
The course will provide a framework for understanding and analyzing a range of health policy issues in domestic and global contexts. The course will focus on the U.S. policy-making and legal system in the domestic context. It will provide additional focus on global law and policy as it relates to vulnerable populations of refugees, displaced populations, and populations living in poverty. The course will consider essential issues in health policy and law including health insurance, health economics, individual rights in health care, gender equity, and health care access and quality.

PBH 350 3 hours
Determinants of Health and Health Equity
The focus of this course will be on examining the broad range of environmental, social, cultural, and policy factors that contribute to disparate outcomes between population groups. This course will introduce students to the literature and methods of social epidemiology. Structured in a seminar format, with readings and case studies, students will examine specific cases of disparate health outcomes within communities including an analysis of the determinants of those disparities. Approaches to health equity will be discussed. *Offered Spring semester. Prerequisites: PBH 100 and PBH 320; MAT 210 or SOC 355 or PSY 275.*

PBH 360 1-4 hours
Independent Study
An individualized, directed study involving a specified topic.

PBH 370 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

PBH 393 1-4 hours
Practicum
Supervised learning involving a first-hand field experience or a project. Generally, one hour of credit is awarded for a minimum of 40 hours of practicum experience. *Offered primarily during Summer following junior year or Fall of senior year. Prerequisites: PBH 100, PBH 110, PBH 210, PBH 320, PBH 330, PBH 340, and PBH 350.*

PBH 425 1 hour
CHES Preparation Seminar
This course provides a detailed review of the analysis and application of the Seven Areas of Responsibilities and Competencies. Focus is on helping increase knowledge of the concepts and successfully pass the Certified Health Education Specialist (CHES) examination in either the Fall or Spring semester of the senior year. It is designed to review the health educator responsibilities, competencies, and sub-competencies and also provide an overview of the national certification examination. Additional work will be required by the student to maximize success on the exam. *Prerequisite: Senior in Public Health major or permission of instructor. Pass/fail only.*

PBH 450 1-4 hours
Directed Research
Investigative learning involving closely directed research and the use of such facilities as the library or laboratory.

PBH 480 1-4 hours
Seminar
A limited-enrollment course designed especially for upper-class majors with emphasis on directed readings and discussion.

PBH 490 1-2 hours
Honors
Individualized study or research of an advanced topic within a student's major. *Open to students with at least a 3.00 GPA in the major field.*

PBH 493 2 hours
Public Health Senior Capstone
This course will be structured as a seminar, pulling together the experiences of all the students into a broad public health framework. Major challenges faced during practicum will be discussed. Readings, videos, guest lectures, and optional workshops will support the discussions that take place in class. An integrative senior paper will provide the structure for students to integrate their faith, public health coursework, and practicum experiences. Part of the comprehensive exam, paper, or project required for graduation will be completed during the practicum. *Offered Spring semester. Prerequisites: PBH 100, PBH 110, PBH 210, PBH 320, PBH 330, PBH 393; and PBH 340 or PBH 350.*

Sustainable Development Courses

SUS 120 1 hour
Environmental Stewardship and Sustainable Living
Key topics related to stewardship and sustainable living are presented in a weekly seminar. Guest lecturers and discussions are focused on aspects of ecological and social sustainability and its application in daily life and on campus.

SUS 170 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

SUS 200 3 hours
Environment and Society
Introduction to ecological principles and human impacts on the environment. Issues studied include population dynamics, natural resources, pollution problems, and environmental ethics. Lab exercises focus on experimental ecology and the basic techniques used to describe and measure environmental quality. *Meets the foundational core life science requirement. Environmental science majors should elect SUS 231 rather than SUS 200.*

SUS 211 4 hours
Crops and Society
This course will study the contribution of crops to society and society's development. The course will cover cereal crops, legumes, herbs, spice, fibers, medicinal plants, and tropical and temperate fruits and nuts. Soil and water conservation will be covered. Emphasis will be on agriculture in developing nations and development policies that affect agriculture, stewardship, the poor, and malnourished.

SUS 231 4 hours
Environmental Science, Society, and Sustainability
An introduction to environmental science, including a discussion of ecological principles and their application, energy systems, pollution problems, environmental policy and decision making, and the scientific and ethical implications of human impacts on the environment. Lab exercises focus on experimental ecology and the basic techniques used to describe and measure environmental quality. This course serves three functions: (1) it is the entry level course for environmental science majors; (2) it may be taken for foundational core lab science credit; and (3) biology majors may count it as a 200-level biology course when calculating course hour requirements in biology. *Three hours of lecture and two hours of lab per week. Meets the foundational core life science requirement.*

SUS 270 1-4 hours
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

SUS 310 3 hours
Poverty and Sustainable Development
An exploration of the key ideas and debates in development theory with an emphasis on evaluating whether and how global poverty can be alleviated without irreparably damaging the environment. Case studies feature interdisciplinary approaches to sustainable and transformational development drawn from agroecology, sociology, public health, holistic missions, and political economy.

SUS 310L **1 hour**
Poverty and Sustainable Development Lab
Labs feature community-based skills and interdisciplinary analytical approaches to sustainable and transformational development applied to service-learning projects to understand poverty in surrounding communities. *Corequisite: SUS 310.*

SUS 315 **4 hours**
Sustainable Food Systems and Health
This course focuses on understanding agriculture and food systems from a sustainability perspective and connecting that with human health. Students learn the principles of agro-ecology and how to apply them to various types of agriculture. They also critically evaluate global and local food systems, becoming familiar with strategies that have been tried to improve the equitable distribution of food and the environmental sustainability of food systems. Students also learn about the connection between food and chronic disease with specific skills in preparing food to help reduce the risk of diabetes and cardiovascular disease.

SUS 325 **4 hours**
Sustainable Development in Practice
This field-based course explores contemporary trends in international development through the lens of sustainable community development. The social, ecological, and economic sustainability of development are assessed through a case-study approach. The course will be offered in partnership with a non-governmental organization doing transformational development in one of the countries where they are working. The course will include a service component and discussions of those experiences will emphasize intercultural competencies. *Offered Interterm of odd calendar years. Prerequisite: SUS 231.*

SUS 330L **1 hour**
Assessment and Planning Lab for Sustainability
Students will participate in a community-based sustainability assessment and mapping project. This will include direct observations, carrying out interviews, and gathering secondary data related to sustainability. *Offered Fall semester of every other year. Prerequisite: SUS 231.*

SUS 360 **1-4 hours**
Independent Study
An individualized, directed study involving a specified topic.

SUS 370 **1-4 hours**
Selected Topics
A course offered on a subject of interest but not listed as a regular course offering.

SUS 393 **1-4 hours**
Practicum
Supervised learning involving a first-hand field experience or a project. Generally, one hour of credit is awarded for a minimum of 40 hours of practicum experience. *Offered primarily during Summer.*

SUS 435 **4 hours**
Environmental and Sustainability Planning and Assessment
A culminating course involving application of interdisciplinary principles of environmental and sustainability planning, monitoring, and evaluation involving community-based projects and case studies.

SUS 450 **1-4 hours**
Directed Research
Investigative learning involving closely directed research and the use of such facilities as the library or laboratory.

SUS 480 **1-4 hours**
Seminar
A limited-enrollment course designed especially for upper-class majors with emphasis on directed readings and discussion.

SUS 490 **1-2 hours**
Honors
Individualized study or research of an advanced topic within a student's major. *Open to students with at least a 3.00 GPA in the major field.*

SUS 493 **2 hours**
Sustainable Development Capstone
An integrative, junior/senior-level course in which major themes from within the sustainable development major and from the Taylor foundational core curriculum are intentionally revisited at a depth appropriate to college seniors. *Offered Fall semester of every other year. Prerequisite: Junior or senior standing as a sustainable development major.*

Notes