Environmental Studies

The environmental studies program draws on the expertise of faculty distributed throughout the academic disciplines at Whitworth to provide a robust interdisciplinary approach to the study of the natural world. The program integrates insights from the natural sciences, social sciences, humanities and theology to develop students' environmental literacy and competence, providing a holistic education that encourages thoughtful and informed care of the earth and its creatures. Both interdisciplinary majors that are a part of the program require students to develop competence across a range of fields. The B.A. in environmental studies focuses in particular on the social, political, ethical and religious dimensions of environmental challenges and opportunities, while the B.S. in environmental science focuses on the physical and biological dimensions, providing a thorough grounding in the sciences. Both programs reflect Whitworth's long-standing commitment to the care of creation as an integral part of our mission to love the God who created all things, to follow Christ who redeems all things, and by the power of the Spirit to serve our fellow human beings with whom we are bound to the life of all of creation.

Student Learning Outcomes

Environmental studies programs will equip Whitworth students with:

1. **Critical Thinking.** Students develop an ability to think critically about some of the most pressing questions of our day by considering the environmental impact of their personal and professional decisions.
2. **Interdisciplinary Competence.** Students are able to assess the causes and consequences of environmental issues from the perspective of the natural and social sciences, theology, and the humanities.
3. **Faith and Learning.** Students actively demonstrate the application of their faith or worldview to care for the whole creation.
4. **Effective Communication.** Students will communicate about the causes and consequences of environmental issues from an interdisciplinary perspective in both oral and written form.
5. **Field Skills.** Students will spend time in the field, experiencing a broad array of field-based environmental skills, preparing them for future careers as environmental professionals.

Requirements for an Environmental Science Major, B.S. (55-58)

ENS Core Courses (9)		
BI 120	Introduction to Environmental Science	3
PO 250	Environmental Politics	3
One of the following:		3
TH 212	Redemption of Creation	
TH 214	Theology & Ecology	
General Science Requirements (20)		
BI 140	General Biology I: Genes, Cells and Evolution	4
BI 143	General Biology II: Ecology and Evolution	4
BI 240	General Biology III: Organismal Diversity	4
CH 161	General Chemistry I	3
CH 161L	General Chemistry I Lab	1
CH 181	General Chemistry II	3
CH 181L	General Chemistry II Lab	1
Chemistry Requirements (7)		
CH 271	Organic Chemistry I	3
CH 271L	Organic Chemistry I Lab	1
CH 331	Environmental Chemistry	3
Ecology Requirements (8)		
BI 304	Ecological Measures	4
BI 347	Global Change Ecology	4

Field Intensive Requirements (one of the following)		3-4
BI 341	Central American Field Ecology	
BI 346	Field Parasitology	
*Approved Au Sable Field-Based Course		
Geographic Information Systems (one of the following)		3-4
ENS 255	Introduction to GIS	
*Au Sable course EnvST 362 Environmental Applications for GIS		
Seminar (2)		2
ENS 301	Environmental Studies Seminar	
ENS 401	Environmental Studies Seminar	
One additional course from the ENS major electives list (must be 200 or higher)		3-4
Students pursuing the Environmental/Sustainability Education endorsement must take the following among their electives:		
EDU 343	Science: K-9 Methods and Assessment	
or EDU 455W	Science in Secondary School	
EDU 410	Environmental and Sustainability Education in the K-12 Classroom	

Requirements for an Environmental Studies Major, B.A. (36-39)

ENS Core Courses (9 credits)		
BI 120	Introduction to Environmental Science	3
PO 250	Environmental Politics	3
One of the following:		3
TH 212	Redemption of Creation	
TH 214	Theology & Ecology	
Environmental Science Courses (7)		
BI 347	Global Change Ecology	4
ENS 255	Introduction to GIS	3
Field Intensive Requirement (one of the following)		4
BI 341	Central American Field Ecology	
*Approved Au Sable Field-Based Course		
Environmental Writing (one of the following)		3
ENS 357W	Creative Nonfiction Workshop: Environmental and Nature Writing	
EL 210	Composition for Writers (Environmental Writing Section)	
Environmental Ethics (3)		3
ENS 302W	Environmental Ethics	
Society and the Environment (one of the following)		3
HI 384	Pacific Northwest History	
ENS 360	Sociology of the Environment	
EC 350	Environmental Economics	
PO 356	Global Climate Change Governance	
PO 359	Global Environmental Politics	
Seminar - Must take both (2)		2
ENS 301	Environmental Studies Seminar	
ENS 401	Environmental Studies Seminar	
Two additional courses from the ENS major elective list. At least one must be 200 level or higher.		5-8
Students pursing the specialty endorsement in Environmental/Sustainability Education (ESE) must take the following among their electives:		
EDU 343	Science: K-9 Methods and Assessment	

or EDU 455W	Science in Secondary School	
EDU 410	Environmental and Sustainability Education in the K-12 Classroom	

Requirements for an Environmental Studies Minor (20-25)

ENS 120/BI 120	Introduction to Environmental Science	3
ENS 250/PO 250	Environmental Politics	3
One of the following:		3
ENS 212/TH 212	Redemption of Creation	
ENS 214/TH 214	Theology & Ecology	
Four courses total, at least one from the Natural Science category and one from the Social Science/Humanities category		11-16
Students pursuing the Environmental/Sustainability Education endorsement must take the following among their electives:		
EDU 343	Science: K-9 Methods and Assessment **	
EDU 410	Environmental and Sustainability Education in the K-12 Classroom **	

* Selected sections only. Please see your advisor.

** Students fulfilling requirements for the ESE endorsement should take EDU 410 AND either EDU 343 OR EDU 455.

Environmental Science/Studies Elective Courses

Natural Science Electives		
BI 102	Introductory Biology	3
BI 105	Plants in Culture	3
BI 111	Marine Biology	3
BI 303	Plant Taxonomy	4
BI 304	Ecological Measures	4
BI 311	General Biochemistry	3
BI 323	Animal Physiology	4
BI 324	Animal Behavior	4
BI 331	Plant Physiology	4
BI 341	Central American Field Ecology	3
BI 345	Ecology	4
BI 347	Global Change Ecology	4
BI 350	Comparative Vertebrate Anatomy	4
BI 363	Genetics	4
BI 365	Ecological Developmental Biology	4
BI 381	Statistical Applications for Biology	3
BI 399	Molecular Genetics	4
CH 111	Green Chemistry	3
CH 112	Chemistry and Health	3
CH 122	Chemistry in Modern Living	3
CH 331	Environmental Chemistry	3
GL 139	Environmental Geology	3
NS 101	Earth and Sky	3
Social Science Electives		
EC 350	Environmental Economics	3
EC 381	Sustainable Development Abroad: Poverty And Environmental Sustainability"	3

EL 110	Writing & Design	3
EL 210	Composition for Writers	3
EL 357	Environmental and Nature Writing	3
HI 384	Pacific Northwest History	3
PO 359	Global Environmental Politics	3
SO 360	Sociology of the Environment	3
SO 465	Population Analysis	3
TH 212	Redemption of Creation	3
TH 214	Theology & Ecology	3
TH 302W	Environmental Ethics	3

*These courses may have prerequisites that are not included in the major. Please refer to the catalog and talk with your advisor when planning to take these courses.

Courses

ENS 101 Earth and Sky **3**

A broad study of earth science including geology and astronomy, oceans, the atmosphere and fundamental underlying physical concepts. Includes the nature and the origin of the solar system, the structure of the earth, and how earth processes operate and affect human life; for example: volcanoes, earthquakes, rivers, groundwater, glaciers, ocean processes, atmosphere and weather. For elementary education students. Also listed as NS 101. Fall and spring semesters.

ENS 102 Introductory Biology **3**

Contemporary understanding of the basic organization and function of biological systems and the nature and interdependence of living organisms. Emphasis on cell structure, the diversity of organisms, and physiology. Lab. Meets natural science requirement. Aslo listed as BI 102.

ENS 105 Plants in Culture **3**

Basic structures and life processes in plants. Survey of historical and contemporary uses of plants. Focus on ways in which human life is physically dependent on plants, and on the many ways in which human cultures reflect the specific plants available to them. No lab. For non-science majors. Meets natural science requirement. Also listed as BI 105. Periodic offering.

ENS 111 Marine Biology **3**

Introduction to life in the sea. Emphasis on the diversity of marine organisms and adaptations to marine habitats, marine ecosystems and food webs. No lab. For non-science majors. Meets natural science requirement. Also listed as BI 111. Jan Term. Periodic offering.

ENS 112 Green Chemistry **3**

The focus will be on environmentally friendly chemistry (green chemistry) applied to the design, development, and implementation of chemical processes and products that are not harmful to humans or the environment. Basic math and algebra skills will be used. For non-majors. Also listed as CH 111. Periodic Jan Term offering.

ENS 113 Chemistry and Health **3**

Applications of chemical principles to concepts of health and disease. Overview of chemistry discoveries and their contributions to understanding current health issues. For non-majors. Also listed as CH 112. Periodic Jan Term offering.

ENS 120 Introduction to Environmental Science **3**

Overview of how science informs our approach to environmental concerns, with application to specific current environmental challenges, including water resources, energy, land use, biodiversity, and global change. Also discussed how faith integrates with science to shape our approach to the environment. Meets natural science requirement. Also listed as BI 120. Spring semester.

ENS 122 Chemistry in Modern Living **3**

Overview of current chemical issues, for the non-science student. Topics may include air pollution, global warming, ozone layer, acid rain, nuclear energy, solar energy, plastics, nutrition and/or pharmaceutical drugs. Basic math and algebra skills will be used. For non-majors. Also listed as CH 122. Periodic Jan Term offering.

ENS 131 Understanding Earth **4**

Structure of the earth and the forces of plate tectonics that build and move continents. Examination of the dynamic interactions between the lithosphere (crust), atmosphere, and hydrosphere. Laboratory included. Also listed as GL 131. Jan Term.

ENS 139 Environmental Geology **3**

Interactions of the human species with land, sea and air. Geologic hazards, earth resources, oceanography, meteorology. Also listed as GL 139. Fall semester, odd years.

ENS 146 Physics in Current Events **3**

Using current events as a starting point, we will discuss the physics behind these events and explore where it leads. Topics may include forces, energy, waves, sound, electricity and magnetism, heat, fluids, relativity, nuclear and particle physics, astronomy, and astrophysics. The selection will be based largely on current events in news media, such as newspapers, TV, radio, and the Internet. Students are encouraged to suggest topics of interest to them. Course includes a lab component. Fulfills the natural science requirement. Also listed as PS 146.

ENS 210 Composition for Writers **3**

A written communication option for students who are confident in their writing and looking for new composition challenges; especially recommended for potential English majors and minors, and for students who enter with a love of writing and the confidence to work independently. Study of traditional textual composition along with multimodal composing (e.g., multimedia composing that might include images or sounds), design thinking, rhetorical analysis, research as a rhetorical process, and argument for audiences, including public audiences.

ENS 212 Redemption of Creation **3**

An introduction to the whole story of the Bible with a focus on the created order and God's plans in redemption and new creation. Considers the significance of a biblical theology of creation and redemption for contemporary issues. Also listed as TH 212. Fall semester.

ENS 214 Theology & Ecology **3**

Develops a biblical theology of creation care rooted in Scripture's portrayal of creation and redemption in Christ. Attention is given to environmental issues and the ecology and natural history of the Northwest. Includes study, work, worship, outdoor exploration and disciplined reflection. Also listed as TH 214. January, odd years, Tall Timber Ranch in the Cascades.

ENS 250 Environmental Politics **3**

Studies the role of markets, governments, and civil society in shaping the way people behave toward the environment, focusing on the concept of sustainability in terms of society, economics and the environment. Because people interact in a variety of ways, the course moves from local to global and focuses on issues at each level. Also listed as PO/EC 250.

ENS 255 Introduction to GIS **3**

Introduction to the collection, management, analysis, and presentation of spatial data using the tools of Geographic Information Systems and Global Positioning Systems. Includes 3 full-day field trips during the week.

ENS 257 Creative Nonfiction Workshop: Environme ntal and Nature Writing **3**

Students will read contemporary examples of environmental and nature writing. They will produce, workshop, and revise texts about experiences in nature and current environmental issues.

ENS 274 Environment and Performance **3**

Explore our relationships with the land we inhabit through engagement with indigenous elders, artists, scientists, and the land itself. Learning will culminate in original performance pieces, crafted in response to and in dialogue with the ecosystem encountered. Most class days spent partially or entirely outside.

ENS 301 Environmental Studies Seminar **1**

Prepares environmental studies students for next steps in environmental careers. Intended for sophomores or juniors in the environmental studies program. Students prepare for an internship, research experience, or environmentally related temporary employment.

ENS 302W Environmental Ethics **3**

An exploration of scientific, philosophical, and religious views concerning the non-human world and our responsibilities towards other creatures, fellow human beings, and future generations. Includes readings in classic environmental texts, a service learning component, and a focus on practical issues relevant to the northwestern United States.

ENS 303 Plant Taxonomy **4**

History, theories and methods of classification, identification, nomenclature and description. Role of taxonomy as a biological discipline. Types of taxonomic evidence. Descriptive terminology. Survey of selected families. Lab focuses on use and construction of diagnostic keys,identification of local flora, preparation of field data records and herbarium specimens. Lab. Prerequisites: BI 140 and BI 141. Also listed as BI 303. Spring semester, even years.

ENS 304 Ecological Measures **4**

This course will explore a number of fields of ecological research and management, focusing first on the reasons for measuring ecosystem attributes pertinent to each field, as well as covering sampling design, analysis, and common measurement techniques. Three required Saturday field trips. Prerequisite: BI 345. Also listed as BI 304. Fall semester.

ENS 305 Landscape Ecology **4**

Landscape ecology is the study of the causes and consequences of landscape-scale pattern and process. Topics will include ecological scale, restoration ecology, disturbance ecology, ecological modeling, and geospatial ecological techniques. Includes 1 Saturday field trip. Prerequisite: BI 345. Also listed as BI 305. Spring semester. Periodic offering.

ENS 305W Landscape Ecology **4**

Landscape ecology is the study of the causes and consequences of landscape-scale pattern and process. Topics will include ecological scale, restoration ecology, disturbance ecology, ecological modeling, and geospatial ecological techniques. Includes 1 Saturday field trip. Prerequisite: BI 345. Spring semester.

ENS 305L Lab: Landscape Ecology **0**

ENS 310 Northwest Writers **3**

Readings from a diverse group of Northwestern poets, fiction writers, and creative nonfiction writers, with consideration of central themes and concerns shared among them. Explores the relationship between these writers and their region. Also listed as EL 310.

ENS 323 Animal Physiology **4**

Anatomical, physiological and behavioral adaptations of animals to their particular habitats. Lectures focus on respiration in air and water, circulation, metabolism, temperature limits and thermoregulation, osmotic adaptations and excretion, and amoeboid, flagellar, ciliary, and muscular movement. Lab. Prerequisites: BI 140, BI 143, BI 240, CH 271 and BI 311 or CH 401. Junior standing or by permission of instructor.

ENS 324 Animal Behavior **4**

The study of the mechanisms and evolution of animal behavior. Topics include methods of observation and quantification of behavior, natural selection, sexual selection, evolution of animal choice, and the biological basis of all social interactions. Lab. Prerequisites: BI 140 and BI 141. Also listed as BI 324. Fall semester, odd years.

ENS 331 Plant Physiology **4**

Water relations, mineral absorption and nutrition, translocation mechanisms, respiration, photosynthesis, nitrogen metabolism, growth regulators, photomorphogenesis, senescence and stress physiology. Focus on vascular plants. Lab emphasizes whole organism responses. Prerequisites: BI 140, BI 141, BI 311, and CH 271. Also listed as BI 331. Also listed as CH 331. Spring semester, odd years.

ENS 331L Environmental Chemistry Lab **1**

Explore the laboratory methods typical in environmental analysis. Includes sampling techniques, use of certified protocol(s), and spectroscopic and instrumental analysis. Also listed as ENS-331L. Corequisite: concurrent enrollment in CH331, CH331W, or ENS331. Spring semester even years.

ENS 332 Environmental Chemistry **3**

Study of the environment from a systems approach. Includes study of the hydrosphere (water), atmosphere (air), and geosphere (earth) and interactions with the anthrosphere (humans). Prerequisites: CH 271.

ENS 341 Central American Field Ecology **4**

Field-based course that provides a unique context to perform student designed research in three Central American ecosystems in Costa Rica. Course will focus on field data collection, analysis, and reporting for ecological systems. Requires extensive time outdoors in conditions ranging from wet and cold to hot and dry. Also listed as BI 341.

ENS 342 Field Marine Ecology **4**

Field-based course designed to explore the interactions of temperate marine organisms with their living and non-living environment. Students explore life histories and ecology of intertidal marine life in rocky shore, sand, mud flat, and planktonic communities. The class will be stationed at the Friday Harbor Marine Laboratory on San Juan Island, Puget Sound, Washington. Permission of instructor; limited enrollment. Prerequisites: BI 140, BI 141, BI 339 and BI 345. Also listed as BI 342. Jan Term, odd years.

ENS 345 Ecology **4**

Fundamental relationships and processes by which organisms interact with each other and their physical environment. Focus on physiological adaptations, population growth and regulation, community and ecosystem structure and function, and biogeography. Lab. Prerequisites: BI 140 and BI 141. Also listed as BI 345. Spring semester.

ENS 347 Global Change Ecology **4**

This course will explore global-scale changes and the interplay of ecosystems with these changes. Topics will explore how changes such as global warming, invasive species and land degradation influence global nutrient and energy cycling, inter- and intra-species interactions, and feedbacks in the earth system.

ENS 347W Global Change Ecology **4**

This course will explore global-scale changes and the interplay of ecosystems with these changes. Topics will explore how changes such as global warming, invasive species and land degradation influence global nutrient and energy cycling, inter- and intra-species interactions, and feedbacks in the earth system.

ENS 347L Lab:Global Change Ecology **0**

ENS 350 Environmental Economics **3**

Studies the role of markets, governments, and civil society in shaping the way people behave toward the environment, focusing on the concept of sustainability in terms of society, economics and the environment. Because people interact in a variety of ways, the course moves from local to global and focuses on issues at each level. Prerequisites: EC 210 or MA 171 or MA 158. Periodic offering.

ENS 353 International Political Economy **3**

Progress of people in organizing beyond national borders; prospects for a world community based on world law. Advanced study in international relations. Also listed asx PO/ENS 353.

ENS 356 Global Climate Change **3**

This course focuses on global climate governance, a process through which different political actors seek solutions to tackle the many challenges of global climate change. It also brings students to the United Nations Climate Change Summits as an off-campus program.

ENS 357W Environmental and Nature Writing **3**

Students will read contemporary examples of environmental and nature writing. They will produce, workshop, and revise texts about experiences in nature and current environmental issues.

ENS 359 Global Environmental Politics **3**

Investigating the political dynamics of environmental affairs from a global perspective.

ENS 360 Sociology of the Environment **3**

This course explores social issues related to environmental justice using theories and concepts from the field of Sociology. Sociological issues addressed include inadequate access to healthy food, inadequate transportation, air and water pollution, unsafe homes, etc. Students will examine contemporary environmental concerns associated with the unequal distribution of environmental hazards across societies, social groups, and communities. Students will explore the social, industrial, and government forces that create inequitable burdens of environmental pollution as well as movements to reduce such burdens. This course considers the global impact of environmental injustices.

ENS 365 Ecological Developmental Biology **4**

Developmental processes as they are influenced by their environmental context including: predators, competitors, toxic compounds, changes in temperature and humidity, availability of nutritional resources, and other factors. The influence of epigenetics and evolutionary adaptation on developmental plasticity will also be examined. Additionally, the course will explore insights gained into human health and disease by examining topics mentioned above. Prerequisite: Take BI-240. Corequisite: Take BI-365L. Corequisite or prerequisite: Take BI-311 or CH-401. Spring term, odd years.

ENS 369 Mycology **4**

Aspects of growth, metabolism, genetics and environmental modification peculiar to fungi. Distinguishing characteristics of major fungal groups. Lab. Prerequisites: BI 140, BI 141 and BI 311. Also listed as BI 369.

ENS 369W Mycology **4**

Aspects of growth, metabolism, genetics and environmental modification peculiar to fungi. Distinguishing characteristics of major fungal groups. Lab. Prerequisites: BI 140, BI 141 and BI 311.

ENS 369L Lab: Mycology **0**

ENS 381 Sustainable Development Abroad: Poverty, Inequality, Environment, Social Change **3**

Establishes a basic understanding of the theory and practical application of the "hows" and "whys" of a particulate international culture abroad, particularly as it relates to the historic, present and future challenges of that economy and to doing business with various people groups at home and abroad. Business models unique to non-American cultures will be explored in depth. Also listed as DS 381. Also listed asa LAS 381.

ENS 384 Pacific Northwest History **3**

Explores the Pacific Northwest as a geographic culture area from prehistory to the present. Perspectives of the various peoples who have lived there: Native Americans, Europeans and Americans. Modernization and contemporary issues in the Pacific Northwest. Role of regionalism, international conflict and ecological issues. Also listed as HI 384.

ENS 401 Environmental Studies Seminar **1**

Prepares environmental studies students for next steps in environmental careers. Intended for seniors in the environmental studies program. Students present on past research or internship experiences and lead journal review discussions.

ENS 448 Environmental Microbiology **4**

This course will examine the applied effects of microorganisms on the environment and on human activity, health and welfare. The role of microbes in municipal waste treatment, bioremediation and agriculture will be discussed. The laboratory component of the course will explore the detection and quantitation of microbial activity, including cultural, microscopic, physiological and molecular approaches. Prerequisites: BI-140, BI-141 and CH-271. Also listed as BI 448. Periodic offering.

ENS 480 Field Study **1-8**