

## Resource Specialization Courses Overview

The purpose of these informational documents is to help GRS students choose courses that would be of interest for their resource specialization. This is an overview of current courses, although they may change in the future. The most updated information can be found on the UBC course website:

<https://courses.students.ubc.ca>

## **Environment**

Last updated: November 2019

<u>Course Number</u>	<u>Course Name</u>	<u>Description</u>
ANTH 360	Introduction to Ecological Anthropology	Analysis of the relations between human societies and the ecological aspects of their environment (including technology, society, and ideology). Previously ANTH 460.
ANTH 461	Anthropological Study of Local Ecological Knowledge	Analysis of the concepts of ecological anthropology via the medium of local ecological knowledge. ANTH 360 is recommended as background.
APBI 200	Introduction to Soil Science	Physical, chemical and biological properties of soils; soil formation, classification, use and conservation.
APBI 210	Vascular Plants	A comparative study of pteridophytes, gymnosperms and angiosperms, integrating form, function, and ecology.
APBI 260	Introductory Topics in Applied Biology	Biophysical and socioeconomic factors affecting systems management and production in selected agroecosystems.
APBI 319	Aquaculture and the environment	Interactions between aquaculture and the environment. Current issues, comparison of systems, species, production methods, environments, and socioeconomics.
APBI 342	Soil Biology	The diversity of soil organisms (bacteria, protozoa, fungi, animals, plants) in natural and managed ecosystems; roles in primary production, nutrient cycling, decomposition and reclamation; interactions between soil organisms; responses to environmental change.
APBI 360	Agroecology II: Application and analysis	Animals and Plants as Components of Agricultural Ecosystems. A systems approach is used to investigate the functions and interactions of plants and animals in

		agricultural systems.
APBI 361	Key Indicators of Agroecosystem Sustainability	A detailed exploration of biophysical, economic, and social ecosystem sustainability indicators for primary production subsystems.
APBI 401	Soil Processes	Integration of soil physics, chemistry, and biology in understanding essential soil processes.
APBI 402	Sustainable Soil Management	Application of fundamental, unifying, soil science principles in sustainable ecosystem management.
APBI 403	Soil Sampling, Analyses and Data Interpretation	Field and laboratory analytical techniques in the chemical, biological and physical assessment of soils.
APBI 426	Plant-Microbe Interactions	Biology and physiology of selected plant-microbe relationships. Impacts of plant-microbe relationships on society.
APBI 444	Agroforestry	An introduction to the application of knowledge and principles of agroecology and forest ecology to global agroforestry systems. The course includes a one-weekend field trip that requires a supplemental fee.
APBI 460	Agroecology III: Synthesis and evaluation	The relationship between biological diversity and sustainability in food producing agroecosystems; emphasis on ecological similarities between natural ecosystems and managed agroecosystems.
ASIC 220	Introduction to Sustainability	Sustainability examined from scientific, economic, and societal perspectives.
BIOL 230	Fundamentals of Ecology	Dynamics of plant and animal populations, structure of ecological communities and functioning of ecosystems. Interpretation of research results and application to environmental issues. Labs meet once a month.
BIOL 306	Advanced Ecology	Ecology of populations, communities and ecosystems. Tests of ecological theory with experiments and application to environmental issues. Labs meet once a month.
BIOL 320	Survey of Algae	Ecology of populations, communities and ecosystems. Tests of ecological theory with experiments and

		application to environmental issues. Labs meet once a month
BIOL 343	Plants and Peoples	The interactions of plants and human societies: the role of people in the origin, evolution and dispersal of food, drug and economic plants, and the influences of plants on human societies. Suitable for upper-level Arts students.
BIOL 402	Aquatic Ecology	Theoretical and applied limnology; ecology of inland water organisms in relation to physical, chemical and biological factors. One weekend field trip required.
BIOL 404	Ecological Methodology	Design, execution, and analysis of ecological surveys and experiments. Practical field methods for estimating population metrics and describing community structure. Computer techniques for the statistical analysis of ecological data.
BIOL 406	Plant Ecology I	Plant community ecology including a consideration of the major approaches to sampling, analyzing and interpreting vegetation patterns. Instruction given in field work and computer analysis of field data.
BIOL 412	Phytogeography	Description and interpretation of present and past floristic vegetational patterns; integration of evolutionary, ecological, and phytogeographical concepts. Terrestrial and aquatic plants are considered. Restricted to students of third and fourth years.
BIOL 413	Zoogeography	The role of physical, ecological, and evolutionary processes in determining the geographic distribution of animals including humans, with implications for speciation and conservation. Restricted to students in third and fourth year.
BIOL 416	Principles of Conservation Biology	Ecological basis of conserving biological diversity and ecosystem services; application of ecological theory to global and local conservation problems in the context of economic, legal, political, and social perspectives.
BIOL 417	Phylogenetic Biology	Biodiversity from an evolutionary perspective. The evolutionary (phylogenetic) tree of genetic descent that links all organisms: its reconstruction, interpretation, and

		implications for fields from ecology to molecular biology.
BIOL 418	Evolutionary Ecology	Ecological adaptation and evolutionary processes in contemporary populations; natural selection, variation, optimization, foraging theory, coevolution, arms races; life history theory, evolution of sex, sexual selection, evolution in managed populations.
BIOL 440	Plant Genomics	Concepts, principles, applications, and recent discoveries in genome structure, genetics, and comparative genomics in plants with a focus on economically important plants.
BIOL 450	Molecular Adaptation of Animals to the Environment	Physiological, biochemical, and molecular strategies of adaptation of animals to environmental challenges. The evolution of genetic and biochemical systems, and their impact on animal structure and function.
BIOL 462	Ecological Plant Biochemistry	The structure, biosynthesis, distribution and biological function of secondary plant metabolites.
BIOL 465	Diversity and Evolution of Fishes	Introduction to fish diversity, with a focus on their phylogenetic interrelationships and the evolutionary, ecological, and biogeographic processes involved in generating patterns of fish biodiversity.
CHEM 302	Atmospheric Environmental Chemistry	Introduction to structure, composition and chemical processes occurring in Earth's atmosphere, including interactions with solar radiation, stratospheric ozone layer, photochemical smog and acid rain.
CONS 101	Introduction to Conservation	Seminars on current natural resources conservation and forest sciences topics.
CONS 200	Foundations of Conservation	Conceptual foundations of conservation; means of conserving nature and natural resources.
CONS 210	Visualizing Climate Change	Introduction to climate change through the lens of local landscapes and future scenarios, using visual media to communicate the underlying science and psychology, and engage communities in local climate change solutions.

CONS 302	Issues in Genomics and the Environment	Introductory genomics in the context of genetics and epigenetics; current and topical issues, including genetic determinism, environmental DNA, revival of extinct species, and applications of genomics to improve our life and environment including adaptation to climate change
CONS 310	Ecology in a Changing Climate	Impact of climate change on ecological systems. Builds framework for understanding past and future changes following fundamental organizing units of ecology, individuals, populations, species, communities, and ecosystems.
CONS 330	Conservation Science and Sustainability	Fundamental concepts in conservation science. Different philosophies, perspectives, and disciplines used in setting priorities for managing biodiversity at all scales.
CONS 340	Introduction to Geographic Information Systems for Forestry and Conservation	Introduction to principles, practice and context of Geographic Information Systems (GIS) applied to forest management and natural resource conservation issues. Priority enrolment to students in the Faculty of Forestry.
CONS 370	Aboriginal Forestry	Issues that may be encountered in professional natural resources work with or for Aboriginal communities and organization, including contemporary issues of Aboriginal rights and title, traditional uses, and self-government.
CONS 425	Sustainable Energy: Policy and Governance	Energy as a global policy problem; current energy challenges; energy systems and energy analysis; the politics and policy of energy alternatives.
CONS 481	Conservation Planning and Wildland Recreation	Theory and tools needed for the selection and design of protected areas, the designation of land use types, and the management and conservation of wildland recreation resources.
CONS 486	Fish Conservation and Management	Principles of fish biology, population and community ecology necessary to understand conservation and management; overview of current issues, tactics and institutions involved with fisheries conservation and management

ECON 370	Benefit-Cost Analysis and the Economics of Project Evaluation	Techniques and problems in benefit-cost analysis of public projects. Examination of alternative approaches to public decision-making such as cost-effectiveness analysis and multiple-objective frameworks. Case studies of projects in the areas of natural resources, the environment, human resources, public services, and transportation.
ECON 371	Economics of the Environment	Economic analysis applied to various environmental issues, including sustainable development, quality of life, and environmental impacts of specific industrial and consumption activities. The design and implementation of government policies. Global environmental effects of human economic activity.
ECON 471	Economics of Nonrenewable Resources	Application of economic analysis to the management of nonrenewable natural resources. Emphasis is placed on the economics of alternative energy sources. Other topics include mineral economics, criteria for the optimal use of resources, and measurement of resources.
ECON 472	Economics of Renewable Resources	Application of economic analysis to the management of renewable resources. Special attention is given to criteria for the optimal use of depleting resources such as forests and water. Other topics include public policy with regard to environmental quality, conservation, and outdoor recreation.
ENDS 211	Introduction to Environmental Design	Survey of the visual, cultural, ecological and spatial literacies in environmental design and planning.
ENDS 440	Environment and Urban Form	Relationships between, and integration of, the natural environment and the physical form, spatial structure, and livability of cities.
ENVR 200	Introduction to Environmental Science	Seminars and field trips introducing the major global, regional, and local environmental issues facing human societies.
ENVR 300	Introduction to Research in Environmental Science	Environmental research. Students investigate research methodologies and reporting in a range of scientific disciplines and fields.

ENVR 400	Community Project in Environmental Science	Instructor-guided collaboration between student teams and community partners on community-based environmental science projects. Teams articulate project questions and goals, devise methods, conduct research and communicate results.
EOSC 310	The Earth and the Solar System	The Earth as a planet: its composition, internal dynamics, and surface evolution. Rotation, magnetic field, plate tectonics, earthquakes, volcanoes. The ocean, atmosphere, and biosphere as components of a varying geo-environment.
EOSC 314	The Ocean Environment	An introduction to the oceans and the processes that have shaped them, their composition and movement, waves, tides, beaches, interactions with the atmosphere and human exploitation of the non-living resources.
EOSC 315	The Ocean Ecosystem	An introduction to life in the oceans, its variety and evolution; primary producers and their links to the environment, zooplankton, marine communities, living marine resources and their role in today's world.
EOSC 326	Earth and Life Through Time	The fossil record of adaptation and extinction emphasizing the interaction of biological and geological processes.
EOSC 329	Groundwater Hydrology	Introduction to theory of groundwater flow; flow nets; regional groundwater resource evaluation; well hydraulics; role of groundwater in geologic processes.
EOSC 330	Principles of Geomorphology	Landform development; morphological and historical analysis of landforms; applications in engineering and resource development.
EOSC 340	Global Climate Change	Mechanisms and processes of past and future global environmental and climate change.
EOSC 350	Environmental, Geotechnical, and Exploration Geophysics I	Principles of geophysical survey design, data acquisition, processing and interpretation with emphasis on near-surface problems. Magnetic, seismic reflection/refraction, electromagnetic and ground penetrating radar surveys. Case history analysis of environmental and geotechnical problems.

EOSC 428	Field Techniques in Groundwater Hydrology	Hydraulic head measurements, water-quality sampling, pump and slug testing, infiltration measurements, profiling techniques. Held over five days after spring term at the Richmond groundwater hydrology field-school site. Enrolment limitations.
EOSC 429	Groundwater Contamination	Contaminant transport processes in groundwater flow systems; aqueous and multiphase transport; mathematical models describing migration and chemical evolution of contaminant plumes; case studies.
EOSC 470	Biological Oceanography	A quantitative examination of processes regulating the abundance, distribution and production of phytoplankton, zooplankton, microbes and fish. Controls of primary and secondary production, ecosystem dynamics and food webs.
EOSC 474	Marine Pollution	An interdisciplinary study of pollution, with examples drawn from coastal and oceanic environments, including areas of local interest. Intended for third- and fourth-year students with a background in the sciences.
EOSC 478	Introduction to Fisheries Science	An introduction to the ecology and management of freshwater and marine fisheries. Topics include: population dynamics, species interactions, communities, environmental influences, stock assessment, economics and sociology of fisheries. Laboratories will consist of numerical analyses and simulations.
FRE 374	Land and Resource Economics	Willingness to pay, opportunity costs, externalities, and market failures in natural resource markets; dynamic efficiency; economic applications including mineral, marine, forest, land, water, and biodiversity.
FRE 385	Quantitative Methods for Business and Resource Management	Spreadsheet modeling and analysis of business and resource management problems: decision analysis, forecasting, linear programming, simulation modeling, and inventory management.
FRE 420	The Economics of International Trade and the Environment	Market failure and gains from trade in the presence of natural resource externalities; the multilateral trading system and the environment; case studies in trade-related environmental impacts.

FRE 490	Current Issues in Food and Resource Economics	N/A
FRST 100	Sustainable Forests	An overview of forests and forestry. Survey of the disciplines, areas of study, and values that frame sustainable management of forests in BC and the world. Assignments focus on critical thinking and written communication skills.
FRST 201	Forest Ecology	The structure and function of forest ecosystems, including: energetics; productivity; nutrient, carbon and water cycling; soils; the physical environment; population and community ecology; disturbance ecology; ecological succession; biological diversity and ecological resilience.
FRST 303	Principles of Forest Science	Introduction to growth of trees and forests with emphasis on evolutionary, ecological and environmental aspects.
FRST 305	Silviculture	Silviculture concepts and principles; stand dynamics; artificial and natural regeneration; cultural techniques for forest stand establishment and stand tending; silvicultural systems; decision making and development of prescriptions; connections to forest planning.
FRST 307	Biotic Disturbances	Concepts of disturbance ecology with special reference to insects and diseases in the forests of British Columbia; forest health problems in the biogeoclimatic zones of BC; present management strategies and future potentials in a scenario of climate change.
FRST 320	Abiotic Disturbances: Fire and Climate	Ecological effects of fire and climatic (wind, temperature, and snow) disturbances; fire danger rating, principles of fire management and prescribed fire use; windthrow risk modelling and management.
FRST 421	Quantitative Forest Management	Introduction to the quantitative tools necessary in forest management. Available only through Distance Education.
FRST 439	International Forestry	The socio-economic, biological and technological aspects of forestry within the international frame, in both the developed and developing world. Regional studies and the role of national and international agencies.

FRST 444	Agroforestry	Integration of farms and forests, including tropical agroforestry systems, non-timber forest products, forest farming, woodlot management, silvopastoralism, riparian buffers, windbreaks, soil fertility improvement and nutrient cycling.
FRST 512	Belowground Forest Ecosystems	Review of current literature on specific topics in forest soil ecology, including bacterial endophytes, microbial diversity, nutrient cycling, and mycorrhizae.
FRST 588	Fluvial Ecohydrology	Hydrology, geomorphology and ecology of streams and their catchments; significance of stream processes within the fluvial network; management issues, particularly in the context of forest harvesting.
GEOB 200	Atmospheric Environments	Physical principles underlying weather and climates. Thermal, moisture and wind climates from the scale of plants and animals to the globe. Daily weather systems and climate change.
GEOB 207	Introduction to Biogeography	Geographical ecology emphasizing plant distributions, abiotic-biotic interactions, effects of disturbance, succession, and human impacts across scales. Labs and field trips examine a local site.
GEOB 270	Geographic Information Science	Computer-based graphical methods of data input and analysis. Emphasis on data visualization techniques such as cartographic modelling and exploratory data analysis.
GEOB 305	Introduction to Hydrology	Principles of hydrology at site, watershed, and larger regional scales. Introduction to techniques of measurement and analysis. Emphasizes surface water hydrology of western North America.
GEOB 307	Biogeography and Global Change	Biogeographic concepts in understanding responses in ecosystems to environmental change at global, regional, and local scales. Conservation issues such as the loss of biodiversity and endangered species.
GEOB 370	Advanced Geographic Information Science	Theoretical and practical aspects of Geographic Information Systems, including cartographic modelling, digital terrain models, management issues, and spatial interpolation.

GEOB 373	Introductory Remote Sensing	Aerial photography; measurement from aerial photographs; photo-interpretation in geographic analysis; remote sensing of the earth's surface and atmosphere.
GEOG 310	Environment and Sustainability	Concepts of environment, resources and sustainability; the roles of physical and human geography in understanding the interaction of humans and the environment; introduction to management of environment-resource systems.
GEOG 311	Urban Environments	The impact of urban development on the natural environment and vice versa. Study of the ecology and metabolism of cities and green urban design, using global and local case studies.
GEOG 312	Climate Change: Science and Society	Climates over the geological, historical and instrument periods. Theories of climatic change. Monitoring and modelling the climate system. Impacts of change on environmental and socio-economic systems.
GEOG 316	Geography of Natural Hazards	The role of geophysical events, human ecology, environmental perception, world social and political order in explaining the risk of natural disasters. Assessment of acceptable risk, disaster relief and reconstruction and contrasts between developed and developing nations.
GEOG 318	Sustainability in a Changing Environment	Biophysical and human causes of short- and long-term environmental change at various spatial scales, including measurement, interpretation, and policy.
GEOG 319	Environmental Impact Assessment	The principles, implementation, and role of environmental impact assessment in environmental management, in Canada and internationally.
GEOG 357	Introduction to Social Geography	The development of social and behavioural geography, focusing on how places, landscapes, and environments both reflect and shape social life.
GEOG 361	Introduction to Economic Geography	History and methods of economic geography. Location of resource industries, manufacturing, and service activities with emphasis on British Columbia in its North American and world setting. Recommended for students with no

		previous exposure to Economic Geography, before taking other courses in the 36x and 46x series.
GEOG 410	Environment and Society	Geographical analysis of society-environment relations. Relates resource management to environmental politics, political economy, and sustainable development. Perspectives drawn from political ecology and political economy, environmental history and environmental philosophy.
GEOG 412	Water Management: Theory, Policy, and Practice.	Interdisciplinary analysis of critical water issues, in Canada and internationally. Focus on social science perspectives. Emphasis on presentation, research, and essay-writing skills.
GEOG 419	Research in Environmental Geography	Details available from Geography Undergraduate Advisor. Not necessarily offered each year.
GEOG 423	Development of Environmental Thought	An examination of how attitudes toward human nature and non-human nature have changed from Mesolithic times to the present in Western society.
GEOG 497	The Arctic	Physical and biological characteristics of the circumpolar Arctic, emphasizing terrestrial environments and the impacts on and by humans, including: glacial history; climatology; biogeography/ecology of arctic tundra; human-environment interactions, settlement and exploration; and current environmental, social and economic problems.
HGSE 352	First Nations Governance and Natural Resource Management	The political, economic, and legal environment of Aboriginal-Canadian relations and its influence on resource use and management; review of historic relationships, emerging case law, and new reconciliation frameworks. A core element of the Haida Gwaii Semester.
HGSE 353	Rainforest Ecology and Management	Ecology of the temperate rainforests of Haida Gwaii. A core element of the Haida Gwaii Semester.
HGSE 355	Applied Ecology of Coastal Terrestrial	Processes that shape coastal terrestrial ecosystems through time and applications to current ecological

	Ecosystems	reality. Part of the Haida Gwaii Fall Semester.
HGSE 357	Ecology and Management of Island Wildlife	Unique biological attributes of island wildlife, such as subspecies, isolated populations, and distinct evolutionary pathways, with a focus on endemic species on Haida Gwaii. Part of the Haida Gwaii Fall Semester.
HGSE 358	Systems Thinking for Resource Management	Introduction to systems thinking and resilience to understand dynamics of social change and innovation; use of case studies to demonstrate applications of different types of ecological knowledge, including traditional knowledge and experiential knowledge. Part of the Haida Gwaii Fall Semester.
HIST 106	Global Environmental History	The impact humans have had on the environment, and the ways in which the physical environment has shaped human history: climate, agriculture, energy use, and urbanization.
LAW 323D	International Environmental	Customary international law and treaties relating to the environment; institutional structures. Not offered each year, consult Faculty.
LAW 387	Environmental Law	A foundation course dealing with the regulatory and policy framework for the protection of the environment in Canada, such as pollution control and biodiversity conservation.
LAW 391D	Topics in Environmental Law	N/A
LAW 392	Natural Resources Law	A foundation course dealing with legal problems common to the management of natural resources such as fisheries, mines and minerals, petroleum, forests, and water resources.
POLI 351	Environmental Politics and Policy	Domestic and international determinants of environmental policy; alternative approaches to environmental protection. The sustainable development paradigm; public opinion and interest group pressures; risk assessment; mandatory, voluntary and market-based policy instruments.

SOCI 360	Sociology and Natural Resources	Sociological perspectives on property, resource industries (such as agriculture, fishing, forestry and mining), resource development, and resource communities. May also include examination of social aspects of resource development in the Third World.
SOCI 420	Sociology of the Environment	Sociological approaches to the study of environmental conflicts, issues, movements, impact of changing technology, economic development on the environment.

Previously available courses (may be available again in the future):

AGRO 490 Topics in Applied Biology

ANTH 462 Special Topics in Ecological Anthropology

APBI 290 Introductory Topics in Applied Biology

APBI 420 Greenhouse Horticulture Systems

APBI 440 Plant Genomics

APBI 442 Forest Soils

APBI 495 Principles of Wildlife Management in Forests and Agricultural Environments

APSC 261 Technology and Society I

BASD 501\*\* Corporate Social Responsibility

BASD 502\*\* Case Studies in Global Environmental Issues

BIOL 302 Community and Ecosystem Biology

BIOL 303 Population Biology

BIOL 304 Fundamentals of Ecology

BIOL 305 Introduction to Biological and Geological Oceanography

BIOL 345 Human Ecology

BIOL 403 Biological Oceanographic Methods

BIOL 407 Plant Ecology II

CIVL 200 Engineering and Sustainable Development

ENVR 430 Ecological Dimensions of Sustainability

ENVR 440 Analytical Methods in Sustainability Science

EOSC 311 The Earth and its Resources

EOSC 312 The Earth System and Environmental Evolution

EOSC 370 Introduction to Physical and Chemical Oceanography

EOSC 371 Introduction to Biological and Geological Oceanography

EOSC 431 Groundwater Remediation

EOSC 475 Marine Microbiology

EOSC 476 Estuaries

FRST 405 Forest Ecosystems

FRST 413 Ecological Plant Biochemistry

FRST 420 Forest Environmental Management

FRST 520\*\* Land and Forest Resource Economics

GEOG 101 Introduction to Physical Geography

GEOG 102 Introduction to Physical Geography: Air and Water

GEOG 103 Introduction to Physical Geography: Landforms and Vegetation

GEOG 200 Atmospheric Environments

GEOG 204 Forest and Agricultural Climatology (Equivalent: SOIL 204)

GEOG 205 Introduction to Hydrology

GEOG 207 Introduction to Biogeography

GEOG 300 Microscale Weather and Climate

GEOG 306 Principles of Geomorphology

GEOG 308 Quaternary and Applied Geomorphology

GEOG 315 Environmental Inventory and Classification

GEOG 402 Air Pollution Meteorology

GEOG 411 Environment and Empire

LAW 318 Marine Resources Law

LAW 388 Environmental Law in Practice

LAW 389 Selected Issues in Environmental Law and Policy

RMES 517\*\* Agricultural Watershed Management

\*\* Undergraduate students are sometimes able to take graduate level courses with special permission. Please ask.

**Other graduate courses might be available if student meets eligibility**

[https://www.grad.ubc.ca/sites/default/files/forms/enrolment\\_undergraduate.pdf](https://www.grad.ubc.ca/sites/default/files/forms/enrolment_undergraduate.pdf)

Can't find what you want?

Every year, there are different student directed seminars offered on various topics. If there is none for your very specific interests, you can make your own course! For more information, please see:

<https://students.ubc.ca/enrolment/courses/student-directed-seminars>