Sustainability Related Course List

Faculty	Department	Course Name	Course Number	Course Description	Sustainability Related	Environ-mental	Econo-mic	Social
Arts	African Studies	Introduction to African Studies	301	An interdisciplinary perspective on the people and ecologies of the African continent. The major theme will be the processes and effects of social, religious, political, economic, historical and cultural change on the lives of Africans.	x		x	x
Arts	African Studies	Seminar	501	Study of a particular topic(s) or region(s) from an interdisciplinary and comparative perspective. Students will be required to examine how political, social, economic and cultural factors intersect to shape various issues in the African setting.	x		x	x
Arts	Anthropology	Contemorary Aboriginal Issues in Canada	213	An exploration of the history of Aboriginal/state relations, the development of Indian policy, and current efforts of Aboriginal peoples to address historical matters through the critique of the residential school system and the pursuit of self government, land claims, modern treaties and Aboriginal rights. Includes a critical examination of Canadian historical writing, popular culture, and stereotypes of Indians and will survey contemporary Aboriginal expressions of identity in the arts, literature, cultural performances, and other public contexts.	x	x		x
Arts	Anthropology	Anthropology of HIV/AIDS	349	Examines the individual, clinical, epidemiological, cultural, social, psychological, political, economic, and public policy dimensions of HIV/AIDS along with its meaning and importance on a global level from an anthropological perspective.	x		x	x
Arts	Anthropology	Nutritional Anthropology	589	The study of human dietary practices from biological and cultural perspectives. Subjects covered include the development of nutritional anthropology, principles of nutrition, principles of ecology, diet from an evolutionary, comparative and historic perspective, the impact of undernutrition on human physiology, and behaviour and methods in nutritional anthropology.	x	X		X
Arts	Anthropology	Introduction to Social and Cultural Anthropology	203	The nature of human society: its elements, its variability and its perpetuation. Conclusions will be drawn from comparisons of institutions (political, economic, religious, educational and sexual) in both small-scale and large-scale societies.	x		x	x
Arts	Anthropology	Ecology of Tropical Forest Societies	405	Adaptation of indigenous societies to their tropical forest habitat, and their transformation under the impact of industrial society.	x	x		x
Arts	Anthropology	Topics in Primate Behavioural Ecology and Conservation	451	Advanced topics in the behavioural ecology and conservation biology of nonhuman primates, including related theory and field techniques	x			
Arts	Anthropology	Housing and Society	479	Examines interactions between housing and social organization in cross-cultural context. Emphasizes the varied types of built form, their cultural meanings, implications for social life within households and for society more broadly, and their political and economic consequences. Pays particular attention to contemporary housing problems such as homelessness and urban sprawl.	x		x	x
Arts	Anthropology	Human Ecological Systems	523	The development of human ecology, its current directions and application of analytical techniques as they apply to anthropology, archaeology and geography.	x			x
Arts	Archaeology	Archaeology of the Ancient Puebloan Southwest	317	Survey of the puebloan archaeology of southwestern North America and their pre-puebloan ancestors. Topics include changes in hunter-gatherer mobility and economy, the rise of agriculture in the American Southwest, the rise of integrative communities and religious belief systems, as well as responses to violence, disease, climate change, and the immigration of non-Puebloan outsiders.	x	x		x
Arts	Archaeology	African Complex Societies	439	Ancient African complex societies with an emphasis on state development south of the Sahara. Topics include why these states developed, their participation in internal and international systems of exchange, technological developments, belief systems that supported power structures, and the reasons for their collapse. Time period covered is from the rise of the ancient state of Egypt to the colonial period.	x		X	X
Arts	Archaeology	Gender in Prehistory	503	The theoretical background for feminist archaeology and some of the important advances in Old and New World gender studies. Topics include the relationship of gender hierarchy to the rise of the state; contrasts between the ideological representation of gender and culture practice; and an overarching theme of critical analysis relating the present to the past.	x			X
Arts	Archaeology	Human Ecological Systems	523	The development of human ecology, its current directions and application of analytical techniques as they apply to anthropology, archaeology and geography.	x	x		x
Arts	Archaeology	Landscape Archaeology	591	Human perceptions and uses of the ecophysical and cultural environment. How societies humanize their environment by naming places, identifying resources, establishing paths, modifying and replicating the natural landscape thereby creating a tradition of land use that can be accessed archaeologically.	x	x		x
Arts	Archaeology	Stable Isotope Methods in Archeology	639	Methods and aspplications of stable isotope analysis to archaeological research. Topics to be covered include the use of light stable isotopes to determine past and present diet, the use of stable isotopes to document residence and migration, analysis of stable carbon isotopes in soils, stable isotope ecology for environmental reconstruction and paleoclimate studies.	x	x		
Arts	Art	Selected Topics in Developmental Art	411	Possible topics include, but are not limited to: Multiculturalism and Art Education, Creativity and Art Education, Developmental Issues in Art Education, Art Education with Special Needs Learners.	x			x

Arts	Canadian Studies	Development of the Canadian North	309	Deals with a number of topics relating to the development and habitation of the Canadian north, including history, government, resources, transportation, communication, environmental design, recreation and culture.	x	x	x	x
Arts	Canadian Studies	Gender, Race and Ethnicity in Canada	361	An interdisciplinary introduction to gender, race and ethnicity in Canada to provide an understanding of race, ethnicity and gender as simultaneous and intersecting systems of relationship and meaning.	x			x
Arts	Canadian Studies	The Metis People of Canada	419	An interdisciplinary study of the Metis people of Canada, with special emphasis on the social, economic, and political factors influencing their emergence and continued survival as a distinct indigenous group in Canada.	x			x
Arts	Communications	Food Culture and Communication	477	A theoretical and experiential introduction to food cultures as processes and products of communication. Students will examine how food is constructed and represented through text, film, television, art, and tourism. Political and economic constructions of food culture, security, and sustainability will also be explored.	x		x	x
Arts	Culture and Society	Culture and Society	605	Critical historical processes of development within a global context, competing theoretical and methodological paradigms for evaluating those processes, and their implications for the praxis of development in both the Global North and South.	x			x
Arts	Development Studies	Introduction to Development Studies	201	An interdisciplinary course focusing on development in both a northern and international context. Explores factors that shape development process; introduces concepts and issues such as poverty; colonialism and self-determination; human ecology and sustainable development; and appropriate technology. Examines the orgins, purposes, and performance of contemporary national and international institutions and their effect on people in different geographical and socio-economic contexts.	x	x	x	x
Arts	Development Studies	Field School	400	A field course for the on-site interdisciplinary study of a country or region with regard to issues of development from variety of perspectives, e.g., cultural, economic, environmental, geographical, historical and political perspectives.	x	x	x	x
Arts	Development Studies	Sustainability and Human Ecology in the Circumpolar Arctic	403	The history of northern development and resource management in Canada with emphasis on specific case studies involving sustainability and human ecology in the Circumpolar Arctic. The role of traditional environmental knowledge and its significance to northern development will be examined. Participatory research methodologies may be introduced.	x	x	x	x
Arts	Development Studies	Gender and Development	375	Examines development from the critical perspective of the key role played by gender in development. Case studies from Canadian and international contexts will provide illustrative material for analyzing the issues that emanate from the gendered nature of development processes and practices.	x			x
Arts	East Asian Studies	Understanding Contemporary East Asia	201	An introductory exploration of the contemporary cultures of China, Japan, and Korea that outlines their shared characteristics as well as highlighting their differences. Subjects covered include physical environment, history, philosophy, social and political order, economy, and arts	x	x	x	x
Arts	Economics	The North American Oil Industry	325	An introduction to the crude oil industry in North America, focusing on exploration, development, and production. Topics include Canadian and US oil policies, environmental policy, industry taxation, and royalty regimes.	x	x	x	
Arts	Economics	Development Economics	337	An introduction to developing economies: the meaning, significance and purpose of economic development, major theories of economic development, economic problems of developing countries.	x		x	x
Arts	Economics	Canadian Economic Development	339	The growth and development of the Canadian economy in relation to the endowment of natural resources, changing market conditions and technology, and Canadian public policy.	x	x	x	x
Arts	Economics	The Economics of Social Problems	349	Contribution that economic analysis can make to the understanding of selected current social issues such as poverty, aging, crime, drug abuse and discrimination.	x		x	x
Arts	Economics	Economics and the Environment	377	An introduction to the analysis of environmental problems from an economic perspective. Issues such as air and water quality, biodiversity and endangered species will be addressed from local as well as global views.	x	x	x	
Arts	Economics	International Trade	425	The general equilibrium treatment of the gains from trade, comparative advantage and trade patterns provides a basis for examining topics such as: trade policy under imperfect competition, trade policy and the environment, trade policy and economic growth, and preferential trading arrangements.	x	x	x	
Arts	Economics	Energy Economics and Policy	427	Microeconomic analysis of the allocation of energy resources with a focus on policy issues including the environment, OPEC, national security, price and entry regulation, market design, and the potential for new energy sources.	x	x	x	
Arts	Economics	Water Resource Economics and Policy	473	Selected economic issues in water resource use in Canada and other countries, including policies toward, and management of, water allocation, water quality, and the value of water for ecosystem services.	x	x	x	x
Arts	Economics	Economics of Natural Resources	475	Application of economic theory to the problems of natural resource pricing, allocation and conservation. Rent theory, location theory, intertemporal maximization. Natural resource policy formulation. Contemporary Canadian resource problems.	x	x	x	
Arts	Economics	Environmental Economics	487	This course applies microeconomic theory to the examination of market failures as the source of environmental problems, and to designing and evaluating environmental policies to correct them.	x	x	x	
Arts	Economics	Economic Growth	537	This is an advanced course in Macroeconomics which explores why some countries are rich and others are poor.	x		x	x

Arts	Economics	Economics of International Commercial Policy	619	Examines important longstanding as well as contemporary issues from the economic literature on international trade. This course focuses on quantitative and empirical analysis. Specific topics typically covered are the factor content of trade, firm level and multinational behaviour, empirical testing of political economy determinants of protection, and assessing the environmental impact of trade agreements.	x	x	x	
Arts	Economics	Institutions and Growth	643	A focus on how institutions influence macroeconomic outcomes. The main objective is to understand the role of economic, social and political institutions in economic backwardness and development.	x		x	x
Arts	Economics	Topics on Institutions and Economic Performance	645	A focus on the role of economic, social and political institutions in economic backwardness and development.	x		x	x
Arts	Economics	Redistribution and Social Insurance	651	A focus on the role of economic, social and political institutions in economic backwardness and development.	x		x	x
Arts	Economics	Public Revenue Analysis	653	A focus on the revenue side of public finance, primarily in the form of taxation. The equity and efficiency aspects of different taxes are considered, as is optimal tax design. Possible topics include the taxation of labour and capital, the impact taxation on savings and risk taking, and environmental and resource taxation.	x	x	x	
Arts	Economics	Advanced Topics in Natural Resource Economics	675	Examines economic models of the structure and nature of natural resource industries and their interaction with the rest of the economy. Studied are non-renewable and renewable resources and applies methods from capital theory, growth theory, public economics, and industrial organization to the study of natural resources.	x	x	x	
Arts	Economics	Seminar in Economics of the Environment	677	Environmental economics describes the ways in which people interact with their natural environment and the policies that best achieve society's goals in this context. Topics vary from year to year and may include benefit-cost analysis, non-market valuation, choice of policy instruments, economic growth and the environment, biodiversity, global warming and international environmental treaties.	x	x	x	x
Arts	Fine Arts	Creativity	203	This course focuses on the practices and processes of creativity. As such, attendance at arts events is mandatory. In all cases, the instructor will arrange to find discounted ticket pricing and will select events that are as accessible as possible. Current thinking tells us that creativity may well be the most important human element for our future. From the economy to the environment from politics to entertainment creativity is an endlessly renewable resource that offers benefits for all citizens. As such, students from across all disciplines are invited to explore the ways in which creativity can help to enrich their public and private lives.	x	x	x	x
Arts	Geography	Gateway to Geography	205	An overview of human and physical environments, their inter-relationships and their relevance to environmental issues and world affairs. Major topics are drawn from current global issues where location matters. Specific examples are discussed in a global context and vary by term.	x	x		
Arts	Geography	The Physical Environment	211	Introduction to the physical elements of the environment such as weather, climate, hydrology, landforms, soils, vegetation, and the processes producing variations of these elements on the surface of the earth. The social implications of environmental change, disasters, and hazards are emphasized.	x	x		x
Arts	Geography	Geography of World Affairs	213	Focuses on the major culture regions of the world and also individual countries. Emphasis on the characteristics, distribution, inter-relationships and comparisons of the major culture and physical phenomena of these areas, i.e. population, political situation, economy, language, religion and environment. Some historical developments in each of the areas are presented for perspective, but the major emphasis is on the background for understanding contemporary world affairs.	x	x	x	x
Arts	Geography	The Human Environment	251	The study of people, their origins, culture, technology, economy and impact on the environment. The manner in which people attempt to impose order upon the surface of the earth. Concepts of relative location are introduced with particular regard to both the external orientation and the internal organization of urban areas.	x	x	x	x
Arts	Geography	Natural Events and Human Disasters	311	Explores how various Earth processes create hazards for humans in different regions. Topics include but are not limited to: earthquakes, volcanic eruptions, tsunami, floods, landslides, hurricanes, drought, famine and disease. Lectures will focus on: (1) the causes of dangerous natural events, (2) how the physical geography of a region affects its vulnerability, (3) historic human impacts, and (4) how people in different regions perceive and mitigate risk from these events.	x	x		x
Arts	Geography	Qualitative Methods in Human-Environmental Research	340	Introduction to qualitative research methods and research design in human geography and environmental geography.	x	x		x
Arts	Geography	Sub-Saharan Africa	377	Dimensions and underlying causes of issues facing African peoples: the colonial legacy, fragile environment, cultural and political diversity, population growth, resource development, urbanization, and economic challenges.	x	x	x	x
Arts	Geography	Fluvial Geomorphology	411	Contemporary theory in fluvial geomorphology. Topics include channel flow, sediment transport, stream morphology, channel pattern, channel networks, sedimentation and channel response to human and natural environmental change.	x	x		

Arts	Geography	Biogeography and Natural Ecosystems	417	A multidisciplinary area of contemporary science that examines the distribution (past and present) of animals and plants, on land, in the sea, or in air and the inherent causes of variation in species types, abundance, and survival across the globe. The discipline forms a critical link between the earth sciences (geology and geography) and life sciences (biology).	x	x		
Arts	Geography	Renewable Resources and Natural Environments	421	Geographical resources analysis and management approaches applied to resource sectors such as urban natural areas, wilderness parks and reserves, freshwater resources and fisheries.	x	x	x	x
Arts	Geography	Tourism, Recreation and Environmental Management	429	Dimensions of, approaches to, and issues in recreation and environmental management; planning for sustainable tourism; cultural and heritage tourism; adventure and eco-tourism; and other representative tourism and recreational activities and environments. Case studies emphasize assessment and monitoring, policy initiatives and decision-making, and other practical orientations.	x	x		x
Arts	Geography	Geographic Information Systems II	457	The role of Geographic Information Systems in environmental (physical-human interactions) research and management is explored both theoretically and practically. Topics will relate to major issues within the environmental/earth sciences field. Advanced analytical approaches will be critically examined within lecture and laboratories. A major GIS package will be used for laboratories and student projects.	x	x		x
Arts	Geography	Cities, Poverty and Development	463	Analysis of the explosive growth and geographical character of Third World cities. Topics normally include: rural-urban migration, development theory and urbanization, housing, formal/informal labour market, service and food provision, social and political conflict. Case studies from Latin America, Asia and Africa.	x		x	x
Arts	Geography	Climate Change	503	Overview of global climate dynamics and the interactions between ocean, atmosphere, biosphere, cryosphere, and biogeochemical cycles. Examination of climate change in Earth's past, present, and future, scrutinizing both natural and anthropogenic influences on the global climate system.	x	x	x	
Arts	Geography	Ecohydrology	516	Linkages between physical, chemical and biological processes influencing hydrology in headwater catchments. Application of process based knowledge to problems of water quality management and ecosystem reclamation.	x	x		
Arts	Geography	Conservation	517	Applies advanced geospatial analysis techniques to predictive modelling with a specific focus on conservation. Wildlife species, habitat selection, and consequences of human alteration of landscapes are the entry point to understanding and evaluating the geospatial approaches used, and the techniques may be extended to any spatial phenomena. Students will learn to apply a variety of statistics (e.g. chi-square, logistic regression) and to critically evaluate their analytical approaches within a context of environmental conservation.	x	x		
Arts	Geography	Landscape Ecology	519	Concepts and methods for examining the spatial pattern of natural and managed landscapes and their effects on ecological processes. Applications in land management and biological conservation will also be considered.	x	x		
Arts	Geography	Human Ecological Systems	523	The development of human ecology, its current directions and application of analytical techniques as they apply to anthropology, archaeology and geography.	x	x		x
Arts	Geography	The Politics of Environment: Policy and Political Ecology	525	Key issues in environmental policy, focusing on the power and interest mechanisms that determine environmental resource access and sustainable use. Case-specific applications explore the dynamic roles of the global and the local including international development paradigms, indigenous resource rights, common-pool resource management, powerful policy networks, and local communities struggling in between.	x	x		x
Arts	Geography	Globalization and the City	553	Introduction to the economic, political and cultural forces operating on a global scale that increasingly shape the growth and development of cities. Emphasis is placed on the dynamics of growth, competition, and polarization that structure urban hierarchies as well as cities' internal social and economic geographies.	x		x	x
Arts	Geography	Urban Political Geography	565	An examination of how urban spatial relations shape, and are shaped by, political institutions, organizations, and social movements.	x		x	x
Arts	Geography	The Geography of HIV/AIDS	575	This course will explore the global geography of HIV/AIDS with a concentration on the African and Asian pandemics. Topics will include: epidemiology and epidemic roots, social and economic impacts, orphans and vulnerable children, food security and migration, gendered impacts, anti-retroviral therapy (ART) programs and global responses.	x			x
Arts	Geography	Spatial Ecology	619	Applies the principles of landscape ecology and conservation biology to the study of spatial effects on individual species and on the structure, dynamics, diversity and stability of multi-species communities. The use of GIS and remote sensing technologies is a central theme. Topics include habitat fragmentation, metapopulation analysis and viability, wildlife habitat modelling (static and dynamic), management of endangered species, and spatial decision support. Other aspects of this course include the importance and use of indicator, umbrella, keystone and flagship species in conservation.	x	x		

Arts	History	African History	309	History of Africa with special reference to economic, social and political developments. Topics include society and the natural environment; migration of peoples, ideas and religions; trading networks; the impact of the slave trade; African reactions to European rule; nationalism and the road to independence.	x	x	x	x
Arts	History	English Legal History	474	The common, canon, and international law in England from medieval to modern times. Topics include the development and application of legal doctrine; the evolution of courts and the constitution; and English contributions to theories of international law. Attention is given to the relationship between law and social, economic, and political issues.	x		x	x
Arts	History	Brazilian History since 1500	487	Economic development, political institutions, social and cultural trends, and the interaction between men and women and the environment	x	x	x	x
Arts	History	Canadian Environmental History	437	Historical development of Canadian attitudes towards nature, from the First Nations and the first European settlers to the present day.	x	x		x
Arts	Latin American Studies	Critical Contemporary Issues in Latin America	311	An analysis of critical issues that provides students with a framework for understanding Latin America today. Examines themes of contemporary importance, which may include human rights, indigenous issues, energy, the environment, democratization, poverty and inequality, social movements, migration, and the region's relationship with the United States.	x	x	x	x
Arts	Philosophy	Issues in Environmental Ethics	345	A philosophical examination of selected issues concerning how human beings ought to conduct themselves in relation to other living species and the natural environment. Topics may include: obligations to future generations; animal liberation theories; population policy; pollution; the value of species diversity and species preservation; biocentric and holistic ethical theories of environment; ethical dimension of environmental policy formation.	x	x		x
Arts	Political Science	Issues and Trends in World Politics	283	Major trends and issues in world politics, such as international tensions, migration, ethnic conflicts, human rights and sustainable development.	x	x	x	x
Arts	Political Science	Governments and Politics of Africa	371	Political institutions of selected African states. The influence of class and tribal structure; political parties; elections, the source and nature of ideologies; and economic and social policies.	x		x	x
Arts	Political Science	Canada-United States Relations	437	Roles of the respective governments in the various facets (political, strategic, economic, and socio-cultural) of the relationship between the two countries will be examined.	x		x	x
Arts	Political Science	Comparative Public Policy	447	An examination of a range of public policy issues from a comparative perspective. Topics include social policy, family policy, immigration and multiculturalism, and environmental policy across the advanced industrialized democracies.	x	x		x
Arts	Political Science	International Ethics	587	An examination of ethical reasoning and moral norms in political decision making, institutions, and processes in international politics. Topics such as justice in relation to war and terrorism, sovereignty, intervention and human rights, globalization and global poverty, and the environment may be analysed.	x	x		x
Arts	Psychology	Environmental Psychology	427	The theory and data pertaining to the relationship between human behaviour and the physical environment, both natural and built. Particular emphasis is placed on the implications of current knowledge for the management of the human-environment interface. A research project is an integral part of the course.	x	x		x
Arts	Religious Studies	Religion and the Environment	398	Consideration of issues of public environmental concern from the perspectives of religious studies and ethics. Possible topics include climate change, water depletion, environmental pollution, animal stresses, species/ecosystem decimation, and the climate refugee problem.	x	x		x
Arts	Sociology	The Sociology of Work	393	A sociological analysis of the nature and meaning of work; economic, social, cultural and institutional factors associated with work; the effects of changing technology on work in industrial and post-industrial societies.	x		x	x
Arts	Urban Studies	The Transit City	461	An exploration of the relationships among public transit, urban form, and land use planning and policy in the context of challenges such as climate change, energy shortages, widespread urbanization and traffic congestion.	x	x	x	x
Education	Educational Research	Issues in Educational Management	619.1	This course is designed to provide students with the opportunity to explore current issues in educational management from a range of perspectives. Students will be engaging in discussions which will promote critical thought about the diverse nature of educational management and theoretical principles related to this field. Students will be encouraged to apply their knowledge in exploring the educational management and leadership issues within their own contexts or to those in which they are interested. (Topic 1 - Sustainability for Schools and Leaders)	X		X	X
Environmental Design	Environmental Design	Introduction to Environmental Design	401	An examination of the central concepts of environmental design, delivered in an online format. Topics include: the natural, built and human environments, and interdisciplinary issues.	x	x		x
Environmental Design	Environmental Design	Special Topics in Environmental Design	583	Thematic inquiry and design related to urban design, architecture, environmental science, industrial design and planning.	x	x		x
Environmental Design	Environmental Design	Special Topics in Environmental Design	597	Thematic inquiry and design related to urban design, architecture, environmental science, industrial design and planning.	x	x		x
Environmental Design	Environmental Design	Intro to Design Thinking	603		x			

Environmental Design	Environmental Design	Geographic Information Systems for Environmental Design	611	Introduction to the use of GIS in urban planning and environmental management. Discussions on GIS modelling focus on population projection, location theory, land use modelling and environmental and ecological management. Case studies from both the public and private sector provide the basis of assignments. Emphasis given to developing sensitivity to the application appropriate for specific GIS problems.	x	x		x
Environmental Design	Environmental Design	Urban Transportation, Infrastructure and Land Use	616	Acquaints students with the key infrastructure systems of a city. Examines current policies, standards and practices, challenges, and innovations in the following infrastructure sectors: transportation, water and waste management, open space, energy and communication. Discusses the relationship between infrastructure systems and land use, and impacts on quality of life, economic development, spatial structure, and the environment. Emphasis is given to green infrastructure development. The course also examines various financial and institutional frameworks for delivering infrastructure systems, and how they vary across different contexts.	x	x	x	x
Environmental Design	Environmental Design	Urban Design Studio	618	This studio aims to further develop skills in conceptualization and visualization through consideration of contemporary urban design issues. It includes documentation and analysis of urban form and process, and explores site planning and design of the public realm. Issues of local and regional identity and sustainability inform the approach of the studio. Development of a portfolio will be a requirement of the course.	x			x
Environmental Design	Environmental Design	Health in the Built Environment	621		x			
Environmental Design	Environmental Design	Housing, Neighbourhood Change and Equity	628	Recent developments in Canadian Cities have indicated a need for planners and other urban professionals concerned with the provision of affordable housing in the context of urban growth management. This course provides both theoretical understanding and practical insights into these issues through assessment of the social, economic, and spatial aspects of neighbourhood change. Practical work focuses on inner city neighbourhoods and planning strategies for unique transformation of brownfield sites, intensification, regeneration without displacement and building of sustainable and diverse communities.	x		x	x
Environmental Design	Environmental Design	Field Studies	643	Introduction to the architecture, urban landscape, planning issues, design culture and other relevant faculty topics in an international setting. Specific destination and itinerary in any given year are dependent on availability and interest. Through a week long field trip students will learn about the built and natural environment of the selected city and its context.	x	x		x
Environmental Design	Environmental Design	Urban Design Theory	671		x			
Environmental Design	Environmental Design	Urban Systems (Barcelona Studies)	675	Provides a general overview of Barcelona's urban history, development and planning traditions. Lectures and field studies give a chronological overview of the city's urban, architectural and design history and the inter-relation to political programs, economic and strategic planning as well as cultural nationalism. From the Barcelona case the course will extract a number of more general issues about contemporary cities for debate.	x	x	x	x
Environmental Design	Environmental Design	Transboundary Environmental Issues (EVDB)	683.32		x			
Environmental Design	Environmental Design	Sustainable Cities Block Course	683.74		x			
Environmental Design	Environmental Design	Interdisciplinary Intervention in Environmental Design	723	Interdisciplinary teams will tackle client-based real world environmental design problems. Intervention strategies and design as a problem-solving approach to complex urban, ecological, social, and technological interactions will be addressed.	x	x	x	x
Environmental Design	Environmental Design	Solar Decathon Design Development	783.2		x			
Environmental Design	Environmental Design	Directed Studied - Low Impact Development - Watersheds	783.91		x			
Environmental Design	Environmental Design	DIrected Study - Conservation Design	783.92		x			
Environmental Design	Environmental Design	Directed Study - Multi-Platform Dialogue on City Issues	785.3		x			
Environmental Design	Environmental Design Architecture	Building Science and Technology I	511		x			
Environmental Design	Environmental Design Architecture	Environmental Control Systems	615	Approaches to the design of heating, cooling, and ventilation systems for buildings. Issues in system design such as energy efficiency and indoor air quality.	x	x	x	
Environmental Design	Environmental Design Architecture	Architectural Lighting Design	617	Fundamentals of light and visual perception. Approaches to the design of non-uniform and uniform lighting systems for buildings. Issues in system design such as human satisfaction and performance and energy efficiency. Development of skills in the selection and design of lighting systems.	x		x	x

Environmental Design	Environmental Design Architecture	Comprehensive Design Studio	682.04		x			
Environmental Design	Environmental Design Architecture	Responsive Architecture	697.7		x			
Environmental Design	Environmental Design Architecture	Agile Architecture	697.73		x			
Environmental Design	Environmental Design Planning	Professional Planning Practice	621	Familiarizes students with the various plans, policies, regulatory processes, legal institutions and administrative frameworks of urban and regional planning. Topics include the Municipal Government Act, the Alberta Land Use Framework, environmental law and various legal planning tools such as Municipal Development Plans, Land Use By-Laws, and Area Structure Plans. Examines municipal development processes related to land use re-designations, development permits, subdivision and appeals.	x	x	x	
Environmental Design	Environmental Design Planning	Regional Planning and Land Use Management	623	History, theory and rationales for regional planning. Conservation planning concepts: ecological assets, goods and services; biodiversity conservation; protected areas and networks. Regional land use planning tools: spatial analysis, environmental assessment, risk assessment, cost/benefit analysis, fiscal assessment, regulatory approaches (zoning), market-based incentives. Application to industrial land use in Alberta.	x	x	x	x
Environmental Design	Environmental Design Planning	Physical Planning and Site Design	625	Introduction to urban design practice. Emphasizes sense of place, human behaviour – built from relationships and environment conservation goals. Formulation of a major physical planning and site design concept and strategy. Skills development in drawing and in utilizing graphic conventions to describe, analyze and interpret urban form and processes.	x	x		x
Environmental Design	Environmental Design Planning	Planning History, Theory, and Ethics	627	An introduction to planning history and theory. Develops a critical awareness of key historical, theoretical, and ethical frameworks; legal, political, and economic institutions; and an understanding of their implications for Canadian planning. Examines the historical evolution of community planning, and its influence on contemporary planning and the built environment. Develops an understanding of decision-making which integrates technical, social, environmental and political factors, and the professional roles of planners in this framework. A normative procedural approach to planning is presented, one which is appropriate for a pluralistic liberal democratic society.	x	x	x	x
Environmental Design	Environmental Design Planning	Advanced Professional Plannng Project	644		x			
Business	Business and Environment	Business Law for Strategic Decision-Makers	395	Business law topics may include: regulatory compliance and environment management, tort and contractual liability, legal issues affecting the strategic management of sole proprietorships, partnerships, corporations and joint ventures, personal liability of corporate directors and officers, intellectual property, advertising and promotion law, consumer protection legislation, legal issues affecting employees and independent contractors, the strategic management of international business, securities law and other current business law issues.	x	x	x	
Business	Business and Environment	Managing Social and Environmental Issues in the Global Market Place	753	Canadian companies operating in the international arena find themselves faced with an increasingly complex array of social and environmental risks that threaten their strategic objectives. This course examines this new class of strategic corporate risks through a review of changes in international sustainable development policy initiatives, changes in communications, the emergence of an environmental and social activist sector, and the interaction of these factors resulting in new international business risk challenges. The course uses lectures, cases, simulations and class discussion of theories and concepts.	x	x	x	x
Business	Energy Management	Energy Risk Management	487	This course provides an overview of key issues related to energy risk management. Some of the key topics to be addressed are: managing pricing risks associated with changing market conditions and deregulation; tools used to manage volatility, including futures and options for energy risk management; environmental risk management, and risk financing for the energy sector.	x	x	x	
Business	Energy Management	International Energy Development	489	This course will focus on international energy development, energy contracts, sustainable development, and the management of environmental and corporate social responsibility issues.	x	x	x	x
Business	Energy Management	Canadian Energy Management and Regulation	301	This is a required course for all science, engineering and business students in energy programs offered by each faculty. This course examines energy development in Canada and the business, law and policy issues arising from the development of different energy sources (oil and gas, coal, nuclear, electricity and alternative energy sources).	x	x	x	
Business	Entrepreneurship and Innovation	Technology and Innovation Management	793	The dynamics of innovation as the primary driving force within firms and modern industrialized economies. Potential concepts are: incremental versus radical innovations, market-pull versus technology-push theories, dominant designs, technological trajectories, key factors for successful innovation. The emergence of new technologies; the importance of national and regional innovation systems; the role of science, regulations and social pressure in innovations dynamics; knowledge management; and implications for firms in rapidly changing industrial settings may be discussed.	x		x	x

Business	Strategy and Global Management	Strategic Management in the Global Energy Industry	751	Characteristics of the energy industry. Major strategic issues facing top management teams in corporations involved in oil and gas and power businesses and relevant strategic tools for addressing them. Industry structure, energy value chain, key players and their strategies, industry dynamics and trends, supply and demand, expansion, M&As, roles of governments, OPEC and international politics, Kyoto Protocol, major technological drivers, organization and top management leadership.	x	x	x	x
Business	Tourism Management	Policy Planning and Development in Tourism	741	The planning process. The nature of tourism, and its role in national and regional development. Economic, social, psychological, environmental and technological impacts of tourism on the host community. Trade-offs. Strategies in development. Planning and public policy. National, provincial and local tourism programs. The Alberta example.	x	x	x	x
Business	Tourism Management	Profit and Control in Tourism and Hospitality	469	Examination of the information systems useful in value-added processes within tourism and hospitality organizations. Interpretive, analytical, and judgmental skills will be applied in the study of quality and environmental costs, JIT and ABC costing, cash management, performance evaluation, and other topics.	x	x	x	x
Kinesiology	Kinesiology	Epidemiology of Health and Physical Activity	493	An examination of physical activity/disease relationships through application of population-based methods including research design and interpretation of studies. The content will assist the student in identifying the quality and extent of research supporting the relationships between health, disease, and habitual physical activity and fitness.	x			x
Law	Law	Environmental Law	531	Legal theories, concepts, principles, and processes relevant to environmental protection. Topics include ecological and ethical dimensions, jurisdictional issues, common law rights and remedies, environmental assessment, public participation, contaminated sites, enforcement and compliance, economic approaches, endangered species and protected spaces, land use planning, and environmental dispute resolution.	x	x		x
Law	Law	Environmental Impact Assessment Law	623	Environmental impact assessment (EIA) law and practice in Canada. Topics include the role of EIA in the regulatory process and as a planning tool, federalism, triggers, equivalency, harmonization, joint assessment, implementation of assessment decisions, adaptive management, strategic environmental assessment, the role of traditional knowledge, and public participation.	x	x		x
Law	Law	Environmental Law and Ethics	624	The ethical underpinning of environmental law, with a consideration of various views, including the land ethic, deep and shallow ecology, instrumental and utilitarian approaches, and inherent value.	x	x		x
Law	Law	International Development Law	626	The role of law in promoting social and economic growth, with a focus on the rule of law as an instrument of development and the dialogue between the developed and less developed worlds through international agreements. Topics include the rules of international trade and finance, intellectual property, the environment and natural resources, and the war on terrorism.	x	x	x	x
Law	Law	International Environmental Law	627	The customary and treaty law rules applicable to global and transboundary environmental issues. Topics include air pollution, climate change, international wildlife law and trade, the international chemicals agreements liability regimes, and shared resources.	x	x	x	x
Law	Law	Natural Resources, Energy and Environmental Law Clinical	691	A clinical seminar involving placements in any one of the following practice areas: energy law, resources law, water law, and environmental law.	x	x	x	
Law	Law	Graduate Seminar in Legal Theory	705	An exploration of schools of legal theory, with the goal of helping students situate their graduate research within one or more of those approaches to legal scholarship. The seminar is structured around a series of readings describing different theoretical approaches and applying these approaches to the areas of natural resources, energy and environmental law.	x	x	x	
Law	Law	Major Research Paper	706	Under the supervision of a member of the Faculty of Law or other suitable person appointed by the Graduate Coordinator, students will complete a major research paper, approximately 50 to 60 pages (15,000 – 18,000 words) in length. The paper must reflect extensive research on a topic in natural resources, energy or environmental law, and it must propose a solution to a problem or present a critical evaluation of an issue in this area of law. The paper will be evaluated on a Pass/Fail basis by the supervisor and one other person appointed by the Graduate Coordinator. In the event of disagreement between the supervisor and the other appointee, the Graduate Coordinator shall determine whether the paper is a Pass or Fail after reading the paper and then consulting with the supervisor and other appointee.	x	x	x	
Medicine	Health and Society	Determinants of Health	301		X	X		X
Medicine	Community Health Sciences	Health Research, Emerging Technologies and Marginalized Groups (CORE)	654		x		x	x
Medicine	Community Health Sciences	Consultation and Evaluation in Human Services and Systems (AKA Program Evaluation) (CORE)	676		x			

Medicine	Community Health Sciences	Determinants of Health	601		x			x
Medicine	Community Health Sciences	Administrative Data Analysis Methodology	664		x			
Medicine	Community Health Sciences	Health Policy	666		x			X
Medicine	Community Health Sciences	Foundations of Population/Public Health	680		x			
Medicine	Community Health Sciences	Environmental Health	687	Examination of the interaction between natural and man-made environments in human health/illness.	x	x		x
Medicine	Medical Science	Cellular Mechanisms of Disease	515		X	X		X
Medicine	Medicine	Medical Skills	320	The medical skills required by students learning to optimize the physical, mental, emotional, and social well-being of patients (and self). Components include Communication, Physical Examination, Clinical Correlations, Ethics, Global Health, Physicianship, and Procedural Skills.	X	X		X
Medicine	Medicine	Healthy Populations	340	Students will learn about concepts of health and disease as they apply to populations, communities, and individual patients. Risks to health in the workplace, health care setting and community (including epidemics) will be considered. The roles of health promotion and disease prevention will be presented. Epidemiology, biostatistics, and health care systems will be covered.	x			X
Medicine	Medicine	Medical Skills	420	The medical skills required by students learning to optimize the physical, mental, emotional, and social well-being of patients (and self). Components include Communication, Physical Examination, Clinical Correlations, Ethics, Global Health, Physicianship and Procedural Skills.	X			X
Nursing	Nursing	The Discipline and Profession of Nursing I: Foundational Professional Concepts	285	The study of concepts foundational to the profession and discipline of nursing. Exploration of concepts of complexity, transition, social justice, ethic of caring, health promotion and principles of population health. Emphasis on understanding the social commitments and contributions made by nursing within its professional scope of practice. And an overview of the Canadian health care system.	X			X
Nursing	Nursing	Supporting Health I: Communities and Populations	288	Focus on a broad understanding of health and the basic frameworks and principles of population health promotion, primary health care and upstream thinking. Explores how health can be created and supported in a society. Emphasis on developing communication and relationship building skills to work effectively in a group or a team. Strategies to assess protect and promote the health of groups and communities.	X			X
Nursing	Nursing	The Science of Health II: Families in Transition	387	Holistic models addressing bio/psycho/social/spiritual/cultural dimensions of family health processes are addressed. Focus on the epidemiological, physiological, pathology, and mental health knowledge that underlies the assessments of key family transitional periods. Young and senior families are highlighted.	X			X
Nursing	Nursing Offsite	Focused Nursing (Theory)	453	Exploration of concepts and models related to the focus of community as client, with emphasis on dimensions of community and population health, health promotion perspectives, team building and partnerships, community assessment, planning and evaluation approaches, and intervention strategies.	x		x	x
Engineering	Chemical Engineering	Air Pollution Control Engineering	643	Introduction to air quality and air pollution. Impact of air pollution and greenhouse gases on health and climate change. Energy and air pollution. Fundamentals of fossil fuel combustion and related air pollution. Pre-combustion air pollution control strategies: fossil fuel cleaning/refinery, renewable energy (wind, solar, biomass, etc.), and alternative energy sources (hydrogen, etc). In-combustion air pollution control. Post-combustion air pollution control. Industrial air pollution control. Control of particulate matter. Control of VOCs, SOx, and NOx. Adsorption and absorption of air pollutants. GHG emission control. Indoor air quality engineering. Recent advances on related topics.	x	x		
Engineering	Chemical Engineering	Chemical Engineering and Process Development	423	Design of chemical processing units and plants; cost estimates and chemical process economics; optimization techniques; introduction to linear programming. Safety and environmental considerations in process design.	x	x	x	x
Engineering	Chemical Engineering	Special Problems	619	Advanced studies on specialized topics in chemical, petroleum, biochemical and environmental engineering	x	x	x	
Engineering	Civil Engineering	Transportation Engineering I	473	Systems approach in transportation engineering and planning; Goals and objectives of urban and regional transportation planning; Introduction to transportation modes; Transportation demand models; Highway Alignment; Fundamentals of traffic flow; Highway capacity and level of service; Roadway intersection design and operation; Urban transportation technologies; Environmental and energy impacts of transportation.	x	x		x

Engineering	Civil Engineering	Environmental Aspects of Energy	508	Environmental assessment and management in the energy sector. Ecological footprint introduction. Site investigation, field techniques and program implementation, remedial planning and design, cost and time analysis, physical, chemical and biological remediation techniques, biomass and waste to energy, energy use and emissions in transportation systems, energy efficiencies and emissions in building construction, assess problems with energy use from an environmental setting, develop and apply engineered solutions, ecological and environmental footprints of energy industries.	x	x	x	
Engineering	Civil Engineering	Materials and Design	513	Practical examination of the design of concrete mix designs (asphalt and Portland cement), processes and systems to improve the performance and sustainability of Civil Engineering structures. Use of waste and recycled materials in Portland and asphalt concretes. Recognition, prevention, diagnosis and repair of durability problems to extend the service life of structures. Topics in structural design.	x	x		
Engineering	Civil Engineering	Project Management II	565	Introduces fundamentals of engineering and construction management techniques, tools and processes. The course covers understanding of design and contract documents, estimating and cost control; project organizations, design of temporary facilities including formwork and safety related matters, construction processes, dispute resolution, social, economic and environmental impacts, regulatory requirements, project completion and commissioning.	x	x	x	x
Engineering	Civil Engineering	Group Design Project	570	team design project applying engineering and project management principles to prepare a multidisciplinary design and bid document for a civil engineering project. Students are expected to consult with local industry and professors in the Department. Teams will prepare a final report and will present this report to a committee, comprising of representatives from the Department and industry. Proposals should document and discuss the project development, design and execution plan with an emphasis on the technical, human resources and business aspects of the project. Initial engineering design for all Civil Engineering design aspects including: Environmental, Geotechnical, Hydraulics, Materials, Structural and Transportation. Preparation of design documents and specifications and presentation of competitive bids.	x	x	x	
Engineering	Civil Engineering	Enviromental Engineering II	581	Water and wastewater quantities and quality, water distribution and wastewater collection systems, hydraulic considerations, design of sanitary sewers, storm drainage systems, physical, chemical, and biological processes for water and wastewater treatment; aeration, coagulation, flocculation, sedimentation, single and multi-media filtration, disinfection, activated sludge system and trickling filter, adsorption, reverse osmosis, membrane filtration, advanced oxidation, sludge processing and disposal, industrial water and wastewater treatment, water conservation, reuse and recycling.	x	x		
Engineering	Civil Engineering	Bituminous Materials	611	Origin of bituminous materials. Production, composition, and internal structure. Natural and petroleum-refined bituminous materials. Characteristics of bituminous materials and their measurement. Basic material and rheological tests. Application of bituminous materials in asphalt paving technologies. Hot mixes and asphalt emulsions. Paving mix design, properties and testing. Main failure modes of asphalt pavements. Industrial asphalts. Environmental impacts of asphalt technologies.	x	x	x	
Engineering	Civil Engineering	Risk Analysis	645	The objective of this course in engineering risk analysis and risk assessment is to familiarize students with the principles and techniques of quantitative risk analysis. Key focus points are the treatment of uncertainties, the attitude of conservatism, risk perception, the careful use of quantitative risk measures, and a discussion of the dangers tasks facing risk-based decision makers. Includes: Hazards, risk, risk analysis, risk assessment; risk measures; probability, uncertainty modelling, stochastic variables; using and misusing data, reliability, tails; risk assessment frameworks, models in health and environmental risk analysis, models in engineering risk analysis; risk perception, risk comparison; and practical case studies.	x	x	x	
Engineering	Civil Engineering	Law for Project Managers	699	Legal issues related to the effective management of projects. Introduction to the legal system and processes; environmental law; intellectual property nondisclosure; professional liability; contract law; strategic alliances; employment law; the builder's lien act. Cases are reviewed and students are expected to complete a number of assignments requiring research into case law.	x	x	x	
Engineering	Civil Engineering	Mountain Highway Engineering	713	Road vehicle performance in mountainous terrain; the slow moving vehicle problem; highway capacity and level of service; terrain classification; alignment elements, cross section elements, intersections, traffic barriers; planning and design of passing lanes, climbing lanes, truck escape ramps, turnouts, and low-volume roads; traffic management in avalanche zones; environmental impact of highways in mountainous terrain. Vehicle operating costs; engineering evaluation of mountain highway projects.	x	x		
Engineering	Civil Engineering	Computational Methods for Environmental Engineering	743	Taylor series, numerical integration. Linear and nonlinear algebraic equations and solvers. Ordinary and partial differential equations. Finite difference methods: explicit, implicit and Crank-Nicholson methods. Finite difference, finite element or finite volume numerical approximations. Initial and boundary value problems. Boundary conditions, discretization considerations, and design of approximations, accuracy and error reductions. Applications in environmental engineering, such as pollutant dispersion and transport, will be discussed.	x	x		

Engineering	Civil Engineering	Hazardous Waste and Contaminated Sites Management	745	Integrated waste management. Functional and fundamental properties of hazardous waste. Toxicological properties of contaminants. Contaminant release mechanisms. Fate and transport of contaminants in the environment. Contaminated site assessment principles. Quantitative human health risk assessment (QHHRA) as applied to contaminated sites. Hazard identification, exposure pathway analysis, risk characterization. Risk management and site remediation. Methods of hazardous waste treatment and contaminated site remediation. Secure land disposal of hazardous waste and contaminated soils and sludges.	x	x		
Engineering	Civil Engineering	Contaminated Soil Remediation	747	Overview of soil remediation engineering. Contaminant partitioning in air, water and gas phases. Phases of site assessments, Physical and chemical treatment processes, soil vapour extraction, air sparging, soil washing, soil flushing, thermal desorption and incineration, solidification and stabilization, vitrification, biological treatment processes, bioremediation kinetics, ex situ and in situ techniques. Liquid phase bioremediation as it pertains to soil remediation.	x	x		
Engineering	Civil Engineering	Environmental Aspects of Waste Disposal Systems	749	Soil-chemical interactions and implications in waste disposal system design; landfill design principles; leachate production, leachate migration in the unsaturated/saturated zones; analytical and numerical solution of flow and transport equations; applications and case studies of groundwater contamination; design and construction of barrier systems; bioreactor landfills; landfill closure issues; greenhouse gas control systems.	x	x		
Engineering	Electrical Engineering	Power Systems Operation and Markets	597	Power system operation and economic load dispatch, concept of marginal cost, Kuhn-Tucker's conditions of optimum, unit commitment, hydro-thermal coordination, power flow analysis, optimal power flow, probabilistic production simulation, power pools and electricity markets, market design, auction models, power system reliability, primary and secondary frequency control and AGC, steady-state and transient stability, power sector financing and investment planning.	x		x	
Engineering	Electrical Engineering	Grid-Connected Inverters for Alternative Energy Systems	661	Analysis and design of grid-connected inverters fed by an alternative energy source. Switch mode converters, inverter topologies, harmonics, drive electronics, control methodologies, implementation techniques, course project.	x	x		
Engineering	Energy and Environment, Engineering	Introduction to Energy and the Environment	355	History of energy technologies, energetics of natural systems and agriculture, formation, extraction, and transformations of fossil fuels, renewables such as biomass, solar and wind; and the electricity system, environmental impacts of energy systems, technical options for transforming energy systems to reduce environmental impacts.	x	x	x	
Engineering	Energy and Environment, Engineering	Pollution Prevention and Control for Energy Industry	501	An overview of environmental laws and regulations. Environmental standards for air quality, water and land. Regulatory approval process for new energy projects. Base-Line Study and Environmental Impact Assessment. Environmental review of new energy projects. Pollution prevention methodology and techniques. Separation and recycle streams. Process modification, integration, analysis and control. Risk assessment.	x	x	x	
Engineering	Energy and Environment, Engineering	Effluent Treatment Processes for Energy Industry	505	Application of fundamental engineering concepts to develop process design specifications for various unit operations and separation processes used for the treatment of gaseous (air), aqueous (wastewater) and solid effluents from mining, exploration, production, transportation and utilization of carbon-based energy sources.	x	x	x	
Engineering	Energy and Environment, Engineering	Special Topics in Energy and Environment	519	Current advanced topics in Energy and Environment.	x	x	x	
Engineering	Energy and Environment, Engineering	Alternative Energy Systems	575	An overview of alternative energy systems including hydroelectric, wind, solar (thermal, concentrating, and photovoltaic), distributed generation using gas turbines. Energy system performance quantified using thermodynamic, fluid mechanic, and heat transfer analysis.	x	x	x	
Engineering	Energy and Environment, Engineering	Electrical Transmission System Planning and Operation	577	Electricity markets, carbon markets, optimal operation of electricity systems, environmental impacts of transmission networks, regulatory issues.	x	x	x	
Engineering	Engineering	Technology and Society	481	An interpretive course on the interrelationship between technology and society. The first part of the course surveys significant historical developments within disciplinary areas such as energy, materials, production processes, structures, transport, communications, and computation. Sequence within each area: discovery, development, application, impact, future. Social and economic consequences are also considered. The latter part of the course explores contemporary problems of society and technology.	x		x	x
Engineering	Engineering	Engineering Economics	209	The basic tools and methodology of engineering economic studies. Topics include investment decisions, theory of replacement, economies of scale, externalities, social decision making and government regulation. Examples are drawn from engineering projects.	x		x	x

Engineering	Environmental Engineering	Environmental Chemistry and Microbiology	605	Chemistry of organic and inorganic contaminants in the environment. Natural chemical cycles in the biosphere, geosphere, hydrosphere and atmosphere, and consequences of anthropogenic disturbances. Aquatic, atmospheric and soil chemistry. The fate of hazardous, refractory and heavy metal pollutants in the environment. Introductory toxicological chemistry and atmospheric chemistry. Analytical techniques for contaminants in air, water, energy and soil. Introductory microbiology: characteristics and classification of microorganisms, kinetics and mathematical models of microbial growth, applications in environmental engineering. Introduction to ecology.	x	x		x
Engineering	Environmental Engineering	Earth Observation for the Environment	637	An Introduction to environmental earth obervation systems, in particular satellite platforms. Techniques for fusing multi-dimensional datasets (i.e. multi-specttral, multi-temporal, multi-resolutionm and point source ground data). A number of environmental issues will be discussed, including carbon sequestration; advanced techniques for estimating biophysical variable that are integral parts in various environmental models; vegetation phenology; and understanding of climatic influence on forested and polar eco-systems.	x			x
Engineering	Environmental Engineering	Air Pollution Control Engineering	641	Introduction to air quality and air pollution. Impact of air pollution and greenhouse gases on health and climate change. Energy and air pollution. Fundamentals of fossil fuel combustion and related air pollution. Pre-combustion air pollution control strategies: fossil fuel cleaning/refinery, renewable energy (wind, solar, biomass, etc.), and alternative energy sources (hydrogen, etc). In-combustion air pollution control. Post-combustion air pollution control. Industrial air pollution control. Control of particulate matter. Control of VOCs, SOx, and NOx. Adsorption and absorption of air pollutants. GHG emission control. Indoor air quality engineering. Recent advances on related topics.	x	x		x
Engineering	Environmental Engineering	Advanced Topics in Solid Waste Engineering	651	Analysis and implementation of solid waste minimization strategies. Aerobic biological treatment of waste. Landfill bioreactors for energy recovery. Performance based design of landfills, soil-chemical interactions and implications. Leachate migration in unsaturated/saturated zones. Design and construction of barrier systems. Leachate collection systems. Landfill closure issues. Life cycle assessment of waste management systems.	x	x	x	x
Engineering	Environmental Engineering	Contaminated Soil Remediation	653	Overview of soil remediation engineering. Contaminant partitioning in air, water and gas phases. Phases of site assessments, Physical and chemical treatment processes, soil vapour extraction, air sparging, soil washing, soil flushing, thermal desorption and incineration, solidification and stabilization, vitrification, biological treatment processes, bioremediation kinetics, ex situ and in situ techniques. Liquid phase bioremediation as it pertains to soil remediation.	x	x	x	
Engineering	Environmental Engineering	Hazardous Waste and Contaminated Sites Management	655	Integrated waste management. Functional and fundamental properties of hazardous waste. Toxicological properties of contaminants. Contaminant release mechanisms. Fate and transport of contaminants in the environment. Contaminated site assessment principles. Quantitative human health risk assessment (QHHRA) as applied to contaminated sites. Hazard identification, exposure pathway analysis, risk characterization. Risk management and site remediation. Methods of hazardous waste treatment and contaminated site remediation. Secure land disposal of hazardous waste and contaminated soils and sludges.	x	x		
Engineering	Environmental Engineering	Energy and Environment	671	Energy overview from primary energy to end use; formation, extraction, and transformations of fossil fuels; physics and engineering of nuclear power; renewable energy sources: biomass, solar and wind; electricity generation, transmission and economics; building energy systems; heat and power integration; greenhouse gas (GHG) emissions and technical options for reduction of GHSs; energy utilization and efficiency.	x	x		
Engineering	Environmental Engineering	Thermal Systems Analysis	673	Fundamentals of thermodynamics, fluid mechanics and heat transfer; thermal and energy systems, heat exchangers, co-generation; Second law of thermodynamics and concept of entropy generation and thermo-economics; Environmental issues and pollution control; Renewable energy system; Co-generation design; Heat exchanger design; Energy storage systems; Optimization process.	x	x		
Engineering	Environmental Engineering	Life Cycle Assessment	693	Concepts of life cycle assessment. Consideration of environmental and economic impacts from the extraction of resources to the disposal of unwanted residuals. Review and evaluation of tools and frameworks (e.g. process, input-output, hybrid life cycle assessment). Relative merits of various methods for interpreting and valuing the impacts. Examples of applications in environmental engineering and the energy industry.	x	x	x	
Engineering	Geomatics Engineering	Land Use Planning	581	Theoretical and historical bases of planning. Urban reform and development of planning in Canada. Sustainable development. Subdivision planning process. Provincial and municipal planning approval requirements. Public participation. Site assessments. Field exercises may take place off campus over weekends.	x	x	x	x

Engineering	Geomatics Engineering	Earth Observation for the Environment	637	An introduction to environmental earth observation systems in particular to satellite platforms. Technique for fusing multi-dimensional datasets (i.e., multi-spectral, multi-temporal, multi-resolution, and point-source ground data). A number of environmental issues will be discussed, including carbon sequestration, advanced techniques for estimating biophysical variables that are integral parts of various environmental models; vegetation phenology; and understanding of climatic influence on forested and polar ecosystems, etc.	x	x		
Engineering	Mechanical Engineering	Energy Systems	539	Energy resources. Energy conservation and management. Thermal power plants, internal and external combustion engines. Introduction to fuel technology and processing. Alternative energy systems: hydroelectric, solar, wind, nuclear, magnetohydrodynamics, thermoelectrics, thermionics, photo-voltaic, fuel cells.	x			
Engineering	Mechanical Engineering	Mechanical Systems in Buildings	583	Fundamentals of heating, ventilating, and air conditioning systems in buildings. Heating and cooling loads. Codes, regulations, and standards. System selection, generation equipment, heat exchangers, distribution and driving systems, terminal units, controls and accessories, and cost estimating. Energy efficiency and renewable energy applications. Elevators and escalators. Lifting devices. Sewage systems.	x	x		
Engineering	Mechanical Engineering	Thermal Systems Analysis	637	Fundamentals of thermodynamics, fluid mechanics and heat transfer; thermal and energy systems, heat exchangers, co-generation; Second law of thermodynamics and concept of entropy generation and thermo-economics; Environmental issues and pollution control; Renewable energy system; Co-generation design; Heat exchanger design; Energy storage systems; Optimization process.	x	x		
Engineering	Petroleum Engineering	Fuel Science and Technology	561	Classification of fuels. Origin, geology, production and processing of fossil fuels. Supply, consumption and demand for fuels - historical patterns and future trends. Thermodynamics and reaction kinetics of combustion. Physical and chemical properties and influence on fuel utilization. Ecological, efficiency, safety, economic considerations. Non-conventional fuels. Transportation and handling.	x	x	x	
Engineering	Petroleum Engineering	Design for Oil and Gas Engineering II	531	Team Design Project continuing from Petroleum Engineering 511. Detailed design of large scale development and commercial exploitation of a petroleum resource. Topics considered will include: reservoir simulation; drilling and completion design; specification of petroleum processing equipment such as heaters, heat exchangers, contacting and separating equipment; safety and environmental issues; economic evaluation.	x	x	x	
Engineering	Petroleum Engineering	Unconventional Oil Exploitation	571	Description and analysis of heavy oil geology and heavy oil recovery technologies. Discussion of heavy oil production mechanisms and methods, recovery process design, transportation, facilities, marketing, economics, and environmental issues.	x	x	x	
Science	Biology	Ecology and Human Affairs	307	The major principles of ecology. How the physical environment affects organisms; behavioural ecology and life histories; species interactions; the biology of populations, communities, and ecosystems; biodiversity and conservation. The non-biologists will gain an understanding of ecological and evolutionary principles that will allow them to better appreciate the natural world, and the increasing environmental impacts of humans.	x	x		
Science	Biology	An Introduction to Ecology and Evolution	313	The ecological principles, theories and interactions of organisms at individual, population, community and ecosystem levels will be explored. Ecological principles will be applied to examine current issues involving conservation of species, habitats, biodiversity and ecosystem function.	x	x		
Science	Biology	Insects, Science and Society	375	Examination of insects as the most diverse and abundant form of animal life on the planet, why they are so successful and how they influence our lives. Topics include how insects are built, what they do, and how they interact with people and have come to be so important economically and culturally, as pests, pollinators, experimental animals, maintaining our environment and forming complex societies. Other topics include evolution of insects, insects in history and culture and how insects can help us address issues such as biological conservation, climate change and animal rights.	x	x		x
Science	Biology	Conservation Biology	451	The application of ecological theory and principles to the conservation and management of natural and modified ecosystems, with emphasis on preservation of biodiversity and sustainable development. Topics include disturbance as an ecological process, ecological and evolutionary responsiveness of natural systems, ecology of resource harvesting, management of endangered habitats and populations, implications of human population growth and global change.	x	x	x	x
Science	Botany	Plants and People	309	A review of the structure and function of plants. A survey of the nature of people's basic food plants and an overview of agricultural and forestry practices. Plant improvement by traditional and modern methods, and plant propagation.	x	x	x	x
Science	Cellular, Molecular and Microbial Biology	The Life of Bacteria	343	An introductory study of the systematics, **ecology**, physiology, molecular biology and role in **pathogenesis** of the major groups of prokaryotes	X	X		
Science	Cellular, Molecular and Microbial Biology	Bacterial Pathogens	431	An introduction to microbes that cause infections (in humans, other animals and plants.) Topics include: the relationship between pathogen and host, ability of pathogens to colonize, reproduce and cause **disease, the role of antibiotics and vaccines in treatment and prevention of infection, antibiotic resistance in bacteria**, **environmental control** of virulence factor production.	x	x		x

Science	Cellular, Molecular and Microbial Biology	Environmental Microbiology	543	Focuses on understanding the interactions of micro-organisms with their environment. Roles of micro-organisms in nutrient cycling, biological control, and biodegradation will be discussed. The use of molecular approaches to identify and characterize microbial communities, and to understand the precise nature of microbial interactions with abiotic and biotic environments will be emphasized. Special topics will include plant-microbe and animal-microbe symbiosis, extreme environments and biotechnological applications of environmental microbiology.	x	x		
Science	Cellular, Molecular and Microbial Biology	Petroleum Microbiology	545	Microorganisms can contribute to a more sustainable energy future. Their impact and roles in the fossil fuel industry will be reviewed. Topics will include oilfield souring, biocorrosion, biodegradation, enhanced recovery, upgrading, and bioremediation of contaminated sites.	x	x		
Science	Cellular, Molecular and Microbial Biology	Microbial Diversity	563	An overview of microbial diversity, the evolutionary mechanisms that give rise to it, and the methods used to study it. Topics may include: microbial systematics; characterizing the last universal common ancestor of life; estimating global microbial diversity; “unculturable” microbes and molecular DNA-based methods used to study them in nature; modern cultivation techniques; comparative genomics of microbial species; environmental metagenomics; microbial biogeography and speciation and gene flow in microbial communities.	x	x		
Science	Chemistry	General Chemistry for Engineers	209	Basic chemical concepts. Atomic and molecular structure. Chemical bonding. Chemical kinetics and equilibria. Acid-base and solubility equilibria. Oxidation-reduction phenomena and electrochemistry. The chemistry of water. The chemistry of energy sources. Basic environmental issues.	x	x		
Science	Chemistry	Foundations of Chemistry: Structure and Bonding	211	Same core topics as Chemistry 201 but taught with a greater emphasis on critical thinking, scientific observation and problem solving and the application of chemistry to topics such as drug design and environmental issues.	x	x		
Science	Chemistry	Environmental Chemistry	321	A survey course of major aspects of environmental chemistry including the natural chemical cycles in the biosphere, geosphere, hydrosphere and atmosphere and the consequences of anthropogenic disturbances to these cycles. Topics discussed will include: Aquatic Chemistry and Water Pollution; Atmospheric Chemistry and Its Alteration; Soil Chemistry and the Fate of Pollutants; Hazardous Waste; Toxicological Chemistry.	x	x		
Science	Chemistry	Green Chemistry: Principles and Techniques	423	Green Chemistry focuses on the science and techniques that chemists and chemical and process engineers use to generate less waste, and to develop products and processes that are more atom- and energy-efficient, environmentally sensitive, and cost-effective. This course will look at the principles behind green chemistry, some techniques and processes used in achieving atom- and energy-efficiency, and waste reduction.	x	x	x	
Science	Chemistry	Introduction to Atmospheric Chemistry	521	An introduction to tropospheric and stratospheric chemistry. The detailed chemistry of the stratosphere and troposphere; gas-phase chemical kinetics; photochemistry and atmospheric radiation; aerosols; anthropogenic pollution and air quality; climate forcing; introduction to modelling and atmospheric transport.	x	x		
Science	Environmental Science	ENSC Field Course I	401	This course introduces the common field techniques in quantifying **air, land and water quality**, as well as data analysis and report writing. A field portion is held in the two weeks prior to the start of Fall Session, partly at Kananaskis Field Stations	x	x		
Science	Environmental Science	ENSC Field Course II	501	The focus will be on disturbances **to aquatic and terrestrial ecosystems**. Site visits will be conducted to appropriate areas that have either undergone or are undergoing **industrial disturbance** to assess impacts.	x	x		x
Science	Environmental Science	Special Problems in Environmental Management	502	Surveys many aspects of the professional practice of environmental science including: **environmental management, audit and accounting, law and regulation, life cycle assessment, ethics and philosophy, toxicology and epidemiology, and remediation and reclamation technologies**. Includes a major collaborative research project on a local environmental issue	x	x		x
Science	Environmental Science	Environmental Assessment and Hearings	503	This course formally introduces students to federal and provincial **environmental impact assessment** (EIA).	x	x		x
Science	Environmental Science	Research Project in Environmental Science	504	An independent study or research project under the supervision of one or more Faculty members in the ENSC Program. Originality is emphasized and laboratory and/or field students are encouraged….	x	x		x
Science	Environmental Science	Special problems in Environmental Science	505	A research project under the supervision of one or more Faculty members in the Environmental Science program…..	x	x		x
Science	Geology	Applications of Geoscience	202	Applications of geology and geophysics to the study of earthquakes, volcanoes and other geologic hazards; natural resources; environmental management; human impact on the Earth and global change.	x	x		
Science	Geology	Physical Hydrogeology	401	Hydrologic cycle, conservation principle, Darcy's Law, groundwater flow systems, aquifer testing, soil hydrology, effective stress, land subsidence, solute transport.	x	x		
Science	Geology	Geology, Engineering, and the Environment	471	The principles and methods of physical geology with special emphasis on their application in dealing with civil engineering and environmental problems. Laboratory: properties of minerals and rocks, analysis and interpretation of geological maps, photogeology and seismic refraction in site investigation problems.	x	x		
Science	Geology	The Geological Record of Global Change	475	Geochemical **relationships among the atmosphere, hydrosphere, and lithosphere** will be examined. Topics include the carbon cycle, chemical weathering, mid-ocean ridge hydrothermal activity, past **changes in seawater chemistry**, stable isotopes, **climate**	x	x		

Science	Geology	Contaminant Hydrogeology	505	Chemical and biological processes in surface water and groundwater systems. Topics include: water quality, contaminant transport and dispersal, fluid-sediment interactions, remediation of contamination. Techniques will include the use of thermochemical models, numerical modelling of contaminant migration, and examination of case studies.	x	x		
Science	Geology	Petroleum and Environmental Organic Geochemistry	679	Origin of petroleum; sedimentation of organic matter and the carbon cycle; diagenesis of organic matter; hydrocarbon generation and migration; kinetic models; creosote contamination; methods; interpretation of geochemical data; applications of geochemical data to **geological and environmental problems**.	x	x		
Science	Geophysics	Natural Disasters and Critical Earth Phenomena	375	Causes of disasters such as earthquakes, tsunami, volcanic eruptions, mud flows, landslides, avalanches, flooding, tornadoes and hurricanes, and other critical phenomena such as sinkholes, **ozone depletion and radiation, carbon dioxide and global warming**, El Nino, **toxic natural materials and pollution**, and extraterrestrial impacts. Surveys of historic disasters and their effects on life on Earth. **Methods of prediction and prevention of disasters and precautions for the mitigation of their effects**.	x	X		
Science	Geophysics	Environmental Applications of Geophysics	565	Application of geophysical methods such as resistivity, electromagnetics, and ground penetrating radar to investigations of geological, geotechnical, hydrological, and environmental problems. Small-scale high resolution applications of other geophysical methods (seismic, gravity, magnetics).	x	x		
Science	Marine Science	Introduction to Marine Science	312	Exploring the ocean environment, marine organisms, marine ecosystems and the impact of humans on the sea.	x	x		
Science	Marine Science	Ecological Adaptations of Seaweeds	525	An exploration of morphological, physiological, genetic and reproductive adaptations of seaweeds to their natural and man-altered environments. Daily lectures and laboratory exercises will complement frequent field observations.	x	x		
Science	Physics	Introduction to Energy	371	Energy and power will be discussed. Sources of energy such as wind power, solar power, nuclear power, geothermal energy and fossil fuels and related limitations will be considered. Generation and distribution of electricity will be discussed.	x	x	x	
Science	Physics	Atmospheric and Environmental Physics	573	Quasi-static uniform atmosphere. Atmospheric optics. Scattering in the atmosphere. Atmospheric visibility and aerosols. Cloud physics. Atmospheric electricity. Radiative transfer. Atmospheric circulation. Hydrological cycling. Stable isotopic techniques. Pollutants. Energy transfer. Turbulence. Sky shortwave and visible radiation distribution. Near infrared sky radiation, cloud detection and estimation.	x	x		
Science	Science	Science and Society	403	Students **explore the interaction between science and non-science** areas in various ways including by written and oral presentations.	X	x	x	x
Science	Science	Principles of Hydroelectric Energy	531	An introduction to the scientific fundamentals of hydroelectric energy production. Includes an examination of the technologies and potential for developing hydroelectricity, along with the environmental, societal, and economic issues surrounding its development.	x	x	x	x
Science	Science	Principles of Geothermal Energy	533	An introduction to the scientific fundamentals of hydroelectric energy production. Includes an examination of the technologies and potential for developing hydroelectricity, along with the environmental, societal, and economic issues surrounding its development.	x	x	x	x
Science	Science	Fundamentals of Nuclear Energy Production	421	The science behind nuclear energy production including nuclear reactions, reactor design, waste disposal and historical and proposed accidents.	x	x		
Science	Science	Principles of Solar Energy	521	The nature of solar radiation and how that energy may be captured for useful energy production.	x	x		
Science	Science	Principles of Wind and Wave EnergyAerodynamics of windmills and hydrodynamics of wave collectors	525	Aerodynamics of windmills and hydrodynamics of wave collectors.	x	x		
Science	Statistics	Statistics for the Physical and Environmental Sciences	327	Introduction to the collection of data. Probability and probability distributions. Single and Multi-sample estimation of distribution parameters. Regression and Goodness of Fit tests. Experimental Design and Analysis of Variance. (Note: Course focuses on analyzing data and making informed decisions about environmental policies, resources)	x	x	x	
Science	Zoology	Animal Behaviour	567	Offered from an evolutionary and ecological perspective. Development of ethological ideas; interaction of genotype and environment in ontogeny of behaviour; role of behaviour in dealing with environmental challenges.	x	x		
Social Work	Social Work	International Social Development	673	Examines issues in international social development. There will be an emphasis on analysis of the social forces and conditions giving rise to different models of social development, and on what each of these alternative models tends to produce in terms of social welfare policies and programs.	x			x
Social Work	Social Work	Social Work and Diversity	371	Students will critically examine the issues of diversity and the power relations that form common links among the experiences of oppression and marginalization in Canadian society.	x		x	x
Veterinary Medicine	Veterinary Medicine	Principles of Epidemiology	344	Introduction to the basic principles and methods used in veterinary epidemiology. Concepts include types of epidemiologic studies, measures of disease frequency and association, epidemic and infectious disease dynamics, disease causation, and the relationships between population and individual animal medicine. The course provides foundational skills relevant to population science, which includes public health, health management and clinical medicine.	x	x		x

Veterinary Medicine	Veterinary Medicine	Public Health and Risk Analysis	440	The role of animals as sources of public health hazards and as sentinels for environmental health risk factors is examined. Students apply systems thinking to identify how zoonotic diseases and food safety hazards emerge, spread and can be controlled. Public health methods and tools related to veterinary issues are applied to identify options and methods for the prevention and control of hazards and reduction of health risks.	x	x		x
Veterinary Medicine	Veterinary Medicine	Professional Skills III	507	Building on Veterinary Medicine 307 and 407, students develop their professional skills necessary for dealing with challenging issues in veterinary medicine including death and dying, welfare, ethical dilemmas, conflict and handling medical errors. Communication domains including wildlife, government, production animal, public health, rural and Northern practice and risk communication. The integration of process skills and content are fully explored and expanded for the purpose of case management communication. Additional emphasis is placed on business structures, organization, economics and finance.	x	x	x	x
Veterinary Medicine	Veterinary Medicine	Theriogenology	541	Lecture, cases, group work and laboratory sessions are used to provide the basis of knowledge and skills to develop clinical competence in managing the reproductive health of economically important livestock species and companion animals. Students integrate knowledge from various disciplines to diagnose and manage clinical issues pertaining to the reproductive health of animals on an individual-animal or herd basis. The economic implications of reproductive efficiency in various livestock species are analyzed.	x		x	x
Veterinary Medicine	Veterinary Medicine	Ecosystems and Public Health	583	This course allows students to choose from a variety of rotations that enable concentration within Ecosystem and Public Health.	x		x	x
Interdisciplinary Programs	Architectural Studies	Introduction to Architectural Studies	201	An introduction to architecture as an artistic and scientific endeavour as well as an examination of its purpose and intentions, its processes, and its products. Students will develop an understanding of the social, cultural, historical, technological, economic, and natural context influencing the design of buildings and other objects.	x	x	x	x
Interdisciplinary Programs	Architectural Studies	History of Architecture and Human Settlements	457	A survey history of architecture and human settlement from the prehistoric world until the present. The first course addresses the pre-modern traditions of the major world cultures. The second course explores the traditions of the Western world from the beginning of the Italian Renaissance until the present. The courses will examine the changes in world view that have altered the course of architecture through the study of selected works of architecture and urbanism.	x			
Interdisciplinary Programs	Architectural Studies	Interdisciplinary Seminar	483	Conceptual frameworks in Environmental Design and theories related to design and environment that influence environmental design thinking and practice.	x	x		
Interdisciplinary Programs	Community Rehabilitation	Introduction to Disability Studies	205	The social, political, economic, health and advocacy systems that support and empower persons with disabilities and their families.	x		x	x
Interdisciplinary Programs	Community Rehabilitation	Management and Leadership in Nonprofits	415	Management and leadership issues within private, non-profit and public community based organizations and businesses.	x		x	x
Interdisciplinary Programs	Community Rehabilitation	Social Constructions of Disability and Health	425	An inquiry-based course on Social Construction, Social Problem Theory and Narrative as foundations for interdisciplinary study, health capacity, community practice and personal empowerment.	x		x	x
Interdisciplinary Programs	Community Rehabilitation	Bioethics and Disability	545	An in-depth view of the impact of bioethics on social policy, disability studies, disability research and the lives of disabled people.	x			x
Interdisciplinary Programs	Community Rehabilitation	Health Research, Emerging Technologies and Marginalized Groups	547	An online course that provides an in-depth global outlook on new, envisioned and emerging sciences and technologies and their global impact on a) disabled people and disability studies; b) the concept and field of rehabilitation and identity of rehabilitation professionals; c) the concept of health professionals. Also provides an understanding of how disability studies scholars and rehabilitation and health policy, systems and care delivery scholars and professionals can enrich the new, envisioned and emerging science and technology and governance of science and technology discourse.	x			x
Interdisciplinary Programs	Indigenous Studies	Indigenous Studies	317	Examination of human ecological connectedness with the natural environment. Topographical, biological, and zoological Indigenous science. Issues of preservation, naming, and use of the natural environment.	x	x		x
Interdisciplinary Programs	Indigenous Studies	Issues in Australian Indigenous Politics and Society	341	A survey of contemporary issues in social and political relations among Australian Indigenous peoples and between the state and Indigenous peoples in Australia. Includes such topics as policy development, land rights, apology and reconciliation, non-Indigenous public opinion, frontier politics, and other aspects of the politics and sociology of decolonization.	x	x		x
Interdisciplinary Programs	Interprofessional Health Education	Interprofessional Practice in Mental Health	501	Students from different helping professions come together to examine selected issues of interprofessional practice in the area of mental health and co-occurring addictive disorders, focusing on the experience of mental illness, treatment alternatives, practice implications, advocacy and policy issues, and future challenges and change. Incorporates in-class and field experiences with consumers and families, employers and professionals, services and organizations.	x			x

Interdisciplinary Programs	Interprofessional Health Education	Interprofessional Practice in Mental Health	601	Students from different helping professions come together to examine selected issues of interprofessional practice in the area of mental health and co-occurring addictive disorders, focusing on the experience of mental illness, treatment alternatives, practice implications, advocacy and policy issues, and future challenges and change. Incorporates in-class and field experiences with consumers and families, employers and professionals, services and organizations.	x			x
Interdisciplinary Programs	Sustainable Energy Development	Energy Systems I: Non-Renewable Energy	601	Explore the interaction between non-renewable resources (petroleum, natural gas, coal, thermal stations, hydro) and the environment. Consider the technical and environmental aspects within the energy and environment cycle for evaluation and management.	x	x	x	
Interdisciplinary Programs	Sustainable Energy Development	Energy Systems II: Renewable Energy	603	Study renewable energy sources as prospective energy suppliers for the future, along with conditions for sustained implementation of renewable energy technologies (biomass, solar, wind, geothermal, co-generation).	x	x	x	
Interdisciplinary Programs	Sustainable Energy Development	Water Pollution and its Impact on the Energy Sector	607	Causes and consequences of water pollution and management practices and technologies for prevention, mitigation and control of pollutant effluents, water usage and management in energy development.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Air Pollution and its Impact on the Energy Sector	609	Causes and consequences of air pollution and management practices and technologies for prevention, mitigation and control of pollutant emissions.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Land Pollution and Waste Management in the Energy Sector	611	Causes and consequences of land pollution and management practices and technologies for prevention, mitigation and control of pollution. Waste management principles and effective practices in the development of energy projects.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Energy Systems III: Planning and Energy Economics	613	Financial principles and evaluation techniques and their application to energy investment planning and to assessment of foundations in energy economics and policies.	x		x	
Interdisciplinary Programs	Sustainable Energy Development	Environmental Impact Assessment in the Energy Sector	615	Principles and professional practice of environmental impact assessment, with application to energy development projects.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Environmental Law in the Energy Sector	619	Legal systems, nature and sources; international environmental law and its implementation; fundamental legal concepts including jurisdiction, procedural fairness, liability, property and contract; environmental regulatory systems and alternative instruments; judicial review; enforcement and compliance; non-judicial dispute resolution.	x	x	x	
Interdisciplinary Programs	Sustainable Energy Development	Environmental Management Tools in the Energy Sector	621	Environmental management tools including strategic policies; structures; impact and production assessment; audits; indicators and reporting; life cycle assessment; risk management; and economic instruments.	x	x	x	
Interdisciplinary Programs	Sustainable Energy Development	Topics in Energy and the Environment	699	Intensive study of selected topics in energy and the environment and related subjects. Course will reflect changing content needs and faculty interests.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Research Project	625	An introduction to research methodology and to energy environmental issues. Knowledge and skill are demonstrated through the completion of an interdisciplinary project.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Group Research Project	627	Completion and presentation of a group project that is related to a current environmental issue or problem.	x	x		
Interdisciplinary Programs	Sustainable Energy Development	Advanced Seminars	629		x	x		
Interdisciplinary Programs	Transportation Studies	Introduction to Transportation Planning	473	Goals and objectives of urban and regional transportation planning; the transportation planning process; trip generation, trip distribution, modal split, traffic assignment; transportation surveys and data collection; fundamentals of traffic flow; capacity and level of service; urban transportation technology; computer simulation models of urban transportation; environmental impacts; transportation systems management; energy considerations; pedestrian movement systems; urban goods movement; impact of transportation system on city growth; urban transportation policy and financing in Canada.	x	x	x	x
Interdisciplinary Programs	Transportation Studies	Selected Topics in Transportation Policy	513	Analysis of government's role in regulating, financing, and managing transportation infrastructure and operations. Comparison of cases in Asia, North America, and Europe will highlight the challenges and opportunities of making transportation more sustainable. Consult the Transportation Studies Program Director for the topics to be explored in a given year.	x	x	x	x
Other	Energy and Environmental Systems	Project Course	603	Projects are applied interdisciplinary problem-solving courses in which students work as leaders or as members of project teams. Most course time is devoted to project management and presentations from students. The project course gives students experience working on weakly-structured, real-world problems that require teamwork and contributions from diverse disciplines. They are co-managed by students and faculty advisors and should be responsive to an external "client" or expert panel. Problem areas are abstracted from local, provincial and national situations and involve the interaction of energy systems, the environment and public policy. Oral and written presentations concerning the results of project studies are required	x	x		x
Other	Energy and Environmental Systems	Graduate Seminar	606	The graduate research seminar fosters the development of presentation and communication skills as well as engagement in critical analysis and debate. Course time is primarily research presentations by faculty, research staff and students. All students must present their work.	x	x		

Other	Energy and Environmental Systems	Tools for Systems Analysis	607	This intensive block week course provides an introduction to analytical methods and software tools that are most frequently used for research in energy and environmental systems. Analytical methods include risk, uncertainty and decision analysis; an introduction to engineering economics; and an introduction to tools for environmental modelling. Software tools include Excel, and extensions such as Crystalball, general purpose systems such as Matlab and Mathematica; and GIS tools for non-specialists.	x	x	x	
Other	Energy and Environmental Systems	Special Topics	619	Students will be provided with the opportunity to focus on advanced studies in specialized topics pertaining to energy system engineering, law, public policy or economics, or a combination of these issues.	x	x	x	
Other	University	Special Topics in Sustainability	511.02	Theoretical Basis for Interdisciplinary Intervention and Design	x			
Other	University	Special Topics in Sustainability	611.02	Theoretical Basis for Interdisciplinary Intervention and Design	x			