

Geography

The following programs are offered by the Department of Geography and Environmental Studies in cooperation with other academic units.

Earth Sciences and Physical Geography B.Sc.

Combined Honours: see the Earth Sciences program section of this Calendar.

Earth Sciences and Geography B.Sc. Combined Honours with Concentration in Terrain Science: see the Earth Sciences program section of this Calendar.

Graduation Requirements

In addition to the requirements listed below, students must satisfy:

1. the University regulations, including the process of Academic Performance Evaluation (see the *Academic Regulations of the University* section of this Calendar),
2. for B.A. programs, the common regulations applying to all B.A. students including those relating to Breadth Requirements (see *Academic Regulations for the Bachelor of Arts Degree*),
3. for B.Sc. programs the common regulations applying to all B.Sc. students including those relating to Science Continuation and Breadth Requirements (see *Academic Regulations for the Bachelor of Science Degree*).

Students should consult the Department when planning their program and selecting courses.

B.A. Program Requirements

Geography

B.A. Honours (20.0 credits)

A. Credits Included in the Major CGPA (10.0 credits)

1. 1.0 credit in:	1.0
GEOG 1010 [0.5]	Global Environmental Systems
GEOG 1020 [0.5]	People, Places and Environments
2. 0.5 credit from:	0.5
GEOG 2020 [0.5]	Physical Environments of Canada
GEOG 2013 [0.5]	Weather and Water
GEOG 2014 [0.5]	The Earth's Surface
3. 1.5 credits in:	1.5
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution
GEOG 2005 [0.5]	Geographic Inquiry
GEOG 2006 [0.5]	Statistical Methods in Geography
4. 1.0 credit in:	1.0
GEOG 2200 [0.5]	Global Connections
GEOG 2300 [0.5]	Space, Place and Identity
5. 1.0 credit in:	1.0
GEOG 3000 [0.5]	Honours Field Course
or GEOG 3030 [0.5]	Regional Field Excursion
GEOG 3900 [0.5]	Geographic Thought and Methodology
6. 0.5 credit from:	0.5

GEOG 3001 [0.5]	Qualitative Methods	
GEOG 3003 [0.5]	Quantitative Geography	
GEOM 2007 [0.5]	Geographic Information Systems	
GEOM 3002 [0.5]	Air Photo Interpretation and Remote Sensing	
GEOM 3007 [0.5]	Cartographic Theory and Design	
7. 1.0 credit from:		1.0
GEOG 3021 [0.5]	Culture, Place and Time	
GEOG 3022 [0.5]	Environmental and Natural Resources	
GEOG 3023 [0.5]	Cities in a Global World	
GEOG 3024 [0.5]	Understanding Globalization	
GEOG 3025 [0.5]	Geographies of Selected Regions	
GEOG 3026 [0.5]	Topics in the Geography of Canada	
8. 1.0 credit in GEOG and/or GEOM at the 3000- level or above		1.0
9. 2.5 credits from:		2.5
a) Thesis stream: GEOG 4909 [1.0] plus 1.5 credits in GEOG/GEOM at the 4000-level		
b) Course stream: 2.5 credits in GEOG/GEOM at the 4000-level		
B. Credits Not Included in the Major CGPA (10.0 credits)		
10. 8.0 credits in electives not in GEOG		8.0
11. 2.0 credits in free electives		2.0
Total Credits		20.0

Geography with Concentration in Physical Geography

B.A. Honours (20.0 credits)

A. Credits Included in the Major CGPA (10.0 credits)

1. 1.0 credit in:	1.0
GEOG 1010 [0.5]	Global Environmental Systems
GEOG 1020 [0.5]	People, Places and Environments
2. 1.5 credits in:	1.5
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution
GEOG 2005 [0.5]	Geographic Inquiry
GEOG 2006 [0.5]	Statistical Methods in Geography
3. 0.5 credit from:	0.5
GEOG 2200 [0.5]	Global Connections
GEOG 2300 [0.5]	Space, Place and Identity
4. 1.0 credit in:	1.0
GEOG 3000 [0.5]	Honours Field Course
or GEOG 3010 [0.5]	Field Methods in Physical Geography
GEOG 3900 [0.5]	Geographic Thought and Methodology
and in Physical Geography	
5. 1.0 credit in:	1.0
GEOG 2013 [0.5]	Weather and Water
GEOG 2014 [0.5]	The Earth's Surface
6. 0.5 credit from:	0.5
GEOG 4406 [0.5]	Practicum I
GEOG 4408 [0.5]	Practicum II (with a placement in physical geography)
7. 2.0 credits from:	2.0
GEOG 3102 [0.5]	Geomorphology
GEOG 3103 [0.5]	Watershed Hydrology

GEOG 3104 [0.5]	Principles of Biogeography	
GEOG 3105 [0.5]	Climate and Atmospheric Change	
GEOG 3108 [0.5]	Soil Properties	
GEOM 3002 [0.5]	Air Photo Interpretation and Remote Sensing	
8. 2.5 credits from:		2.5
a) Thesis stream:		
i. 1.0 credit in:		
GEOG 4909 [1.0]	Honours Research Essay	
ii. 1.5 credits from:		
GEOM 4003 [0.5]	Remote Sensing of the Environment	
GEOG 4004 [0.5]	Environmental Impact Assessment	
GEOG 4005 [0.5]	Directed Studies in Geography (with a topic in physical geography)	
GEOG 4013 [0.5]	Cold Region Hydrology	
GEOG 4017 [0.5]	Global Biogeochemical Cycles	
GEOG 4101 [0.5]	Quaternary Geography	
GEOG 4103 [0.5]	Water Resources Engineering	
GEOG 4104 [0.5]	Microclimatology	
GEOG 4108 [0.5]	Permafrost	
OR		
b) Course stream:		
2.5 credits from:		
GEOM 4003 [0.5]	Remote Sensing of the Environment	
GEOG 4004 [0.5]	Environmental Impact Assessment	
GEOG 4005 [0.5]	Directed Studies in Geography	
GEOG 4013 [0.5]	Cold Region Hydrology	
GEOG 4017 [0.5]	Global Biogeochemical Cycles	
GEOG 4101 [0.5]	Quaternary Geography	
GEOG 4103 [0.5]	Water Resources Engineering	
GEOG 4104 [0.5]	Microclimatology	
GEOG 4108 [0.5]	Permafrost	
B. Credits Not Included in the Major CGPA (10.0 credits)		
10. 8.0 credits in electives not in GEOG or GEOM		8.0
11. 2.0 credits in free electives.		2.0
Total Credits		20.0

Geography

B.A. Combined Honours (20.0 credits)

A. Credits Included in the Geography Major CGPA (7.0 credits)		
1. 1.0 credit in:		1.0
GEOG 1010 [0.5]	Global Environmental Systems	
GEOG 1020 [0.5]	People, Places and Environments	
2. 0.5 credit from:		0.5
GEOG 2020 [0.5]	Physical Environments of Canada	
GEOG 2013 [0.5]	Weather and Water	
GEOG 2014 [0.5]	The Earth's Surface	
3. 0.5 credit from:		0.5
GEOG 2200 [0.5]	Global Connections	
GEOG 2300 [0.5]	Space, Place and Identity	
4. 1.0 credit from:		1.0
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution	
GEOG 2005 [0.5]	Geographic Inquiry	

GEOG 2006 [0.5]	Statistical Methods in Geography	
5. 0.5 credit in:		0.5
GEOG 3900 [0.5]	Geographic Thought and Methodology	
6. 1.5 credits in GEOG and/or GEOM at the 3000- level or above		1.5
7. 1.0 credit in GEOG and/or GEOM at the 4000- level		1.0
8. 1.0 credit in:		1.0
GEOG 4909 [1.0]	Honours Research Essay or GEOG at the 4000-level	
B. Additional Requirements (13.0 credits)		13.0
9. The requirements of the other Honours discipline must be satisfied		
10. 5.0 credits in electives not in Geography or the other discipline		
11. Sufficient free electives to total 20.0 credits for the program.		
Total Credits		20.0

Geography

B.A. General (15.0 credits)

A. Credits Included in the Major CGPA (7.0 credits)		
1. 1.0 credit in:		1.0
GEOG 1010 [0.5]	Global Environmental Systems	
GEOG 1020 [0.5]	People, Places and Environments	
2. 0.5 credit from:		0.5
GEOG 2020 [0.5]	Physical Environments of Canada	
GEOG 2013 [0.5]	Weather and Water	
GEOG 2014 [0.5]	The Earth's Surface	
3. 1.0 credit from:		1.0
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution	
GEOG 2005 [0.5]	Geographic Inquiry	
GEOG 2006 [0.5]	Statistical Methods in Geography	
4. 1.0 credit in:		1.0
GEOG 2200 [0.5]	Global Connections	
GEOG 2300 [0.5]	Space, Place and Identity	
5. 1.0 credit in GEOG and/or GEOM at the 2000- level or above		1.0
6. 2.5 credits in GEOG and/or GEOM at the 3000- level or above		2.5
B. Credits Not Included in the Geography Major CGPA (8.0 credits)		
7. 7.0 credits in electives not in GEOG or GEOM		7.0
8. 1.0 credit in free electives.		1.0
Total Credits		15.0

Course Categories for

B.Sc. Geography

Geography Science Electives		
GEOG 1010 [0.5]	Global Environmental Systems	
GEOG 2006 [0.5]	Statistical Methods in Geography	
GEOG 2013 [0.5]	Weather and Water	
GEOG 2014 [0.5]	The Earth's Surface	
GEOG 3000 [0.5]	Honours Field Course	
GEOG 3010 [0.5]	Field Methods in Physical Geography	

GEOG 3003 [0.5]	Quantitative Geography
GEOG 3102 [0.5]	Geomorphology
GEOG 3103 [0.5]	Watershed Hydrology
GEOG 3104 [0.5]	Principles of Biogeography
GEOG 3105 [0.5]	Climate and Atmospheric Change
GEOG 3108 [0.5]	Soil Properties
GEOG 4000 [0.5]	Field Studies
GEOG 4004 [0.5]	Environmental Impact Assessment
GEOG 4005 [0.5]	Directed Studies in Geography
GEOG 4013 [0.5]	Cold Region Hydrology
GEOG 4017 [0.5]	Global Biogeochemical Cycles
GEOG 4101 [0.5]	Quaternary Geography
GEOG 4103 [0.5]	Water Resources Engineering
GEOG 4104 [0.5]	Microclimatology
GEOG 4108 [0.5]	Permafrost
GEOG 4406 [0.5]	Practicum I
GEOG 4408 [0.5]	Practicum II

Geomatics Science Electives

GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution
GEOM 2007 [0.5]	Geographic Information Systems
GEOM 3002 [0.5]	Air Photo Interpretation and Remote Sensing
GEOM 3005 [0.5]	Geospatial Analysis
GEOM 3007 [0.5]	Cartographic Theory and Design
GEOM 4003 [0.5]	Remote Sensing of the Environment
GEOM 4007 [0.5]	Seminar in Cartography
GEOM 4008 [0.5]	Advanced Topics in Geographic Information Systems
GEOM 4009 [0.5]	Applications in Geographic Information Systems
GEOM 4406 [0.5]	Practicum I
GEOM 4408 [0.5]	Practicum II

Science Continuation

See Academic Regulations for the Bachelor of Science Degree for a list of courses in this category.

Experimental Science Electives

See Academic Regulations for the Bachelor of Science Degree for a list of courses in this category.

Approved Arts or Social Sciences Electives

See Academic Regulations for the Bachelor of Science Degree for a list of courses in this category.

B.Sc. Program Requirements

Geography with Concentration in Physical Geography

B.Sc. Honours (20.0 credits)

A. Credits Included in the Major CGPA (9.0 credits)

1. 0.5 credit from:	0.5
GEOG 1010 [0.5]	Global Environmental Systems
ERTH 1006 [0.5]	Exploring Planet Earth
2. 1.5 credits in:	1.5
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution
GEOG 2013 [0.5]	Weather and Water
GEOG 2014 [0.5]	The Earth's Surface
3. 2.5 credits from:	2.5

GEOG 3010 [0.5]	Field Methods in Physical Geography
GEOG 3102 [0.5]	Geomorphology
GEOG 3103 [0.5]	Watershed Hydrology
GEOG 3104 [0.5]	Principles of Biogeography
GEOG 3105 [0.5]	Climate and Atmospheric Change
GEOG 3108 [0.5]	Soil Properties

4. 2.0 credits in GEOG or GEOM Science Electives at the 4000-level 2.0

5. 1.5 credits in GEOG Science Electives 1.5

6. 1.0 credit in: 1.0

GEOG 4906 [1.0] Honours Research Project

B. Credits Not Included in the Major CGPA (11.0 credits)

7. 1.0 credit in Experimental Science Electives 1.0

8. 0.5 credit in: 0.5

MATH 1007 [0.5] Elementary Calculus I

9. 0.5 credit in MATH, STAT or COMP 0.5

10. 2.0 credits in Science Continuation, not in GEOG or GEOM 2.0

11. 2.0 credits in Science Faculty Electives 2.0

12. 0.5 credit in: 0.5

NSCI 1000 [0.5] Seminar in Science (or Approved Arts or Social Sciences)

13. 1.0 credit in Approved Arts or Social Sciences, not in GEOG 1.0

14. 0.5 credit in Approved Arts or Social Sciences 0.5

15. 3.0 credits in free electives. 3.0

Total Credits 20.0

Minors

Minor in Geography (4.0 credits)

Open to all undergraduate degree students not in Geography programs.

Requirements

1. 1.0 credit in: 1.0

GEOG 1010 [0.5] Global Environmental Systems

GEOG 1020 [0.5] People, Places and Environments

2. 0.5 credit from: 0.5

GEOG 2013 [0.5] Weather and Water

GEOG 2014 [0.5] The Earth's Surface

GEOG 2020 [0.5] Physical Environments of Canada

3. 0.5 credit in: 0.5

GEOG 2005 [0.5] Geographic Inquiry

4. 0.5 credit from: 0.5

GEOG 2200 [0.5] Global Connections

GEOG 2300 [0.5] Space, Place and Identity

5. 1.0 credit in GEOG and/or GEOM at the 3000-level or above 1.0

6. 0.5 credit in GEOG or GEOM 0.5

7. The remaining requirements of the major discipline(s) and degree must be satisfied.

Total Credits 4.0

Minor in Geography: Physical Geography (4.0 credits)

Open to all undergraduate degree students not in Geography programs.

Requirements

1. 0.5 credit in:		0.5
GEOG 2013 [0.5]	Weather and Water	
2. 0.5 credit in:		0.5
GEOG 2014 [0.5]	The Earth's Surface	
3. 3.0 credits from:		3.0
GEOM 3002 [0.5]	Air Photo Interpretation and Remote Sensing	
GEOG 3102 [0.5]	Geomorphology	
GEOG 3103 [0.5]	Watershed Hydrology	
GEOG 3104 [0.5]	Principles of Biogeography	
GEOG 3105 [0.5]	Climate and Atmospheric Change	
GEOG 3108 [0.5]	Soil Properties	
GEOG 4013 [0.5]	Cold Region Hydrology	
GEOG 4017 [0.5]	Global Biogeochemical Cycles	
GEOG 4101 [0.5]	Quaternary Geography	
GEOG 4104 [0.5]	Microclimatology	
GEOG 4108 [0.5]	Permafrost	
4. The remaining requirements of the major discipline(s) and degree must be satisfied.		
Total Credits		4.0

Geography (GEOG) Courses

Geography and Env.St.

Faculty of Arts & Social Sciences

4000-level courses are normally restricted to students with fourth-year Honours standing. However, students with third-year standing may take 4000-level courses provided they have the necessary prerequisites, a Geography CGPA of 6.50 or better, and permission of the Department.

GEOG 1010 [0.5 credit]

Global Environmental Systems

Principles, processes and interactions in the Earth's environment emphasizing the flow of energy and matter within global systems. Atmospheric and oceanic processes, earth surface processes and biogeochemical cycling. Case studies on the interaction between human activity and the natural environment.

Precludes additional credit for GEOG 1001/ENST 1001 (if taken before 2006-2007).

Lectures three hours a week, laboratory two hours a week.

GEOG 1020 [0.5 credit]

People, Places and Environments

Examination of the relationships between people, society and the natural environment at scales ranging from the local community to the global one. Population change, cultural patterns, and the major historical, economic and political forces that shape human activity and experiences from place to place.

Also listed as ENST 1020.

Precludes additional credit for GEOG 1001/ENST 1001 (if taken before 2006-2007).

Lectures two hours a week and laboratory or tutorial one hour a week.

GEOG 2005 [0.5 credit]

Geographic Inquiry

Theory and method in the production of geographical knowledge. The research process, from generating questions through reporting results. Intensive and extensive research approaches are compared, demonstrating their complementary potential.

Fundamentals of qualitative data generation and analysis. Prerequisite(s): 1.0 credit in Geography or Environmental Studies at the 1000-level and second-year standing, or permission of the Department.

Lectures two hours a week, workshop two hours a week.

GEOG 2006 [0.5 credit]

Statistical Methods in Geography

Introduction to solving problems in geography using descriptive and inferential statistical methods. Graphical and numerical tools to describe distributions. Probability, sampling and estimates, and hypothesis testing. Fundamentals of spatial statistics and analysis.

Precludes additional credit for STAT 2507, STAT 2606, ECON 2200 [1.0], ECON 2201, ECON 2202, PSYC 2002, PSCI 2702.

Prerequisite(s): GEOG 2005 or permission of the Department.

Lectures two hours a week, laboratory two hours a week.

GEOG 2013 [0.5 credit]

Weather and Water

Introduction to climate, weather and the hydrological cycle. Physical properties of the atmosphere, radiation and energy balances, global circulation, atmospheric moisture and precipitation, weather systems and forecasting, mechanisms of climate change.

Precludes additional credit for GEOG 2100.

Prerequisite(s): GEOG 1010 or EARTH 1006.

Lectures three hours a week, laboratory three hours a week.

GEOG 2014 [0.5 credit]

The Earth's Surface

Introduction to geomorphology. Weathering, slope and fluvial processes within drainage basins, and glacial and periglacial processes.

Prerequisite(s): GEOG 1010 or EARTH 1006.

Lectures three hours a week, laboratory three hours a week.

GEOG 2020 [0.5 credit]**Physical Environments of Canada**

Canada's physiography, climates, biogeography, soils, and landforms.

Precludes additional credit for GEOG 2102.

Prerequisite(s): GEOG 1010 or EARTH 1006 or EARTH 1010.

Lectures three hours a week.

GEOG 2200 [0.5 credit]**Global Connections**

Globalization and global environmental change as linked processes. Geographical analysis of economic, cultural and political transformations acting at global, national and local scales. Choices and constraints underlying economic, social and environmental sustainability.

Prerequisite(s): 1.0 credit in Geography or Environmental Studies at the 1000-level, or second-year standing.

Lectures three hours a week.

GEOG 2300 [0.5 credit]**Space, Place and Identity**

Cultural specifications of place and identity in geopolitics. Landscapes as artifacts of local, national and global identity. Diasporas, migrations and historical evolution of the meanings of location. Consumption and urban cultural spaces.

Prerequisite(s): 1.0 credit in Geography or Environmental Studies at the 1000-level, or second-year standing.

Lectures two hours a week, discussion one hour a week.

GEOG 2600 [0.5 credit]**Geography Behind the Headlines**

Exploration of the geographical backgrounds to selected issues of current public interest, through geography's perspective of integrating human and physical environments. Issues selected will be structured from the global through the national/regional to the local, identifying the interdependencies among the scales.

Lecture three hours a week.

GEOG 3000 [0.5 credit]**Honours Field Course**

Guided and independent geographic field research, with a focus on data collection methods, analysis and presentation of findings. Normally consists of a 7-10 day field excursion in the Ottawa region. A supplementary charge may apply.

Precludes additional credit for ENST 2900 (no longer offered) and ENST 3900.

Prerequisite(s): third-year Honours standing in Geography, or permission of the Department.

GEOG 3001 [0.5 credit]**Qualitative Methods**

In-depth examination of the rationale for and use of qualitative approaches in geographical research. Topics include: links between theory and methods; qualitative methodologies, such as: interviewing, textual analysis, group discussions, participant observation, ethnography; interpretative strategies; research ethics; triangulation.

Prerequisite(s): GEOG 2005.

Lecture and discussion three hours per week.

GEOG 3003 [0.5 credit]**Quantitative Geography**

Quantitative methods used in geographical research: multiple correlation and regression, principal component/factor analysis, spatial statistics, cluster analysis, and a review of other selected techniques. Computer-based analysis.

Prerequisite(s): GEOG 2006 or permission of the Department.

Lecture two hours a week, laboratory two hours a week.

GEOG 3010 [0.5 credit]**Field Methods in Physical Geography**

Field and laboratory approaches, methodologies and techniques in physical geography. Field projects will be undertaken to collect data for analysis, evaluation and presentation. A supplementary charge may apply.

Prerequisite(s): GEOG 2013 or GEOG 2014.

Normally consists of six all-day sessions.

GEOG 3021 [0.5 credit]**Culture, Place and Time**

Examination of culture, identity and place over time. Colonial and other historical processes that have shaped societies from place to place; relationships between cultural groups and their natural surroundings; gender, ethnicity, nationality and other dimensions of identity; impacts of globalization.

Prerequisite(s): GEOG 2200 and GEOG 2300 and third-year standing or permission of the Department.

Lecture three hours a week.

GEOG 3022 [0.5 credit]**Environmental and Natural Resources**

Exploration of complexity, dynamics, uncertainty and equity issues underpinning environmental and resource issues; review and appraisal of selected contemporary methods to assess and manage environmental and natural resources.

Prerequisite(s): GEOG 2200 and GEOG 2300 and third-year standing or permission of the Department.

Lecture three hours a week.

GEOG 3023 [0.5 credit]**Cities in a Global World**

Introduces the study of cities as “systems of cities” - the political economy of linkages between urban places located unevenly in space - and, “cities as systems” - case studies of socio-cultural, political and economic relations within biophysical and built environments.

Prerequisite(s): GEOG 2200 or permission of the department.

Lecture and discussion three hours a week.

GEOG 3024 [0.5 credit]**Understanding Globalization**

Geographical analysis of processes of globalization: theoretical frameworks, historical context and contemporary challenges.

Prerequisite(s): GEOG 2200 and GEOG 2300 and third-year standing or permission of the Department.

Lecture three hours a week.

GEOG 3025 [0.5 credit]**Geographies of Selected Regions**

Geographical analysis of key questions facing a selected region of the world. Attention will focus on selected topics within one or more regions and their related global context.

Prerequisite(s): third-year standing in a B.A. program or permission of the Department.

Lecture three hours a week.

GEOG 3026 [0.5 credit]**Topics in the Geography of Canada**

Selected topic concerning the geography of Canada. Topic varies from year to year.

Precludes additional credit for GEOG 2505 [no longer offered].

Prerequisite(s): GEOG 1020 and second-year standing or permission of the Department.

Lecture three hours a week.

GEOG 3030 [0.5 credit]**Regional Field Excursion**

Guided and independent geographic field research, with a focus on data collection methods, and analysis and presentation of findings. Consists of an excursion outside of the Ottawa region. A supplementary charge may apply.

Prerequisite(s): third-year Honours standing in Geography, or permission of the Department.

A 7-10 day field excursion.

GEOG 3102 [0.5 credit]**Geomorphology**

Geomorphological agents of landscape change at the Earth's surface, emphasizing the role of water, ice and wind in erosion and deposition; use of geomorphic indicators in studies of environmental change. A supplementary charge may apply.

Prerequisite(s): GEOG 2014 and third-year standing, or permission of the Department.

Lectures two hours a week, laboratory two hours a week, one field excursion.

GEOG 3103 [0.5 credit]**Watershed Hydrology**

Principles of hydrology at local and watershed scales, emphasizing: soil moisture regimes; field data collection and analysis of surface water or snow and ice conditions; hydrologic processes in cold environments; and regional runoff regimes in Canada. A supplementary charge may apply.

Note: first-year mathematics and physics are recommended.

Prerequisite(s): GEOG 2013, or permission of the Department.

Lectures two hours a week, laboratory three hours a week, two field excursions, including a two-day excursion. Students are responsible for long-distance transportation, food and lodging costs associated with the field excursions.

GEOG 3104 [0.5 credit]**Principles of Biogeography**

Contemporary and past controls on distribution of plants and animals at global, regional and local scales; significance of these distributions.

Also listed as BIOL 3608.

Prerequisite(s): GEOG 1010 or BIOL 2600, or permission of the Department.

Lectures, laboratory, and fieldwork five hours a week.

GEOG 3105 [0.5 credit]**Climate and Atmospheric Change**

The global climate system, with emphasis on global change variability over the historical and modern periods; the changing composition of the atmosphere and its impact on climate; analysis and interpretation of climatic and atmospheric data; modeling of climate systems.

Prerequisite(s): GEOG 2006 and GEOG 2013 or permission of the Department.

Lecture two hours a week, laboratory two hours a week.

GEOG 3108 [0.5 credit]**Soil Properties**

The physical and chemical properties of soils; soil-water relationships, weathering processes, soil mineralogy, cation exchange, soil pH. A plant-oriented perspective predominates.

Precludes additional credit for GEOG 3008.

Prerequisite(s): GEOG 1010 or GEOG 2013, or permission of the Department.

Lectures and laboratory five hours a week.

GEOG 3206 [0.5 credit]**Health, Environment, and Society**

Factors influencing human health in an ecological framework involving population structure, habitat, and behaviour. Changes in the distribution of communicable and degenerative diseases are portrayed as being related to historical and contemporary development and globalization processes. Sources, types and characteristics of geographically referenced health information.

Precludes additional credit for GEOG 4206 (taken before 1999-2000).

Prerequisite(s): third-year standing.

Lectures three hours a week.

GEOG 3209 [0.5 credit]**Sustainability and Environment in the South**

Analysis of the relationships between people and environment in selected regions in the South (Africa, Asia, Latin America). Emphasis on sustainable livelihoods and local action in relation to broader socio-economic and political processes. Regions selected vary from year to year.

Prerequisite(s): third-year standing and GEOG 2200 or GEOG 2300 or permission of the Department.

Lecture and discussion three hours a week.

GEOG 3404 [0.5 credit]**Geographies of Economic Development**

Geographical approaches to economic development and difference at local, regional and global scales. Critical historical, cultural, social and political economic perspectives on 'development', including theories of the state, colonial power, and development institutions. Spatial dynamics and environmental impacts of economic activity.

Prerequisite(s): GEOG 2200 or permission of the Department.

Lectures three hours a week.

GEOG 3501 [0.5 credit]**Northern Lands**

The physical characteristics, historical geography, economic resources, settlement patterns and problems and the future development of Arctic and Subarctic lands, focusing primarily on Canada.

Prerequisite(s): third-year standing or permission of the Department.

Lectures three hours a week.

GEOG 3700 [0.5 credit]**Population Geography**

The distributional aspects of population attributes; areal patterns of population characteristics and their spatial variations associated with differences in the nature of places; migratory movements within the framework of spatial models of interactions between locations.

Prerequisite(s): GEOG 2200 or GEOG 2300, or permission of the Department.

Lectures three hours a week.

GEOG 3900 [0.5 credit]**Geographic Thought and Methodology**

Current debates in the academic discipline of geography; connections between these debates and key concepts used in the practice of geographic research; development of critical thinking, writing and presentation skills.

Prerequisite(s): third year Honours standing in Geography or permission of the department.

Lecture and discussion three hours a week.

GEOG 4000 [0.5 credit]**Field Studies**

Field observation and methodology in a selected region; individual or group basis.

Also listed as ENST 4400.

Prerequisite(s): permission of the Department.

Hours to be arranged.

GEOG 4004 [0.5 credit]**Environmental Impact Assessment**

Principles, scope and purpose of environmental impact assessment, from conceptual and methodological points of view; range of environmental issues, with emphasis on Canadian case studies.

Note: GEOG 3022 is recommended.

Prerequisite(s): fourth-year Honours standing in Geography or Environmental Studies or Environmental Science, or permission of the Department.

Lectures and seminars three hours a week.

GEOG 4005 [0.5 credit]**Directed Studies in Geography**

Students pursue their interest in a selected theme in geography on a tutorial basis with a member of the Department.

Also listed as ENST 4005.

Precludes additional credit for GEOG 4001 and GEOG 4002 (either taken before 1998-99).

Prerequisite(s): fourth-year Honours standing in Geography and permission of the Department.

GEOG 4013 [0.5 credit]**Cold Region Hydrology**

An examination of cold region hydrologic processes via experimental and observational studies; analysis of hydrologic data and application of hydrologic models.

Prerequisite(s): GEOG 3103.

Lecture three hours a week.

GEOG 4017 [0.5 credit]**Global Biogeochemical Cycles**

Processes that control the fluxes and reservoirs of biologically active chemical constituents on land, in the atmosphere, and in the oceans. Interactions between biogeochemical cycles and the Earth's climate; impact of land use and fossil fuel emissions on biogeochemical cycles and global change.

Prerequisite(s): GEOG 3105 or permission of the department.

Lectures three hours a week.

GEOG 4021 [0.5 credit]**Seminar in Culture, Identity and Place**

Selected topic or field of inquiry concerning the geographic dimensions of culture, identity and place.

Prerequisite(s): GEOG 3021 and fourth-year Honours standing in Geography or permission of the Department.
Seminar three hours a week.

GEOG 4022 [0.5 credit]**Seminar in People, Resources and Environmental Change**

A selected topic or field of inquiry concerning natural resource use and environmental change.

Prerequisite(s): GEOG 3022 and fourth-year Honours standing in Geography or permission of the Department.
Seminar three hours a week.

GEOG 4023 [0.5 credit]**Seminar in Sustainable Urban Environments**

A selected topic or field of inquiry concerning urban geography.

Prerequisite(s): GEOG 3023 and fourth-year Honours standing in Geography or permission of the Department.
Seminar three hours per week.

GEOG 4024 [0.5 credit]**Seminar in Globalization**

A selected issue or topic related to globalization.

Prerequisite(s): GEOG 3024 and fourth-year Honours standing in Geography or permission of the Department.
Seminar three hours week.

GEOG 4040 [0.5 credit]**New Directions in Human Geography**

Selected contemporary debates in human geography.

Prerequisite(s): fourth-year Honours standing in Geography or permission of the Department.
Seminar three hours per week

GEOG 4050 [0.5 credit]**Environmental and Geographic Education**

Selected issues - theoretical and applied - concerning environmental and geographic education.

Prerequisite(s): fourth-year Honours standing in Geography or Environmental Studies, or permission of the Department.

Seminar three hours per week.

GEOG 4101 [0.5 credit]**Quaternary Geography**

Changes in the physical environment of the Earth during the last two million years; methods of studying recent Earth history; the last ice age in Canada.

Prerequisite(s): GEOG 3105 or permission of the Department. Note: GEOG 3102 is recommended.
Lectures three hours a week.

GEOG 4103 [0.5 credit]**Water Resources Engineering**

A quantitative analysis of natural water systems and the development of these systems as a resource.

Components of the hydrologic cycle. Quantitative analysis of stream flow. Probability concepts in water resources. Reservoir design and operation. Availability of groundwater. Storm water management.

Also listed as ENVE 3003.

Prerequisite(s): CIVE 3208 and MAAE 2300, or permission of the department.

Lectures three hours a week, problem analysis one hour a week.

GEOG 4104 [0.5 credit]**Microclimatology**

The formation of microclimates near the Earth's surface; energy and water flows; the interaction of atmospheric processes with the physical properties of surfaces.

Prerequisite(s): GEOG 2100 or permission of the Department.

Lectures three hours a week.

GEOG 4108 [0.5 credit]**Permafrost**

Distribution, development, and degradation of permafrost in Canada; thermal and hydrologic regime of permafrost terrain; development of landforms in permafrost regions; geotechnical consideration in northern construction.

Prerequisite(s): GEOG 3108 or permission of the Department.

Lectures three hours a week.

GEOG 4303 [0.5 credit]**Urban Planning**

A systematic approach to urban planning; urban sprawl; data collection; forecasting; standards; space requirements; land use; zoning; transportation; land development; site selection; land capability; layout; evaluation; housing; urban renewal and new towns.

Also listed as CIVE 4303.

Prerequisite(s): third-year registration, or permission of the Department.

Lectures three hours a week, problem analysis three hours alternate weeks.

GEOG 4304 [0.5 credit]**Transportation Engineering and Planning**

Transportation and the socio-economic environment; modal and intermodal systems and components; vehicle motion; human factors, system and facility design; traffic flow; capacity analysis; planning methodology; environmental impacts; evaluation methods.

Also listed as CIVE 3304.

Prerequisite(s): third-year registration, or permission of the Department.

Lectures three hours a week, problem analysis three hours alternate weeks.

GEOG 4406 [0.5 credit]**Practicum I**

Experience in an employment environment through field placement. Observation and involvement in issues and research methods used by professional geographers

May be taken for credit in addition to GEOG 4408.

Also listed as GEOM 4406.

Prerequisite(s): fourth-year Honours standing in Geography and permission of the Department.

Field placement one day a week.

GEOG 4408 [0.5 credit]**Practicum II**

Experience in an employment environment through field placement. Observation and involvement in issues and research methods used by professional geographers

May be taken for credit in addition to GEOG 4406.

Also listed as GEOM 4408.

Prerequisite(s): fourth-year Honours standing in Geography and permission of the Department.

Field placement of one day a week.

GEOG 4906 [1.0 credit]**Honours Research Project**

Candidates for B.Sc. with Honours in Geography undertake a research project based on a laboratory or field problem. The project is supervised by a member of the department and a written report must be submitted. The candidate may be examined orally on the report.

Also listed as GEOM 4906.

Precludes additional credit for GEOG 4904/GEOM 4904 (no longer offered), GEOG 4909/GEOM 4909, ENST 4906, and ENST 4907.

Prerequisite(s): fourth-year Honours standing in Geography.

Hours to be arranged.

GEOG 4909 [1.0 credit]**Honours Research Essay**

Independent design and implementation of a research project leading to the submission of a research thesis. Students work with an individual faculty adviser. The subject for research is decided upon in consultation with the supervisor.

Also listed as GEOM 4909.

Precludes additional credit for GEOG 4904/GEOM 4904 (no longer offered), GEOG 4906, GEOM 4909, ENST 4906, and ENST 4907.

Prerequisite(s): fourth-year Honours standing in Geography, a Geography CGPA of 9.00 or better, an approved research topic, and permission of the Honours supervisor.

Hours to be arranged with faculty adviser.

Summer session: some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at central.carleton.ca

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at central.carleton.ca