

GEOGRAPHY AND PLANNING

Courses

GPHY 101 Human Geography Units: 3.00

The fundamentals of human geography including the meanings of place, the impacts of globalization, multiculturalism, population change and movement, environmental history and politics, cultural geography, issues of uneven resource distribution, the role of colonialism in the modern shape of the world, agricultural geography, and urban geography.

NOTE Field Trip: estimated cost \$30.

NOTE Also offered online. Consult Arts and Science Online. Learning Hours may vary.

LEARNING HOURS 120 (24L;18T;42O;36P).

Requirements: Prerequisite None. Exclusion BISC 100.

Offering Faculty: Faculty of Arts and Science

GPHY 102 Physical Geography and Natural Resources Units: 3.00

This course introduces the major concepts studied in physical geography and natural resources. The processes and interrelationships between the atmosphere, hydrosphere, biosphere, and lithosphere, particularly at, or near the Earth's surface, are investigated to serve as a basis for understanding the nature and distribution of natural resources.

NOTE Field Trip: estimated cost \$30.

LEARNING HOURS 120 (36L;12T;48P).

Requirements: Prerequisite None.

Offering Faculty: Faculty of Arts and Science

GPHY 105 The Digital Earth: Geospatial Data and Earth Observation Units: 3.00

A vast amount of geospatial data has now become publicly accessible through online tools and smartphones. This course provides a critical introduction to the sources of these geospatial data, and the techniques of their visualization and analysis. Students will, by the end of the course, be able to manipulate and analyze these data in GIS software.

NOTE GPHY 105/3.0 is an option course and will not be a prerequisite for entry into GPHY Plans as are GPHY 101/3.0 and GPHY 102/3.0.

LEARNING HOURS 114 (36L;78P)

Offering Faculty: Faculty of Arts and Science

GPHY 203 Water Resources and Management Units: 3.00

Water resources are coming under increasing pressure due to rising levels of demand and pollution. This course examines dimensions of the world's need for this critical resource.

Topics include water distribution and availability, water quality, different water uses and demands, water treatment, and approaches to water management and allocation.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite Level 2 or above or permission of the Department. Equivalency GPHY 103.

Offering Faculty: Faculty of Arts and Science

GPHY 204 Forests as a Global Resource Units: 3.00

Forests are a critical global resource, containing significant biodiversity, regulating CO₂ in the atmosphere, and providing cultural and economic benefits to society. Yet forests are threatened by over-harvesting, fire, development and environmental change. This course examines the ecology, distribution, and sustainability of the world's forests.

LEARNING HOURS 120 (36L;30G;54P).

Requirements: Prerequisite Level 2 or above or permission of the Department. Equivalency GPHY 104.

Offering Faculty: Faculty of Arts and Science

GPHY 207 Principles Of Biogeography Units: 3.00

An examination of ecological and earth system processes that affect the dynamics of organisms, their spatial patterns and their variability in time.

LEARNING HOURS 114 (36L;18Pc;12I;48P).

Requirements: Prerequisite (GPHY 102 or [3.0 units from BIOL or GEOL]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 208 Surface Processes, Landforms, and Soils Units: 3.00

Explores the structure of, and physical processes responsible for the development of landforms and soils. Understanding these systems is directly relevant to environmental planning, hazard and risk assessment, geology, and surface processes on other planets. Topics include weathering, volcanic, tectonic, mass wasting, glacial, and fluvial processes.

NOTE Field Trip: estimated cost \$25.

LEARNING HOURS 120 (36L;36Lb;48P).

Requirements: Prerequisite GPHY 102 or permission of the Department.

Offering Faculty: Faculty of Arts and Science

**GPHY 209 Weather and Climate Units: 3.00**

The weather and climate system will be investigated to provide a background to interpret weather conditions and to understand broader climate and climate change phenomena. Topics include: atmospheric properties, energy and moisture exchanges, weather system evolution, precipitation, climate classification, and forecasting.

LEARNING HOURS 114 (36L;18Pc;60P).

Requirements: Prerequisite GPHY 102 or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 215 Field Studies in Physical Geography Units: 3.00

This course will introduce students to field methods and techniques used in wide variety of physical geography and related environmental fields. The emphasis will be on hands-on application of field sampling, measuring and mapping approaches. Taught as a field camp in prior to fall term, or after the exam period in April.

NOTE Field Trip: estimated cost \$500.

LEARNING HOURS 120 (80;40Oc;72P).

Requirements: Prerequisite (GPHY 207 or GPHY 208 or GPHY 209) or permission of the Department. Equivalency GPHY 307.

Offering Faculty: Faculty of Arts and Science

GPHY 227 Cities: Geography, Planning and Urban Life Units: 3.00

The city from a geographical and planning perspective. Topics include origins of urbanism; mega; migrant, and global cities; urban competitiveness; land use planning and design; suburbanization and sprawl; new urban identities and culture; retailing transport; public space; private and temporary cities; urban poverty; politics and governance; sustainable urban futures.

NOTE Also offered online. Consult Arts and Science Online.

Learning Hours may vary.

LEARNING HOURS 120 (18L;18T;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 228 Geographies of the Global Political Economy Units: 3.00

This course examines how geographers understand the global economic system. Topics include globalization, regional economic integration, transnational production and marketing strategies of firms, new patterns of consumption, the rise of the service economy, and work and employment in the new economy.

LEARNING HOURS 129 (36L;9G;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 229 Place, Space, Culture and Social Life Units: 3.00

The role of place and space in understanding how social identities (gender, sexuality, race, nationality, class) are constructed and contested. Topics include the spaces and meanings of the body, home, work, leisure and consumption, cultural landscapes, constructions of nature, globalization and issues of knowledge, power and imperialism.

LEARNING HOURS 120 (36L;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 230 Introduction to Urban and Regional Planning Units: 3.00

Introduction to histories, concepts, principles and practices of urban and regional planning. Examines how diverse residents of communities are involved in plan preparation, technical analyses behind the plans, implementation tools and guiding infrastructure investment. Includes international precedents but focuses on Canadian community planning.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite Level 2 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 240 Introduction to Qualitative Methods in Geography Units: 3.00

An introduction to basic issues in research with human participants, and the qualitative methods commonly employed in such research in geography. Where relevant, students may be introduced to computer software used in qualitative research.

LEARNING HOURS 120 (36L;18Lb;66P).

Requirements: Prerequisite (GPHY 101 or GPHY 102 or BISC 100) or permission of the Department. Exclusion BMED 270; HSCI 270; SOCY 210.

Offering Faculty: Faculty of Arts and Science

GPHY 242 Remote Sensing I: Remote Sensing of the Environment Units: 3.00

The physical principles and practices of collecting, analyzing and interpreting various remote sensing data from the visible, infrared, and microwave regions of the electromagnetic spectrum are examined. In addition, the display, enhancement and interpretation of various digital remote sensing data, from airborne to satellite scales, is emphasized. Enrolment is limited.

LEARNING HOURS 120 (36L;24Lb;60P).

Requirements: Prerequisite (GPHY 101 or GPHY 102 or GPHY 105 or BISC 100) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 243 Geographic Information Science Units: 3.00

An introduction to the basic principles, techniques and applications of Geographic Information Science. Students will learn concepts of Global Positioning Systems (GPS), georeferencing, vector and raster based models and the nature of geospatial data.

LEARNING HOURS 120 (36L;24Pc;60P).

Requirements: Prerequisite Level 2 or above or permission of the Department.

Course Equivalencies: GISC201, GISC410, GPHY243

Offering Faculty: Faculty of Arts and Science

GPHY 247 Introduction to Statistics Units: 3.00

An introduction to the analysis of data from real life situations. Covers study design, descriptive and inferential statistics. Topics include probability, t-tests, regression, Chi-square tests, analysis of variance. Emphasis is in the foundation of statistical inference and practical application of statistical methods using statistical software.

LEARNING HOURS 126 (12L;18Lb;48O;48P).

Requirements: Prerequisite (GPHY 101 or GPHY 102 or BISC 100) or permission of the Department. Exclusion BIOL 243; CHEE 209; COMM 162; ECON 250; KNPE 251; NURS 323; POLS 385; PSYC 202; SOCY 211; STAM 200; STAT 263; STAT 267; STAT 367.

Offering Faculty: Faculty of Arts and Science

GPHY 250 The Geography of Canada Units: 3.00

A regional examination of how economic, political, cultural, and environmental factors shape relationships between land and people in Canada. Emphasis on geographical patterns of development and on the analytical and historical roots of public policy.

LEARNING HOURS 120 (36L;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 254 The Caribbean in Globalizing World Units: 3.00

The past, present and future role of the Caribbean in the world economy, with an emphasis on the colonial legacy, debt and dependency, the effects of neoliberal reform and the changing geographies, and patterns of uneven development created by increasingly transnational flows of capital, people and culture.

LEARNING HOURS 120 (36L;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 257 The Geography of Middle America Units: 3.00

The lands and peoples of Mexico, Central America, and the West Indies, emphasizing the historical factors that shape contemporary life in the region.

LEARNING HOURS 120 (36L;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 258 The Geography of South America Units: 3.00

The lands and peoples of South America, emphasizing how the colonial experience continues to affect contemporary life in the region.

LEARNING HOURS 120 (36L;24O;60P).

Requirements: Prerequisite Level 2 or above or permission of Department.

Offering Faculty: Faculty of Arts and Science

GPHY 304 Northern and Arctic Environments Units: 3.00

Advanced study of the physical geography of northern regions, emphasizing the Canadian Arctic.

LEARNING HOURS 126 (36L;6O;84P).

Requirements: Prerequisite (GPHY 102 or APSC 151) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 305 Applied Cold Regions Science Units: 3.00

Examining key aspects of cold regions science and processes using field and geospatial techniques applied to real-world case studies. Hands-on application of cold regions science methods will be used to explore major themes related to cold region climates, glaciology, hydrology, permafrost, snow science and resource development.

NOTE Field Trip: estimated cost \$75.

LEARNING HOURS 129 (36L;24Lb;9O;60P).

Requirements: Prerequisite (Level 3 or above and [GPHY 208 or GPHY 209]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

**GPHY 306 Natural Environmental Change Units: 3.00**

An overview of the causes and record of global and regional environmental change during the last 100,000 years. Topics include glaciation, ocean-atmosphere interactions, sea level change, climatic variability, vegetation dynamics and discerning between the impact of human activities and that of natural environmental forcing mechanisms.

LEARNING HOURS 126 (36L;60;84P).

Requirements: Prerequisite (GPHY 207 or GPHY 208 or GPHY 209) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 309 Field School in Geography Units: 3.00

This Field School explores the socio-political, cultural, and biophysical dimensions of human environment interactions. It examines how communities perceive and interact with their environments and how they are, in turn, impacted by change. Students will do readings, seminars, assignments, and participate in a Field School for up to four weeks.

NOTE Field School cost is dependent on location and duration in the field, to a maximum of \$3000. Please refer to the Department website for further information.

Requirements: Prerequisite (Level 3 or above and registration in a GPHY Plan) or permission of the Department. Note Visit the Department of Geography and Planning website for more information about this course.

Offering Faculty: Faculty of Arts and Science

GPHY 310 Landscape Ecology Units: 3.00

Study of the relationship between spatial pattern and ecological processes. Topics include spatial arrangement of ecosystems and its influence on the flow of energy, materials and biota; agents of pattern and change; methods and techniques for characterizing landscapes and detecting change; applications in resource conservation and management.

NOTE Field Trip: estimated cost \$30.

LEARNING HOURS 120 (24L;24Lb;60;66P).

Requirements: Prerequisite Level 3 or above and (GPHY 207 or [BIOL 201 and BIOL 202] or BIOL 200 or BIOL 111) or permission of the Department. Equivalency GPHY 418.

Offering Faculty: Faculty of Arts and Science

GPHY 312 Watershed Hydrology Units: 3.00

The course examines the processes that govern the flow and dissolved load in surface waters. Assignments focus on hydrological and hydrochemical data analysis and problem solving. Field projects emphasize hydrological monitoring techniques and methods used to collect and analyze the chemical composition of water samples.

NOTE Field Trip: estimated cost \$50.

LEARNING HOURS 108 (36L;36Lb;36P).

Requirements: Prerequisite (GPHY 208 or GPHY 209) or permission of the Department.

Course Equivalencies: GPHY308, GPHY312

Offering Faculty: Faculty of Arts and Science

GPHY 313 Glacier Processes and Dynamics Units: 3.00

Examining key aspects of contemporary glacier systems including glacier-climate processes, the mechanics of ice flow, and glacier impacts on human activities. Student-led projects give insight into the variability of glacier response globally, while laboratory exercises focus on field-based and remote-sensing approaches to glacier monitoring.

NOTE Field trips may apply in certain years dependent on snow and ice conditions; maximum cost \$75.

LEARNING HOURS 120(36L;36Lb;24O;24P).

Requirements: Prerequisite (Level 3 or above and [GPHY 208 or GPHY 209]) or permission of the Department.

Course Equivalencies: GPHY313, GPHY413

Offering Faculty: Faculty of Arts and Science

GPHY 314 Climate Change Units: 3.00

The study of historical and current climate change, projected future climates emphasizing the effects of global warming, impacts of climate change, and the role of humans as agents of climatic system change.

LEARNING HOURS 120 (36L;12T;72P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 315 Advanced Field Measurements and Their Analysis Units: 3.00

Introducing advanced techniques in environmental field measurements including the design and deployment of automatic weather stations and customized sensors, and geophysical techniques. Practical work involves the design and implementation of a field experiment, and an introduction to R programming as powerful tool for data analysis.

NOTE Field Trip: maximum cost \$500.

LEARNING HOURS 120 (36L;24Lb;60P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 317 Soil, Environment, and Society Units: 3.00

Soils are a critical resource required by societies. Using a strong methodological approach, this course will examine the important biological, chemical, and physical properties of soils. The course will also explore critical soil-related issues facing society, including salinization, degradation from agriculture, climate change, and erosion.

NOTE Field Trip: estimated cost \$30.

LEARNING HOURS 120 (36L;36Lb;48P).

Requirements: Prerequisite (GPHY 208 or GPHY 209) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 318 Advanced Biogeography Units: 3.00

An examination of the distributions of plants and animals on global, regional and local scales, their causes and significance.

NOTE Field Trip: estimated cost \$25.

LEARNING HOURS 116 (36L;80c;72P).

Requirements: Prerequisite Level 3 or above and (GPHY 207 or [BIOL 201 and BIOL 202] or BIOL 200 or BIOL 111) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 319 Contemporary Energy Resources Units: 3.00

Fossil and renewable energy resources are reviewed through a geographic lens. Energy supply and demand are discussed in terms of the global energy sector. The environmental, economic, and social impacts of conventional and renewable energy options are considered, as are policies used to drive a transition in our energy mix.

LEARNING HOURS 126 (36L;18G;360;36P).

Requirements: Prerequisite (Level 3 or above and registration in a GPHY Plan) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 320 Energy and Society Units: 3.00

A broad overview of human history from the earliest hunter-gatherers through the Industrial Revolution as seen through the lens of energy. Considered will be methods of energy generation, and conversion, ranging from the human body to the internal combustion engine, and the interaction of these methods with other aspects of society and economy.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 325 Maps and Society Units: 3.00

A critical study of cartographic representation from the pre-modern era up to and including the political, social, military, and economics roles of maps and geospatial data in the contemporary world.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 327 The Geographical Imagination Units: 3.00

Critical approaches to the role of the geographic, cultural and historical imagination in shaping landscapes, environments and society.

LEARNING HOURS 127 (36L;4G;120;30c;72P).

Requirements: Prerequisite (GPHY 229 or [3.0 units in DEVS at the 200-level or above]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 330 Transportation Geography Units: 3.00

The course provides a systematic examination of urban transportation in the context of general economic, social and spatial trends. Particular focus is placed on the role of the built environment in explaining travel behaviour. The aim is to provide a fair understanding of transportation planning and policy issues and explore potential solutions.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 332 Cities and Planning for Sustainable Development Units: 3.00

Contemporary community planning and urban development from the perspectives of social sciences, planning and real estate development. Emphasis on understanding actors in the process and creating projects that are socially, environmentally and economically sustainable. Informed by international perspectives, but focused on Canadian cities.

NOTE Case Materials: estimated cost \$30. Optional Field Trip: estimated cost up to \$300.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (GPHY 227 and (GPHY 228 or GPHY 229 or DEVS 230) or permission of the Department.

Offering Faculty: Faculty of Arts and Science



GPHY 333 Markets, Environments and Societies Units: 3.00

This course examines the spatial relations (politics, social relations, ecosystems) that shape market exchange and the functioning of economies. We will explore attempts to create markets out of social and environmental 'things' that resist commodification from carbon to care as well as the connections between markets and other aspects of life. LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (Level 3 or above and [GPHY 227 or GPHY 228 or GPHY 229]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 334 Geographies of Growth and Decline Units: 3.00

This course explores how the growth-focus of capitalist society has led to the widespread assumption of growth and territorial stigma of decline. We will examine how social, economic, environmental, cultural, and political processes at the local, national, and global level shape and reinforce distinct geographies of growth and decline. LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 336 Geography, the Environment and Human Health Units: 3.00

Examines the relationship between human health and built, physical, and social environments. Focus is influence of local environmental conditions on population health outcomes within the North American urban context. Policy and programming options for improving local conditions are explored.

LEARNING HOURS 120 (36L;24I;24O;36P)

Requirements: Prerequisite Level 3 and (3.0 units from BIOL 243; CHEE 209; COMM 162; ECON 250; GPHY 240; GPHY 247; KNPE 251; NURS 323; POLS 385; PSYC 202; SOCY 211; STAM 200; STAT 263; STAT 267; STAT 367) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 337 Regional Development and Planning Units: 3.00

Focus on regional planning and development processes, policies, and theories. Explore methods of regional analysis. Assessment of regional planning and development strategies and policy instruments used primarily in Canada with case examples from other international locations. LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (Level 3 or above and [GPHY 228 or GPHY 227 or GPHY 247 or 3.0 units in DEVS at the 200-level or above]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 338 Urban Political Geography Units: 3.00

The forces involved in shaping the political environment and spatial structure of urban areas. Emphasis on the significance of decisions concerning public goods in the distribution of income and equity within the city.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (6.0 units from GPHY 227; GPHY 228; GPHY 229) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 339 Medical Geography Units: 3.00

Current issues in disease ecology and health care delivery systems. Emphasis on patterns of incidence, cultural and environmental associations, spread and control of infectious diseases, comparisons of health care delivery systems, and accessibility to health services.

LEARNING HOURS 120 (36L;24I;24O;36P)

Requirements: Prerequisite Level 3 and (3.0 units from BIOL 243; CHEE 209; COMM 162; ECON 250; GPHY 240; GPHY 247; KNPE 251; NURS 323; POLS 385; PSYC 202; SOCY 211; STAM 200; STAT 263; STAT 267; STAT 367) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 341 Photogrammetry Units: 3.00

An intensive introduction to the art and science of 3D measurement and mapping using photographs, with a particular focus on applications in GIS, Cartography, Cultural Heritage, Urban Planning, Geology and Engineering. LEARNING HOURS 120 (36L;36Lb;48P).

Requirements: Prerequisite Level 3 or above or permission of the Department. Equivalency CLST 351.

Course Equivalencies: GPHY341; CLST351

Offering Faculty: Faculty of Arts and Science

GPHY 342 Remote Sensing II: Digital Image Processing Units: 3.00

This course represents an extension of GPHY 242, with an in-depth examination of image processing techniques for information extraction. Topics include remote sensor technology, image enhancement, classification, change detection, radiometric and geometric correction and sources and applications of remote sensing data.

NOTE Enrollment limited to 40 students.

LEARNING HOURS 120 (24L;24Pc;72P).

Requirements: Prerequisite (GPHY 242 and GPHY 247) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 343 Applications for Geospatial Technology for Business Units: 3.00

This course introduces the practical use of GIS in business and strategic planning decisions. Students will learn how to collect, visualize, and analyze spatial data to address many business, socio-economic, and demographic challenges from a spatial context and present solutions on maps for a wide range of business applications.

LEARNING HOURS 126 (24L;24Lb;24O;54P).

Requirements: Prerequisite GPHY 243 or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 344 Cartography and Computer Aided Design Units: 3.00

An introduction to the principles of Computer Aided Design (CAD) for the creation, manipulation, and editing of plans and maps. Topics will explore the fundamentals of good map design, best practices for visualizing geographic data, digitizing and georeferencing historic maps and air photos, and importing/exporting CAD drawings to/from GIS software.

LEARNING HOURS 120 (24L;24Pc;24G;24O;24P).

Requirements: Prerequisite Level 3 or above or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 345 Spatial Analysis Units: 3.00

An in-depth exploration of the spatial analysis techniques used in vector GIS. The analysis of geographic primitives of points, lines, areas and surfaces in the context of applications drawn from geography, biology, planning and related disciplines. Emphasis is placed on the use of current GIS software in a hands-on environment.

LEARNING HOURS 120 (24L;24Pc;24G;24O;24P)

Requirements: pre GPHY243 and (stats)

Course Equivalencies: GISC301, GPHY345

Offering Faculty: Faculty of Arts and Science

GPHY 346 GIS and Modelling for Environmental Applications Units: 3.00

Study of the techniques of Geographic Information Systems and their applications in solving physical and environmental problems. Topics include data representation and models, spatial interpolation, raster-based analysis and modeling, surface models and terrain analysis, data visualization, temporal analysis, error and accuracy, and other algorithms and analytical procedures.

LEARNING HOURS 120 (24L;24Pc;24G;24O;24P).

Requirements: Prerequisite (GPHY 243 and [3.0 units from GPHY 247; ECON 250; KNPE 251; PHED 251; POLS 385; PSYC 202; SOCY 211; STAT 263; STAT 267; STAT 367]) or permission of the Department.

Course Equivalencies: GISC302, GPHY346

Offering Faculty: Faculty of Arts and Science

GPHY 347 Multivariate and Spatial Statistics Units: 3.00

This course offers an introduction to the theory and application of multivariate statistics to geographical data. Topics include regression and correlation analysis, ANOVA, spatial autocorrelation and other spatial statistics as well as geostatistical operations in GIS software.

LEARNING HOURS 120 (24L;24Pc;24O;24P).

Requirements: Prerequisite 3.0 units from GPHY 247; ECON 250; KNPE 251; PHED 251; POLS 385; PSYC 202; SOCY 211; STAT 263; STAT 267; STAT 367.

Offering Faculty: Faculty of Arts and Science

GPHY 348 Application Design and Customization in GIS Units: 3.00

An introduction to customization of GIS and database software with an emphasis on spatial analysis tool development for desktop and Web-based GIS. Students will learn concepts of user requirements analysis, software requirements preparation, interface and software design, and computer programming while they develop customized GIS applications.

LEARNING HOURS 120 (24L;24Pc;24G;24O;24P).

Requirements: Prerequisite GPHY 243 or (3.0 units from GPHY 247; ECON 250; KNPE 251; PHED 251; POLS 385; PSYC 202; SOCY 211; STAT 263; STAT 267; STAT 367) or permission of the Department.

Course Equivalencies: GISC303, GPHY348

Offering Faculty: Faculty of Arts and Science

**GPHY 349 GIScience and Public Health Units: 3.00**

This course examines contemporary applications of geographic information science (GIScience) and geographic information system (GIS) in public health, including disease mapping, environmental hazards, spatial epidemiology, and problems of accessibility to and siting of health services. LEARNING HOURS 120 (24L;24Pc; 72P).

Requirements: Prerequisite (GPHY 243 and GPHY 247) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 351 Geographies of Indigenous and Settler Relations Units: 3.00

An overview of selected elements of the geographies of Aboriginal peoples in Canada with a focus on the relationship between Aboriginal peoples and their environments, urbanization and culture change, and colonialism. LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (Level 3 or above and [6.0 units from GPHY 227; GPHY 228; GPHY 229] or [3.0 units at the 200-level or above in DEVS or GNDS]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 352 Gender and the City Units: 3.00

Gender in relationship to the spatial organization of contemporary cities. Emphasis on the diversity of gendered experiences as they relate to the urban: housing, violence, social movements, work, and gender symbols LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (6.0 units from GPHY 227; GPHY 228; GPHY 229) or (3.0 units at the 200-level or above in GNDS) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 362 Human Migration Units: 3.00

The movement of people across the surface of the earth from early times to the present, focusing on contemporary issues of immigration, refugees, human rights, social integration and barriers to integration including discussions of racism, citizenship, multiculturalism, and community infrastructure. LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (GPHY 227 or GPHY 228 or GPHY 229) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 365 Geography, Development, and Environment in the 'Third World' Units: 3.00

The geographical implications of the incorporation of the Third World into the global economy. Emphasis will be upon issues relating to both the physical and human environments in reference to development, ecological alteration, cultural change, and spatial readjustment.

LEARNING HOURS 120 (36L;120;72P).

Requirements: Prerequisite (Level 3 or above and [6.0 units from GPHY 227; GPHY 228; GPHY 229] or [3.0 units at the 200-level or above in DEVS or GNDS] or [ENSC 103 or ENSC 203]) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 368 Environments and Society Units: 3.00

A critical evaluation of the changing relationships between nature and society.

LEARNING HOURS 127 (36L;4G;120;30c;72P).

Requirements: Prerequisite (6.0 units from GPHY 227; GPHY 228; GPHY 229) or (3.0 units at the 200-level or above in DEVS).

Offering Faculty: Faculty of Arts and Science

GPHY 369 Urban Natures Units: 3.00

This course examines how interlocking systems of power produce urban environmental issues such as water access, climate disaster, infectious disease, sanitation systems, and foodscapes. It draws on feminist, political economic, Indigenous, and decolonial systems of thought to consider urban environments across the Global North and South. NOTE Field Trip fees may apply in certain years: maximum cost \$150.

LEARNING HOURS 123 (36L;30c;84P).

Requirements: Prerequisite (6.0 units from GPHY 227; GPHY 228; GPHY 229) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 370 Special Topics in Human Geography Units: 3.00

Course offered by visiting faculty on Geography topics related to their research interests. Consult the departmental homepage for further details of specific course offerings each academic year.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (Level 3 or above and registration in a GPHY Plan) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 371 Special Topics in Earth System Science Units: 3.00

Course offered by visiting faculty on Geography topics related to their research interests. Consult the departmental homepage for further details of specific course offerings each academic year.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (Level 3 or above and registration in a GPHY Plan) or permission of the Department.

Offering Faculty: Faculty of Arts and Science

GPHY 372 Special Topics Geographic Information Science Units: 3.00

This course provides intensive coverage of a topic in Geographic Information Science and will be offered periodically by visiting professors. Consult the Departmental homepage for details on specific course offerings each year.

LEARNING HOURS 120 (36L;84P).

Requirements: Prerequisite (Level 3 or above and registration in a GPHY Plan) or permission of the Department.

Course Equivalencies: GISC390, GPHY372

Offering Faculty: Faculty of Arts and Science

GPHY 401 Honours Seminar in Human Geography I Units: 3.00

Seminars offered by regular and visiting faculty on Geography topics related to their research interests. Consult the departmental homepage for further details of specific course offerings each academic year.

NOTE Field Trip fees may apply in certain years: maximum cost \$300.

LEARNING HOURS 132 (36S;240c;72P).

Requirements: Prerequisite Level 4 or above and registration in a (GPHY Major [Arts] or Medial Plan) and (a minimum GPA of 2.60 in 24.0 units in GPHY). Exclusion GPHY 402; GPHY 403.

Offering Faculty: Faculty of Arts and Science

GPHY 402 Honours Seminar in Human Geography II Units: 3.00

Seminars offered by regular and visiting faculty on Geography topics related to their research interests. Consult the departmental homepage for further details of specific course offerings each academic year.

NOTE Field Trip fees may apply in certain years: maximum cost \$300.

LEARNING HOURS 132 (36S;240c;72P).

Requirements: Prerequisite Level 4 or above and registration in a (GPHY Major [Arts] or Medial Plan) and (a minimum GPA of 2.60 in 24.0 units in GPHY). Exclusion GPHY 401; GPHY 403.

Offering Faculty: Faculty of Arts and Science

GPHY 403 Honours Seminar in Human Geography III Units: 3.00

Seminars offered by regular and visiting faculty on Geography topics related to their research interests. Consult the departmental homepage for further details of specific course offerings each academic year.

NOTE Field Trip fees may apply in certain years: maximum cost \$300.

LEARNING HOURS 132 (36S;240c;72P).

Requirements: Prerequisite Level 4 or above and registration in a (GPHY Major [Arts] or Medial Plan) and (a minimum GPA of 2.60 in 24.0 units in GPHY). Exclusion GPHY 401; GPHY 402.

Offering Faculty: Faculty of Arts and Science

GPHY 413 Water, Energy and Carbon Cycling in the Biosphere Units: 3.00

The study of the interaction of the atmosphere with the surface in terms of radiative, heat, water, and trace gas fluxes.

NOTE Field trip fees may apply in certain years. See departmental webpage for more information. Cost will vary depending on location, but not likely to exceed \$175 per year. LEARNING HOURS 120 (36L;12Lb;72P).

Requirements: Prerequisite Level 4 or above and registration in a (GPHY Major [Science] or EGPY Specialization Plan) and (6.0 units from MATH at the 100-level or above) and (6.0 units from BIOL or CHEM or PHYS at the 100-level or above) and a (minimum GPA of 1.90 in 30.0 units from GPHY).

Course Equivalencies: GPHY313, GPHY413

Offering Faculty: Faculty of Arts and Science

GPHY 415 Advanced Analysis of Earth Surface Processes Units: 6.00

A fourth year Honours capstone project course exploring a contemporary geographic issue by integrating advanced knowledge and skills in physical geography and geographic information science. Focus will be on integration of field and laboratory methods, and how they are used to explore contemporary geographic or environmental issues.

NOTE Field Trips within the Province of Ontario: maximum cost \$175.

LEARNING HOURS 240 (12L;12S;36Lb;12G;240c;144P).

Requirements: Prerequisite Level 4 or above and registration in a (GPHY Major [Science] or EGPY Specialization Plan) and (6.0 units from MATH or STAT at the 100-level or above) and (6.0 units from CHEM or PHYS at the 100-level or above) and a (minimum GPA of 1.90 in 30.0 units from GPHY).

Offering Faculty: Faculty of Arts and Science



GPHY 417 Land-Use Change in the Earth System Units: 3.00

Changes in land use and land cover represent significant changes to the dynamics of the earth system. This course will explore the methods used to quantify rates of land-use and land-cover change, and also the biophysical consequences of these changes. The goal of the course is to develop a framework for evaluating the biophysical and societal trade-offs associated with land-use decisions.

NOTE Field Trip fees may apply in certain years: maximum cost \$175.

LEARNING HOURS 131 (30L;41Oc;60P).

Requirements: Prerequisite Level 4 or above and registration in a (GPHY Major [Science] or EGPY Specialization Plan) and (6.0 units from MATH at the 100-level or above) and (6.0 units from BIOL or CHEM or PHYS at the 100-level or above) and a (minimum GPA of 1.90 in 30.0 units from GPHY).

Offering Faculty: Faculty of Arts and Science

GPHY 501 Special Studies in Geography Units: 3.00

Open to fourth-year students who have an average of A- or greater in those courses which form their concentration for admission to Honours in Geography. Special consideration will be given to requests from students with an average of B or more in those courses which form their concentration for admission to Honours. The student will arrange a program of study with a specific member of the Department.

LEARNING HOURS 120 (24I;96P).

Requirements: Prerequisite (Level 4 or above and registration in a [GPHY Major or Medial Plan or EGPY Specialization Plan] and a [minimum GPA of 3.50 in 24.0 units in GPHY] and [consent of a supervising member of the Department]) or by permission of the Departmental Undergraduate Committee. Exclusion GPHY 502; GPHY 503.

Offering Faculty: Faculty of Arts and Science

GPHY 502 Research and Thesis in Geography I Units: 3.00

Research project in Geography supervised by a member of the faculty. Research involving the amount of work associated with other senior 3.0 unit courses will be done as GPHY 502.

NOTE Admission is subject to the availability of supervisors. LEARNING HOURS 120 (24I;96P).

Requirements: Prerequisite (Level 4 or above and registration in a [GPHY Major or Medial Plan or EGPY Specialization Plan] and a [minimum GPA of 3.50 in 24.0 units in GPHY] and [consent of a supervising member of the Department]) or by permission of the Departmental Undergraduate Committee. Exclusion GPHY 501; GPHY 502.

Offering Faculty: Faculty of Arts and Science

GPHY 503 Research and Thesis Geography II Units: 6.00

Research project in Geography supervised by a member of the faculty. Research involving the amount of work associated with larger research projects with work comparable to a 6.0 unit course (including work completed during summer) may be done as GPHY 503.

NOTE Admission is subject to the availability of supervisors. LEARNING HOURS 240 (48I;192P).

Requirements: Prerequisite (Level 4 or above and registration in a [GPHY Major or Medial Plan or EGPY Specialization Plan] and a [minimum GPA of 3.50 in 24.0 units in GPHY] and [consent of a supervising member of the Department]) or by permission of the Departmental Undergraduate Committee. Exclusion GPHY 501; GPHY 502.

Offering Faculty: Faculty of Arts and Science

GPHY 594 Independent Study Units: 3.00

Offering Faculty: Faculty of Arts and Science

GPHY 595 Independent Study Units: 6.00

Offering Faculty: Faculty of Arts and Science

GPHY 596 Independent Study Units: 12.00

Offering Faculty: Faculty of Arts and Science

GPHY 597 Independent Study Units: 18.00

Offering Faculty: Faculty of Arts and Science