

Geography

This section presents the requirements for programs in:

- Geography B.A. Honours
- Geography with Concentration in Physical Geography B.A. Honours
- Geography with Concentration in Urban Geography B.A. Honours
- Geography B.A. Combined Honours
- Geography B.A.
- Earth Sciences and Geography: Concentration in Terrain Science B.Sc. Combined Honours
- Earth Sciences and Physical Geography B.Sc. Combined Honours
- Physical Geography B.Sc. Honours
- Specialization in Globalization and the Environment B.G.In.S. Honours
- Stream in Globalization and the Environment B.G. In.S.
- Minor in Geography
- Minor in Physical Geography
- Minor in Urban Studies

Program Requirements

Geography

B.A. Honours (20.0 credits)

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

1. 1.5 credits in:	1.5
GEOG 1010 [0.5]	Global Environmental Systems
GEOG 1020 [0.5]	People, Places and Environments
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution
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 in:	1.0
GEOG 2005 [0.5]	Introduction to Qualitative Research
GEOG 2006 [0.5]	Introduction to Quantitative Research
4. 1.5 credits from:	1.5
GEOG 2023 [0.5]	Cities, Inequality and Urban Change
GEOG 2200 [0.5]	Global Connections
GEOG 2300 [0.5]	Space, Place and Culture
GEOG 2500 [0.5]	Climate Change: Social Science Perspectives
5. 0.5 credit from:	0.5
GEOG 3000 [0.5]	Honours Field Course
GEOG 3030 [0.5]	Regional Field Excursion
6. 0.5 credit from:	0.5
GEOG 3001 [0.5]	Doing Qualitative Research
GEOG 3003 [0.5]	Quantitative Geography
GEOM 2007 [0.5]	Geographic Information Systems
GEOM 3002 [0.5]	Introduction to Remote Sensing
GEOM 3007 [0.5]	Cartographic Theory and Design

7. 1.0 credit from:	1.0
GEOG 3021 [0.5]	Geographies of Culture and Identity
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
GEOG 3206 [0.5]	Health, Environment, and Society
GEOG 3209 [0.5]	Sustainability and Environment in the South
GEOG 3501 [0.5]	Geographies of the Canadian North
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 pathway:	
GEOG 4909 [1.0] plus 1.5 credits from GEOG/GEOM and/or ENST at the 4000-level	
b) Course pathway:	
2.5 credits from GEOG/GEOM and/or ENST 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. 1.5 credits in:	1.5
GEOG 1010 [0.5]	Global Environmental Systems
GEOG 1020 [0.5]	People, Places and Environments
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution
2. 2.0 credits in:	2.0
GEOG 2005 [0.5]	Introduction to Qualitative Research
GEOG 2006 [0.5]	Introduction to Quantitative Research
GEOG 2013 [0.5]	Weather and Water
GEOG 2014 [0.5]	The Earth's Surface
3. 1.0 credit from:	1.0
GEOG 2023 [0.5]	Cities, Inequality and Urban Change
GEOG 2200 [0.5]	Global Connections
GEOG 2300 [0.5]	Space, Place and Culture
GEOG 2500 [0.5]	Climate Change: Social Science Perspectives
4. 0.5 credit in:	0.5
GEOG 3000 [0.5]	Honours Field Course
GEOG 3010 [0.5]	Field Methods in Physical Geography
5. 2.0 credits from:	2.0
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 3106 [0.5]	Aquatic Science and Management
GEOG 3108 [0.5]	Soil Properties
GEOG 3002 [0.5]	Introduction to Remote Sensing

6. 0.5 credit in: 0.5

a) Co-op students must complete:

0.5 cr in GEOG or GEOM at 4000-level, excluding GEOG 4406, GEOG 4408, GEOM 4406, GEOM 4408

b) All other students must complete:

GEOG 4406 [0.5] Practicum I

7. 2.5 credits from: 2.5

a) Thesis pathway:

i. 1.0 credit in:

GEOG 4909 [1.0] Honours Research Thesis

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

GEOG 4013 [0.5] Cold Region Hydrology

GEOG 4017 [0.5] Global Biogeochemical Cycles

GEOG 4101 [0.5] Two Million Years of Environmental Change

GEOG 4103 [0.5] Water Resources Engineering

GEOG 4104 [0.5] Microclimatology

GEOG 4108 [0.5] Permafrost

OR

b) Course pathway:

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] Two Million Years of Environmental Change

GEOG 4103 [0.5] Water Resources Engineering

GEOG 4104 [0.5] Microclimatology

GEOG 4108 [0.5] Permafrost

GEOG 4408 [0.5] Practicum II

B. Credits Not Included in the Major CGPA (10.0 credits)

8. 8.0 credits in electives not in GEOG 8.0

9. 2.0 credits in free electives. 2.0

Total Credits 20.0

Geography with Concentration in Urban Geography

B.A. Honours (20.0 credits)

A. Credits included in the Major CGPA (11.0 credits)

1. 1.0 credit in: 1.0

GEOG 1010 [0.5] Global Environmental Systems

GEOG 1023 [0.5] Introduction to Cities and Urbanization

2. 0.5 credit from: 0.5

GEOG 1020 [0.5] People, Places and Environments

GEOM 1004 [0.5] Maps, Satellites and the Geospatial Revolution

3. 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

4. 1.0 credit in: 1.0

GEOG 2005 [0.5] Introduction to Qualitative Research

GEOG 2006 [0.5] Introduction to Quantitative Research

5. 0.5 credit in: 0.5

GEOG 2023 [0.5] Cities, Inequality and Urban Change

6. 1.0 credit from: 1.0

GEOG 2200 [0.5] Global Connections

GEOG 2300 [0.5] Space, Place and Culture

GEOG 2500 [0.5] Climate Change: Social Science Perspectives

7. 0.5 credit from: 0.5

GEOG 3000 [0.5] Honours Field Course

GEOG 3030 [0.5] Regional Field Excursion

8. 0.5 credit from: 0.5

GEOG 3001 [0.5] Doing Qualitative Research

GEOG 3003 [0.5] Quantitative Geography

GEOM 2007 [0.5] Geographic Information Systems

GEOM 3002 [0.5] Introduction to Remote Sensing

GEOM 3007 [0.5] Cartographic Theory and Design

9. 0.5 credit in: 0.5

GEOG 3023 [0.5] Cities in a Global World

10. 0.5 credit from: 0.5

GEOG 3021 [0.5] Geographies of Culture and Identity

GEOG 3022 [0.5] Environmental and Natural Resources

GEOG 3024 [0.5] Understanding Globalization

GEOG 3025 [0.5] Geographies of Selected Regions

GEOG 3026 [0.5] Topics in the Geography of Canada

GEOG 3206 [0.5] Health, Environment, and Society

GEOG 3209 [0.5] Sustainability and Environment in the South

GEOG 3501 [0.5] Geographies of the Canadian North

11. 1.0 credit in: 1.0

GEOG 4023 [0.5] Seminar in Special Topics on the City

GEOG 4323 [0.5] Urban and Regional Planning

12. 0.5 credit from: 0.5

AFRI 3004 [0.5] The African City

ARCU 2303 [1.0] Fundamentals of Urbanism

ARCU 3100 [0.5] The Morphology of the City

HIST 3209 [0.5] Canadian Urban History

HUMR 3002 [0.5] Right to the City

13. 0.5 credit from: 0.5

GEOG 4000 [0.5] Field Studies (when offered with an urban theme)

GEOG 4005 [0.5] Directed Studies in Geography (with urban theme)

GEOG 4007 [0.5] Special Topics in Geography and Environmental Studies

ARCU 4300 [0.5]	History of Theories of Urbanism	
ARCU 4600 [0.5]	Post-WWII Urbanism	
ARCU 4801 [0.5]	Topics in Urbanism	
CDNS 4300 [0.5]	Contested Spaces and Communities	
14. 2.5 credits from:		2.5
a) Thesis pathway:		
GEOG 4909 [1.0]	Honours Research Thesis	
1.5 credits in GEOG/GEOM and/or ENST at the 4000 level		
b) Course pathway:		
2.5 credits in GEOG/GEOM and/or ENST at the 4000 level		
B. Credits Not Included in the Major CGPA (9.0 credits)		
15. 7.5 credits in	electives not in GEOG	7.5
16. 1.5 credits in	free electives	1.5
<hr/> Total Credits		<hr/> 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. 1.0 credit from:		1.0
GEOG 2023 [0.5]	Cities, Inequality and Urban Change	
GEOG 2200 [0.5]	Global Connections	
GEOG 2300 [0.5]	Space, Place and Culture	
GEOG 2500 [0.5]	Climate Change: Social Science Perspectives	
4. 1.0 credit from:		1.0
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution	
GEOG 2005 [0.5]	Introduction to Qualitative Research	
GEOG 2006 [0.5]	Introduction to Quantitative Research	
5. 1.5 credits in	GEOG and/or GEOM at the 3000- level or above	1.5
6. 1.0 credit in	GEOG and/or GEOM at the 4000- level	1.0
7. 1.0 credit in:		1.0
a) Thesis pathway		
GEOG 4909 [1.0]	Honours Research Thesis	
OR		
b) Course pathway		
1.0 credit in GEOG at the 4000-level		
B. Additional Requirements (13.0 credits)		
8. The requirements of the other Honours discipline must be satisfied		
9. Sufficient free electives to total 20.0 credits for the program.		
<hr/> Total Credits		<hr/> 20.0

Geography

B.A. (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]	Introduction to Qualitative Research	
GEOG 2006 [0.5]	Introduction to Quantitative Research	
4. 1.0 credit from:		1.0
GEOG 2023 [0.5]	Cities, Inequality and Urban Change	
GEOG 2200 [0.5]	Global Connections	
GEOG 2300 [0.5]	Space, Place and Culture	
GEOG 2500 [0.5]	Climate Change: Social Science Perspectives	
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. 6.0 credits in	electives not in GEOG	7.0
8. 2.0 credit in	free electives.	1.0
<hr/> Total Credits		<hr/> 15.0

Course Categories for B.Sc. Geography

Lists of courses for all other categories (Science Continuation, Approved Experimental Science, Science Faculty Electives and Approved Arts or Social Sciences Electives) are located at the Academic Regulations for the B.Sc. page.

Earth Sciences and Geography:

Concentration in Terrain Science

B.Sc. Combined Honours (20.0 credits)

A. Credits Included in the Major CGPA (12.5 credits)

1. 0.5 credit in:		0.5
GEOG 2014 [0.5]	The Earth's Surface	
2. 0.5 credit in:		0.5
ERTH 1006 [0.5]	Exploring Planet Earth	
3. 2.5 credits in:		2.5
ERTH 2102 [0.5]	Mineralogy to Petrology	
ERTH 2104 [0.5]	Igneous Systems, Geochemistry and Processes	
ERTH 2314 [0.5]	Sedimentation and Stratigraphy	
ERTH 2406 [0.5]	Geology and Map Interpretation	
ERTH 2802 [0.5]	Field Geology I	
4. 0.5 credit from:		0.5
ERTH 3203 [0.5]	Sedimentology	

ERTH 3206 [0.5]	Sedimentary Depositional Systems (See Note, below)	
5. 1.5 credits in:		1.5
ERTH 3205 [0.5]	Physical Hydrogeology	
ERTH 3207 [0.5]	Metamorphic Petrology and Processes	
ERTH 3806 [0.5]	Structural Geology	
6. 1.0 credit in EARTH at the 4000-level		1.0
7. 0.5 credit from:		0.5
GEOG 2006 [0.5]	Introduction to Quantitative Research	
STAT 2507 [0.5]	Introduction to Statistical Modeling I	
8. 1.5 credits in:		1.5
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution	
GEOM 2007 [0.5]	Geographic Information Systems	
GEOG 2013 [0.5]	Weather and Water	
9. 2.0 credits in:		2.0
GEOM 3002 [0.5]	Introduction to Remote Sensing	
GEOG 3102 [0.5]	Geomorphology	
GEOG 3105 [0.5]	Climate and Atmospheric Change	
GEOG 3108 [0.5]	Soil Properties	
10. 1.0 credit in:		1.0
GEOG 4101 [0.5]	Two Million Years of Environmental Change	
GEOG 4108 [0.5]	Permafrost	
11. 1.0 credit from:		1.0
GEOG 4906 [1.0]	Honours Research Project	
ERTH 4908 [1.0]	Honours Thesis	
ERTH 4909 and 0.5 credit 4000-level EARTH		
B. Credits Not Included in the Major CGPA (7.5 credits)		
12. 1.0 credit in:		1.0
MATH 1007 [0.5]	Elementary Calculus I	
MATH 1107 [0.5]	Linear Algebra I	
13. 1.0 credit from:		1.0
CHEM 1001 [0.5]	General Chemistry I	
& CHEM 1002 [0.5]	General Chemistry II	
CHEM 1005 [0.5]	Elementary Chemistry I	
& CHEM 1006 [0.5]	Elementary Chemistry II	
14. 1.0 credit from:		1.0
PHYS 1003 [0.5]	Introductory Mechanics and	
& PHYS 1004 [0.5]	Thermodynamics	
	Introductory Electromagnetism and	
	Wave Motion	
PHYS 1007 [0.5]	Elementary University Physics I	
& PHYS 1008 [0.5]	Elementary University Physics II	
15. 0.5 credit in:		0.5
COMP 1005 [0.5]	Introduction to Computer Science I	
16. 0.5 credit in:		0.5
BIOL 1104 [0.5]	Foundations of Biology II	
17. 0.5 credit in	Advanced Science Faculty electives	0.5
18. 0.5 credit in:		0.5
NSCI 1000 [0.5]	Seminar in Science (or approved course outside the faculties of Science and Engineering and Design)	
19. 1.5 credits in	approved courses outside the faculties of Science and Engineering and Design	1.5

20. 1.0 credit in	free electives.	1.0
Total Credits		20.0

Note: for **Item 4** above, EARTH 3203 is required if prerequisite conditions are met.

Earth Sciences and Physical Geography B.Sc. Combined Honours (20.0 credits)

A. Credits Included in the Major CGPA (13.0 credits)

1. 1.0 credit in:		1.0
ERTH 1006 [0.5]	Exploring Planet Earth	
GEOG 1010 [0.5]	Global Environmental Systems	
2. 1.0 credit in:		1.0
GEOG 2013 [0.5]	Weather and Water	
GEOG 2014 [0.5]	The Earth's Surface	
3. 2.0 credits in:		2.0
ERTH 2102 [0.5]	Mineralogy to Petrology	
ERTH 2104 [0.5]	Igneous Systems, Geochemistry and Processes	
ERTH 2314 [0.5]	Sedimentation and Stratigraphy	
ERTH 2406 [0.5]	Geology and Map Interpretation	
4. 0.5 credit in:		0.5
ERTH 2802 [0.5]	Field Geology I	
5. 1.5 credits in:		1.5
ERTH 3003 [0.5]	Geochemistry and Geochronology	
ERTH 3405 [0.5]	Geophysical Methods	
ERTH 3806 [0.5]	Structural Geology	
6. 0.5 credit from:		0.5
ERTH 3205 [0.5]	Physical Hydrogeology	
GEOG 3103 [0.5]	Watershed Hydrology	
7. 1.0 credit in:		1.0
ERTH 2004 [0.5]	Maps, Satellites and the Geospatial Revolution	
GEOM 3002 [0.5]	Introduction to Remote Sensing	
8. 2.0 credits from:		2.0
GEOG 3003 [0.5]	Quantitative Geography	
GEOG 3010 [0.5]	Field Methods in Physical Geography	
GEOG 3102 [0.5]	Geomorphology	
GEOG 3104 [0.5]	Principles of Biogeography	
GEOG 3105 [0.5]	Climate and Atmospheric Change	
GEOG 3106 [0.5]	Aquatic Science and Management	
GEOG 3108 [0.5]	Soil Properties	
9. 0.5 credit from:		0.5
ERTH 3203 [0.5]	Sedimentology	
ERTH 3206 [0.5]	Sedimentary Depositional Systems	
10. 1.0 credit in	Science Geography or Geomatics courses at the 2000-level or above	1.0
11. 1.0 credit in	Earth Sciences, Science Geography or Geomatics courses at the 4000-level	1.0
12. 1.0 credit from:		1.0
ERTH 4908 [1.0]	Honours Thesis	
OR		
ERTH 4909 [0.5]	Research in Earth Sciences and 0.5 credit in EARTH, GEOG or GEOM at the 4000-level	
OR		
GEOG 4005 [0.5]	Directed Studies in Geography	

and 0.5 credit in EARTH, GEOG or GEOM at the 4000-level

OR

GEOG 4906 [1.0] Honours Research Project

B. Credits Not Included in the Major CGPA (7.0 credits)

13. 1.0 credit in:	1.0
MATH 1007 [0.5] Elementary Calculus I	
MATH 1107 [0.5] Linear Algebra I	
14. 1.0 credit from:	1.0
CHEM 1001 [0.5] General Chemistry I & CHEM 1002 [0.5] General Chemistry II	
CHEM 1005 [0.5] Elementary Chemistry I & CHEM 1006 [0.5] Elementary Chemistry II	
15. 1.0 credit in:	1.0
PHYS 1007 [0.5] Elementary University Physics I & PHYS 1008 [0.5] Elementary University Physics II	
16. 0.5 credit from:	0.5
GEOG 2006 [0.5] Introduction to Quantitative Research	
STAT 2507 [0.5] Introduction to Statistical Modeling I	
17. 0.5 credit in:	0.5
COMP 1005 [0.5] Introduction to Computer Science I	
18. 0.5 credit in approved electives (see list below)	0.5
19. 0.5 credit in:	0.5
NSCI 1000 [0.5] Seminar in Science (or approved course outside of the faculties of Science and Engineering and Design)	
20. 1.5 credits in approved courses outside of the faculties of Science and Engineering and Design	1.5
21. 0.5 credit in free elective	0.5
Total Credits	20.0

Approved Electives - B.Sc. Earth Sciences and Physical Geography

Biology

BIOL 1103 [0.5] Foundations of Biology I
 BIOL 1104 [0.5] Foundations of Biology II

Computer Science

COMP 1006 [0.5] Introduction to Computer Science II

Chemistry

CHEM 2103 [0.5] Physical Chemistry I
 CHEM 2203 [0.5] Organic Chemistry I
 CHEM 2207 [0.5] Introduction to Organic Chemistry I
 CHEM 2501 [0.5] Introduction to Inorganic and Bioinorganic Chemistry

Mathematics

MATH 1005 [0.5] Differential Equations and Infinite Series for Engineering or Physics
 MATH 2007 [0.5] Elementary Calculus II
 MATH 2107 [0.5] Linear Algebra II

Physics

PHYS 2202 [0.5] Wave Motion and Optics

Statistics

STAT 2509 [0.5] Introduction to Statistical Modeling II

Physical Geography

B.Sc. Honours (20.0 credits)

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

1. 1.0 credit from:	1.0
GEOG 1010 [0.5] Global Environmental Systems or EARTH 1006 [0.5] Exploring Planet Earth	
and	
GEOM 1004 [0.5] Maps, Satellites and the Geospatial Revolution	
2. 1.0 credit in:	1.0
GEOG 2013 [0.5] Weather and Water	
GEOG 2014 [0.5] The Earth's Surface	
3. 0.5 credit from:	0.5
GEOG 2006 [0.5] Introduction to Quantitative Research	
STAT 2507 [0.5] Introduction to Statistical Modeling I	
4. 0.5 credit from:	0.5
GEOG 3000 [0.5] Honours Field Course	
GEOG 3010 [0.5] Field Methods in Physical Geography	
5. 2.5 credits from:	2.5
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 3106 [0.5] Aquatic Science and Management	
GEOG 3108 [0.5] Soil Properties	
GEOM 3002 [0.5] Introduction to Remote Sensing	
6. 1.5 credits from:	1.5
GEOG 3000 [0.5] Honours Field Course	
GEOG 3003 [0.5] Quantitative Geography	
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	
GEOG 4000 [0.5] Field Studies	
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] Two Million Years of Environmental Change	
GEOG 4103 [0.5] Water Resources Engineering	
GEOG 4104 [0.5] Microclimatology	
GEOG 4108 [0.5] Permafrost	
7. 2.0 credits from:	2.0
GEOM at the 4000 level or	
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] Two Million Years of Environmental Change	

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	
8. 1.0 credit in:		1.0
GEOG 4906 [1.0]	Honours Research Project	
B. Credits Not Included in the Major CGPA (10.0 credits)		
9. 1.0 credit in	Experimental Science Electives	1.0
10. 0.5 credit in:		0.5
MATH 1007 [0.5]	Elementary Calculus I	
11. 0.5 credit in	MATH or COMP	0.5
12. 2.0 credits in	Science Continuation, not in GEOG	2.0
13. 1.0 credits in	Science Faculty Electives	1.0
14. 0.5 credit from:		0.5
NSCI 1000 [0.5]	Seminar in Science (or approved courses outside the faculties of Science and Engineering and Design)	
15. 1.0 credit in	approved courses outside the faculties of Science and Engineering and Design, not in GEOG	1.0
16. 0.5 credit in	approved courses outside the faculties of Science and Engineering and Design	0.5
17. 3.0 credits in	free electives.	3.0
Total Credits		20.0

Specialization in Globalization and the Environment

B.G.In.S. Honours (20.0 credits)

A. Credits Included in the Major CGPA (12.0 credits)

1. 4.5 credits in:		4.5
GINS 1000 [0.5]	Global History	
GINS 1010 [0.5]	International Law and Politics	
GINS 1020 [0.5]	Ethnography, Globalization and Culture	
GINS 2000 [0.5]	Ethics and Globalization	
GINS 2010 [0.5]	Globalization and International Economic Issues	
GINS 2020 [0.5]	Global Literatures	
GINS 3010 [0.5]	Global and International Theory	
GINS 3020 [0.5]	Places, Boundaries, Movements and Global Environmental Change	
GINS 4090 [0.5]	Honours Seminar in Global and International Studies	

2. 0.0 credit in: International Experience Requirement Preparation

GINS 1300 [0.0]	International Experience Requirement Preparation	
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3. 7.5 credits in: the Specialization

a. 1.5 credits in: Foundations		1.5
GEOG 1010 [0.5]	Global Environmental Systems	
GEOG 1020/ENST 2006 [0.5]	People, Places and Environments	
GEOG 2200 [0.5]	Global Connections	
b. 1.5 credits from: Globalization		1.5
GEOG 2023 [0.5]	Cities, Inequality and Urban Change	
GEOG 2300 [0.5]	Space, Place and Culture	
GEOG 3023 [0.5]	Cities in a Global World	

GEOG 3024 [0.5]	Understanding Globalization	
GEOG 3025 [0.5]	Geographies of Selected Regions	
GEOG 3030 [0.5]	Regional Field Excursion	
GEOG 3404 [0.5]	Geographies of Economic Development	

c. 2.0 credits from: Global Environment

ANTH 3355 [0.5]	Anthropology and the Environment	
GEOG 2500/ENST 2500 [0.5]	Environmental Change: Social Science Perspectives	
GEOG 3022/ENST 3022 [0.5]	Environmental and Natural Resources	
GEOG 3206 [0.5]	Health, Environment, and Society	
GEOG 3209 [0.5]	Sustainability and Environment in the South	
HUMR 3503 [0.5]	Global Environmental Justice	
PSCI 3801 [0.5]	Environmental Politics	
TSES 3002 [0.5]	Energy and Sustainability	

d. 1.0 credit in: Research Methodologies

GEOG 2005/ENST 2005 [0.5]	Introduction to Qualitative Research	1.0
GEOG 2006/ENST 2006 [0.5]	Introduction to Quantitative Research	

e. 1.5 credits from: Honours Seminars

GEOG 4005/ENST 4005 [0.5]	Directed Studies in Geography (topic in Global Environmental Issues)	1.5
GEOG 4022 [0.5]	Seminar in People, Resources and Environmental Change	
GEOG 4023 [0.5]	Seminar in Special Topics on the City	
GEOG 4024 [0.5]	Seminar in Globalization	
GEOG 4909 [1.0]	Honours Research Thesis (topic in Globalization and the Environment)	
PSCI 4808 [0.5]	Global Environmental Politics	

B. Credits Not Included in the Major CGPA (8.0 credits)

4. 8.0 credits in: free electives

C. Additional Requirements

5. The International Experience requirement must be met.

6. The Language requirement must be met.

Total Credits 20.0

Stream in Globalization and the Environment

B.G. In.S. (15.0 credits)

A. Credits Included in the Major CGPA (8.0 credits)

1. 4.0 credits in: Core Courses		4.0
GINS 1000 [0.5]	Global History	
GINS 1010 [0.5]	International Law and Politics	
GINS 1020 [0.5]	Ethnography, Globalization and Culture	
GINS 2000 [0.5]	Ethics and Globalization	
GINS 2010 [0.5]	Globalization and International Economic Issues	
GINS 2020 [0.5]	Global Literatures	
GINS 3010 [0.5]	Global and International Theory	
GINS 3020 [0.5]	Places, Boundaries, Movements and Global Environmental Change	
2. 4.0 credits from: the Stream		4.0

a. Foundations

GEOG 1010 [0.5]	Global Environmental Systems	
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GEOG 1020/ENST	People, Places and Environments	
GEOG 2200 [0.5]	Global Connections	
b. Globalization		
GEOG 2023 [0.5]	Cities, Inequality and Urban Change	
GEOG 2300 [0.5]	Space, Place and Culture	
GEOG 3023 [0.5]	Cities in a Global World	
GEOG 3024 [0.5]	Understanding Globalization	
GEOG 3025 [0.5]	Geographies of Selected Regions	
GEOG 3404 [0.5]	Geographies of Economic Development	
c. Global Environment		
ANTH 3355 [0.5]	Anthropology and the Environment	
GEOG 2500/ENST 2500 [0.5]	Climate Change: Social Science Perspectives	
GEOG 3022/ENST	Environmental and Natural Resources	
GEOG 3206 [0.5]	Health, Environment, and Society	
GEOG 3209 [0.5]	Sustainability and Environment in the South	
HUMR 3503 [0.5]	Global Environmental Justice	
PSCI 3801 [0.5]	Environmental Politics	
TSES 3002 [0.5]	Energy and Sustainability	
d. Research Methodologies		
GEOG 2005/ENST 2005 [0.5]	Introduction to Qualitative Research	
GEOG 2006/ENST	Introduction to Quantitative Research	
B. Credits Not Included in the Major CGPA (7.0 credits):		
3. 7.0 credits in:	Free Electives	7.0
C. Additional Requirements		
4. The Language requirement must be met.		
Total Credits		15.0

Minor in Geography (4.0 credits)

Open to all undergraduate degree students not in Geography programs or the B.G.In.S. Specialization or Stream in Globalization and the Environment.

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 from:		0.5
GEOG 2005 [0.5]	Introduction to Qualitative Research	
GEOG 2006 [0.5]	Introduction to Quantitative Research	
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution	
4. 0.5 credit from:		0.5
GEOG 2023 [0.5]	Cities, Inequality and Urban Change	
GEOG 2200 [0.5]	Global Connections	
GEOG 2300 [0.5]	Space, Place and Culture	

GEOG 2500 [0.5]	Climate Change: Social Science Perspectives	
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 Physical Geography (4.0 credits)

Open to all undergraduate degree students not in Geography programs.

Requirements:

1. 0.5 credit from:		0.5
GEOG 1010 [0.5]	Global Environmental Systems	
ERTH 1006 [0.5]	Exploring Planet Earth	
2. 1.0 credit in:		1.0
GEOG 2013 [0.5]	Weather and Water	
GEOG 2014 [0.5]	The Earth's Surface	
3. 2.5 credits from:		2.5
GEOM 3002 [0.5]	Introduction to Remote Sensing	
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 3106 [0.5]	Aquatic Science and Management	
GEOG 3108 [0.5]	Soil Properties	
GEOG 4013 [0.5]	Cold Region Hydrology	
GEOG 4017 [0.5]	Global Biogeochemical Cycles	
GEOG 4101 [0.5]	Two Million Years of Environmental Change	
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

Minor in Urban Studies (4.0 credits)

Only students pursuing an undergraduate program (except the BA Honours in Geography with a Concentration in Urban Geography) requiring at least 20.0 credits to graduate may be admitted to the Urban Studies minor.

Requirements:

1. 1.0 credit from:		1.0
FYSM 1107 [1.0]	Social Justice and the City	
GEOG 1020 [0.5]	People, Places and Environments	
GEOG 1023 [0.5]	Introduction to Cities and Urbanization	
GEOM 1004 [0.5]	Maps, Satellites and the Geospatial Revolution	
2. 1.0 credit from:		1.0
GEOG 2023 [0.5]	Cities, Inequality and Urban Change	
GEOG 2200 [0.5]	Global Connections	
GEOM 2007 [0.5]	Geographic Information Systems	
3. 0.5 credit in:		0.5
GEOG 3023 [0.5]	Cities in a Global World	
4. 0.5 credit from:		0.5

AFRI 3004 [0.5]	The African City	
ARCU 2303 [1.0]	Fundamentals of Urbanism	
ARCU 3100 [0.5]	The Morphology of the City	
HIST 3209 [0.5]	Canadian Urban History	
HUMR 3002 [0.5]	Right to the City	
5. 0.5 credit from:		0.5
GEOG 4023 [0.5]	Seminar in Special Topics on the City	
GEOG 4323 [0.5]	Urban and Regional Planning	
6. 0.5 credit from:		0.5
ARCU 4300 [0.5]	History of Theories of Urbanism	
ARCU 4600 [0.5]	Post-WWII Urbanism	
ARCU 4801 [0.5]	Topics in Urbanism	
CDNS 4300 [0.5]	Contested Spaces and Communities	
GEOG 4000 [0.5]	Field Studies (when offered with an urban theme)	
GEOG 4005 [0.5]	Directed Studies in Geography (with urban theme)	
GEOG 4007 [0.5]	Special Topics in Geography and Environmental Studies	
Total Credits		4.0

B.A. Regulations

The regulations presented below apply to all Bachelor of Arts programs. In addition to the requirements presented here, students must satisfy the University regulations common to all undergraduate students including the process of Academic Performance Evaluation (consult the Academic Regulations of the University section of this Calendar).

First-Year Seminars

B.A. degree students are strongly encouraged to include a First-Year Seminar (FYSM) during their first 4.0 credits of registration. Students are limited to 1.0 credit in FYSM and can only register in a FYSM while they have first-year standing in their B.A. program. Students who have completed the Enriched Support Program (ESP) or who are required to take a minimum of one English as a Second Language (ESLA) credit are not permitted to register in a FYSM.

Breadth Requirement

Among the credits presented at graduation, students in both the B.A. General and the B.A. Honours degrees and B.Co.M.S. are required to include 3.0 breadth credits, including 1.0 credit from each of three of the four Breadth Areas identified below. Credits that fulfil requirements in the Major, Minor, Concentration or Specialization may be used to fulfil the Breadth Requirement.

Students admitted with a completed university degree are exempt from breadth requirements.

Students in the following interdisciplinary programs are exempt from the B.A. breadth requirement.

- African Studies
- Criminology and Criminal Justice
- Environmental Studies

- Human Rights
- Human Rights and Social Justice

Breadth Area 1: Culture and Communication

American Sign Language, Art History, Art and Culture, Communication and Media Studies, Comparative Literary Studies, Digital Humanities, English, Film Studies, French, Journalism, Media Production and Design, Music, Performance in Public Sphere, and Languages (Arabic, English as a Second Language, German, Greek, Hebrew, Indigenous Languages, Italian, Japanese, Korean, Latin, Mandarin, Portuguese, Russian, Spanish)

Subject codes: ARAB, ARTH, ASLA, CHIN, CLST, COMS, DIGH, ENGL, ESLA, FILM, FINS, FREN, GERM, GREK, HEBR, ITAL, JAPA, JOUR, KORE, LANG, LATN, MPAD, MUSI, PIPS, PORT, RUSS, SPAN

Breadth Area 2: Humanities

African Studies, Applied Linguistics and Discourse Studies, Archaeology, Canadian Studies, Child Studies, Classical Civilization, Directed Interdisciplinary Studies, Disability Studies, European and Russian Studies, History, Human Rights, Humanities, Indigenous Studies, Latin American and Caribbean Studies, Linguistics, Medieval and Early Modern Studies, Philosophy, Religion, Sexuality Studies, South Asian Studies, and Women's and Gender Studies.

Subject codes: AFRI, ALDS, ARCY, CDNS, CHST, CLCV, DBST, DIST, EURR, HIST, HUMR, HUMS, INDG, LACS, LING, MEMS, PHIL, RELI, SAST, SXST, WGST

Breadth Area 3: Science, Engineering, and Design

Architecture, Biology, Chemistry, Computer Science, Earth Sciences, Engineering, Environmental Science, Food Science and Nutrition, Health Sciences, Industrial Design, Information Resource Management, Information Technology (BIT), Information Technology (ITEC), Interactive Multimedia and Design, Mathematics, Neuroscience, Network Technology, Optical Systems and Sensors, Photonics, Statistics, Physics, and Technology, Society, Environment.

Subject codes: AERO, ARCC, ARCH, ARCN, ARCS, ARCU, BIOC, BIOL, BIT, CHEM, CIVE, CMPS, COMP, ECOR, ELEC, ENSC, ENVE, ERTH, FOOD, HLTH, IDES, IMD, IRM, ISCI, ISCS, ISYS, ITEC, MAAE, MATH, MECH, NET, NEUR, NSCI, OSS, PHYS, PLT, SREE, STAT, SYSC, TSES

Breadth Area 4: Social Sciences

Anthropology, Business, Cognitive Science, Criminology and Criminal Justice, Economics, Environmental Studies, Geography, Geomatics, Global and International Studies, Global Politics, Interdisciplinary Public Affairs, International Affairs, Law, Migration and Diaspora Studies, Political Management, Political Science, Psychology, Public Administration, Public Affairs and Policy Management, Social Work, Sociology/Anthropology, Sociology

Subject codes: ANTH, BUSI, CGSC, CRCJ, ECON, ENST, GEOG, GEOM, GINS, GPOL, INAF, IPAF, LAWS, MGDS, PADM, PAMP, POLM, PSCI, PSYC, SOCI, SOWK

Declared and Undeclared Students

Degree students are considered "Undeclared" if they have been admitted to a degree but have not yet selected and been accepted into a program within that degree. The status "Undeclared" is available only in the B.A. and B.Sc. degrees. See the Open Studies program section of this Calendar for recommended registration information. Normally, Undeclared students are required to be eligible to enter a program within their degree before reaching second year standing. Undeclared students should consult Academic Advising Centre for guidance in planning their studies prior to registration.

Change of Program Within the B.A. Degree

Students may transfer to a program within the B.A. degree, if upon entry to the new program they would be in *Good Standing*. Other applications for change of program will be considered on their merits; students may be admitted to the new program in *Good Standing* or on Academic Warning. Students may apply to declare or change their program within the B.A. Degree at the Registrar's Office according to the published deadlines. Acceptance into a program or into a program element or option is subject to any enrollment limitations, specific program, program element or option requirements, as published in the relevant Calendar entry.

Minors, Concentrations and Specializations

Students may apply to the Registrar's Office to be admitted to a minor, concentration or specialization during their first or subsequent years of study. Acceptance into a minor, concentration or specialization is subject to any specific requirements of the intended Minor, Concentration or Specialization as published in the relevant Calendar entry. Acceptance into a Concentration or Specialization requires that the student be in Good Standing.

Mention : Français

Students registered in certain B.A. programs may earn the notation *Mention : Français* by completing part of their requirements in French and by demonstrating a knowledge of the history and culture of French Canada. The general requirements are listed below. For more specific details consult the departmental program entries.

Students in a B.A. Honours program must present:

1. 1.0 credit in French language;
2. 1.0 credit devoted to the history and culture of French Canada;
3. 1.0 credit at the 2000- or 3000-level and 1.0 credit at the 4000-level in the Honours discipline taken in French.

Students in a B.A. General program must present:

1. 1.0 credit in advanced French;
2. 1.0 credit devoted to the history and culture of French Canada;
3. 1.0 credit at the 2000- or 3000-level in the Major discipline taken in French.

Students in Combined Honours programs must fulfil the *Mention : Français* requirement in both disciplines.

Courses taught in French (Item 3, above) may be taken at Carleton, at the University of Ottawa on the Exchange Agreement, or at a francophone university on a Letter of Permission. Students planning to take courses on exchange or on a Letter of Permission should take careful note of the residence requirement for a minimum number of Carleton courses in their programs. Consult the *Academic Regulations of the University* section of this Calendar for information regarding study on Exchange or Letter of Permission.

B.Sc. Regulations

The regulations presented in this section apply to all Bachelor of Science programs. In addition to the requirements presented here, students must satisfy the University regulations common to all undergraduate students including the process of Academic Performance Evaluation (see the *Academic Regulations of the University* section of this Calendar).

Breadth Requirement for the B.Sc.

Students in Bachelor of Science Honours, Major, or General programs must present the following credits at graduation:

1. 2.0 credits in Science Continuation courses not in the major discipline; **students completing a double major are considered to have completed this requirement providing they have 2.0 credits in science continuation courses in each of the two majors**
2. 2.0 credits in courses outside of the faculties of Science and Engineering and Design (but may include NSCI 1000)

In most cases, the requirements for individual B.Sc. programs, as stated in this Calendar, contain these requirements, explicitly or implicitly.

Students admitted to B.Sc. programs by transfer from another institution must present at graduation (whether taken at Carleton or elsewhere):

1. 2.0 credits in courses outside of the faculties of Science and Engineering and Design (but may include NSCI 1000) if, on transfer, the student received credit for fewer than 10.0 credits.
2. 1.0 credit in courses outside of the faculties of Science and Engineering and Design (but may include NSCI 1000) if, on transfer, the student received credit for 10.0 or more credits.

Declared and Undeclared Students

Students who are registered in a program within the degree are called Declared students. Most students designate a program of study when they first apply for admission and so begin their studies as Declared students. Students may also choose to begin their studies within the B.Sc. degree without being registered in a program. These students are referred to as Undeclared students. The recommended course pattern for Undeclared students is provided in the Undeclared entry of the Programs section of this Calendar. Undeclared students normally must apply to enter a program before

beginning their second year of study. The Science Student Success Centre (SSSC) provides Undeclared students guidance to the appropriate support services in making this decision.

Change of Program within the B.Sc. Degree

Students may transfer to a program within the B.Sc. degree if upon entry to the new program they would be in good academic standing.

Other applications for change of program will be considered on their merits; students may be accepted in the new program in *Good Standing* or on *Academic Warning*.

Applications to declare or change their program within the B.Sc. Degree must be made online through Carleton Central by completing a Change of Program Elements (COPE) application form within the published deadlines. Acceptance into a program or into a program element or option is subject to any enrolment, and/or specific program, program element or option requirements as published in the relevant Calendar entry.

Minors, Concentrations and Specializations

Students may add a minor, concentration or specialization by completing a Change of Program Elements (COPE) application form online through Carleton Central. Acceptance into a minor, concentration or specialization requires that the student be in *Good Standing* and is subject to any specific requirements of the intended Minor, Concentration or Specialization as published in the relevant Calendar entry.

Experimental Science Requirement

Students in B.Sc. Honours, Major, or General degree programs must present at graduation at least two full credits of experimental science chosen from two different departments or institutes from the list below:

Approved Experimental Science Courses

Biochemistry

BIOC 2200 [0.5]	Cellular Biochemistry
BIOC 4001 [0.5]	Methods in Biochemistry
BIOC 4201 [0.5]	Advanced Cell Culture and Tissue Engineering

Biology

BIOL 1103 [0.5]	Foundations of Biology I
BIOL 1104 [0.5]	Foundations of Biology II
BIOL 2001 [0.5]	Animals: Form and Function
BIOL 2002 [0.5]	Plants: Form and Function
BIOL 2104 [0.5]	Introductory Genetics
BIOL 2200 [0.5]	Cellular Biochemistry
BIOL 2600 [0.5]	Ecology

Chemistry

CHEM 1001 [0.5]	General Chemistry I
CHEM 1002 [0.5]	General Chemistry II
CHEM 1005 [0.5]	Elementary Chemistry I
CHEM 1006 [0.5]	Elementary Chemistry II
CHEM 2103 [0.5]	Physical Chemistry I
CHEM 2203 [0.5]	Organic Chemistry I
CHEM 2204 [0.5]	Organic Chemistry II
CHEM 2302 [0.5]	Analytical Chemistry I

CHEM 2303 [0.5]	Analytical Chemistry II
CHEM 2800 [0.5]	Foundations for Environmental Chemistry

Earth Sciences

ERTH 1006 [0.5]	Exploring Planet Earth
ERTH 1009 [0.5]	The Earth System Through Time
ERTH 2102 [0.5]	Mineralogy to Petrology
ERTH 2404 [0.5]	Engineering Geoscience
ERTH 2802 [0.5]	Field Geology I
ERTH 3111 [0.5]	Vertebrate Evolution: Mammals, Reptiles, and Birds
ERTH 3112 [0.5]	Vertebrate Evolution: Fish and Amphibians
ERTH 3204 [0.5]	Mineral Deposits
ERTH 3205 [0.5]	Physical Hydrogeology
ERTH 3806 [0.5]	Structural Geology

Food Sciences

FOOD 3001 [0.5]	Food Chemistry
FOOD 3002 [0.5]	Food Analysis
FOOD 3005 [0.5]	Food Microbiology

Geography

GEOG 1010 [0.5]	Global Environmental Systems
GEOG 3108 [0.5]	Soil Properties

Neuroscience

NEUR 3206 [0.5]	Sensory and Motor Neuroscience
NEUR 3207 [0.5]	Systems Neuroscience
NEUR 4600 [0.5]	Advanced Lab in Neuroanatomy

Physics

PHYS 1001 [0.5]	Foundations of Physics I
PHYS 1002 [0.5]	Foundations of Physics II
PHYS 1003 [0.5]	Introductory Mechanics and Thermodynamics
PHYS 1004 [0.5]	Introductory Electromagnetism and Wave Motion
PHYS 1007 [0.5]	Elementary University Physics I
PHYS 1008 [0.5]	Elementary University Physics II
PHYS 2202 [0.5]	Wave Motion and Optics
PHYS 2604 [0.5]	Modern Physics I
PHYS 3007 [0.5]	Third Year Physics Laboratory: Selected Experiments and Seminars
PHYS 3606 [0.5]	Modern Physics II
PHYS 3608 [0.5]	Modern Applied Physics

Course Categories for B.Sc. Programs

Science Geography Courses

GEOG 1010 [0.5]	Global Environmental Systems
GEOG 2006 [0.5]	Introduction to Quantitative Research
GEOG 2013 [0.5]	Weather and Water
GEOG 2014 [0.5]	The Earth's Surface
GEOG 3003 [0.5]	Quantitative Geography
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 3106 [0.5]	Aquatic Science and Management

GEOG 3108 [0.5]	Soil Properties
GEOG 4000 [0.5]	Field Studies
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]	Two Million Years of Environmental Change
GEOG 4103 [0.5]	Water Resources Engineering
GEOG 4104 [0.5]	Microclimatology
GEOG 4108 [0.5]	Permafrost

Science Psychology Courses

PSYC 2001 [0.5]	Introduction to Research Methods in Psychology
PSYC 2002 [0.5]	Introduction to Statistics in Psychology
PSYC 2700 [0.5]	Introduction to Cognitive Psychology
PSYC 3000 [1.0]	Design and Analysis in Psychological Research
PSYC 3506 [0.5]	Cognitive Development
PSYC 3700 [1.0]	Cognition (Honours Seminar)
PSYC 3702 [0.5]	Perception
PSYC 2307 [0.5]	Human Neuropsychology I
PSYC 3307 [0.5]	Human Neuropsychology II

Science Continuation Courses

A course at the 2000 level or above may be used as a Science Continuation credit in a B.Sc. program if it is not in the student's major discipline, and is chosen from the following:

BIOC (Biochemistry)
BIOL (Biology)
CHEM (Chemistry)
COMP (Computer Science) A maximum of two half-credits at the 1000-level in COMP, excluding COMP 1001 may be used as Science Continuation credits.
ERTH (Earth Sciences), except ERTH 2415 which may be used only as a free elective for any B.Sc. program. Students in Earth Sciences programs may use ERTH 2401, ERTH 2402, and ERTH 2403 only as free electives.
Engineering. Students wishing to register in Engineering courses must obtain the permission of the Faculty of Engineering and Design.
ENSC (Environmental Science)
FOOD (Food Science and Nutrition)
GEOM (Geomatics)
HLTH (Health Sciences)
MATH (Mathematics)
NEUR (Neuroscience)
PHYS (Physics), except PHYS 2903
Science Geography Courses (see list above)
Science Psychology Courses (see list above)
STAT (Statistics)

TSES (Technology, Society, Environment) except TSES 2305. Biology General, Major, and Honours students may use these courses only as free electives. Integrated Science and Environmental Science students may include these courses in their programs but may not count them as part of the Science Sequence.

Science Faculty Electives

Science Faculty Electives are courses at the 1000-4000 level chosen from:

BIOC (Biochemistry)
BIOL (Biology) Biology & Biochemistry students may use BIOL 1010 and BIOL 2005 only as free electives
CHEM (Chemistry) except CHEM 1003, CHEM 1004 and CHEM 1007
COMP (Computer Science) except COMP 1001
ERTH (Earth Sciences) except ERTH 1010, ERTH 1011 and ERTH 2415. Earth Sciences students may use ERTH 2401, ERTH 2402, and ERTH 2403 only as free electives.
Engineering
ENSC 2001
FOOD (Food Science and Nutrition)
GEOM (Geomatics)
HLTH (Health Science)
MATH (Mathematics)
NEUR (Neuroscience)
PHYS (Physics) except PHYS 1901, PHYS 1902, PHYS 1905, PHYS 2903
Science Geography (see list above)
Science Psychology (see list above)
STAT (Statistics)
TSES (Technology, Society, Environment) Biology General, Major and Honours students may use these courses only as free electives.

Advanced Science Faculty Electives

Advanced Science Faculty Electives are courses at the 2000-4000 level chosen from the Science Faculty Electives list above.

Approved Courses Outside the Faculties of Science and Engineering and Design (may include NSCI 1000)

All courses offered by the Faculty of Arts and Social Sciences, the Faculty of Public Affairs, and the Sprott School of Business are approved as Arts or Social Sciences courses EXCEPT FOR: All Science Geography courses (see list above), all Geomatics (GEOM) courses, all Science Psychology courses (see list above). NSCI 1000 may be used as an Approved Course Outside the Faculties of Science and Engineering and Design.

Free Electives

Any course is allowable as a Free Elective providing it is not prohibited (see below). Students are expected to comply with prerequisite requirements and enrolment restrictions for all courses as published in this Calendar.

Courses Allowable Only as Free Electives in any B.Sc. Program

CHEM 1003 [0.5]	The Chemistry of Food, Health and Drugs
CHEM 1004 [0.5]	Drugs and the Human Body

CHEM 1007 [0.5]	Chemistry of Art and Artifacts
ERTH 1010 [0.5]	Our Dynamic Planet Earth
ERTH 1011 [0.5]	Evolution of the Earth
ERTH 2415 [0.5]	Natural Disasters
ISCI 1001 [0.5]	Introduction to the Environment
ISCI 2000 [0.5]	Natural Laws
ISCI 2002 [0.5]	Human Impacts on the Environment

MATH 0107 [0.5]	Algebra and Geometry
PHYS 1901 [0.5]	Planetary Astronomy
PHYS 1902 [0.5]	From our Star to the Cosmos
PHYS 1905 [0.5]	Physics Behind Everyday Life
PHYS 2903 [0.5]	Physics Towards the Future

Prohibited Courses

The following courses are not acceptable for credit in any B.Sc. program:

COMP 1001 [0.5]	Introduction to Computational Thinking for Arts and Social Science Students
MATH 0005 [0.5]	Precalculus: Functions and Graphs
MATH 0006 [0.5]	Precalculus: Trigonometric Functions and Complex Numbers
MATH 1009 [0.5]	Calculus: with Applications to Business
MATH 1119 [0.5]	Linear Algebra: with Applications to Business
MATH 1401 [0.5]	Elementary Mathematics for Economics I
MATH 1402 [0.5]	Elementary Mathematics for Economics II

Co-operative Education

For more information about how to apply for the Co-op program and how the Co-op program works please visit the Co-op website.

All students participating in the Co-op program are governed by the Undergraduate Co-operative Education Policy.

Undergraduate Co-operative Education Policy Admission Requirements

Students can apply to co-op in one of two ways; directly from high school or after beginning a degree program at Carleton.

If a student is admitted to co-op from high school, their grades will be reviewed two terms to one year prior to their first work term to ensure they continue to meet the academic requirements after their 1st or 2nd year of study. The time at which evaluation takes place depends on the program of study. Students will automatically be notified via their Carleton email account if they are permitted to continue.

Students not admitted to Carleton University with the co-op option on their degree can apply for admission via the co-operative education program website. To view application deadlines, visit carleton.ca/co-op.

Admission to the co-op option is based on the completion of 5.0 or more credits at Carleton University, the CGPA requirement for the students' academic program as well

as any course prerequisites. The articulated CGPA for each program is the normal standard for assessment. Please see the specific degree program sections for the unique admission and continuation requirements for each academic program.

English Language Proficiency

Students admitted to Carleton based on CAEL, IELTS or TOEFL assessments and who are required to take an ESL course must take and pass the Oral Proficiency in Communicative Settings (OPECS) Test. The test must be taken before being permitted to register in COOP 1000. Admission to the co-op program can be confirmed with a minimum score of 4+.

Participation Requirements

COOP 1000

Once a student has been given admission or continuation confirmation to the co-op option s/he must complete and pass COOP 1000 (a mandatory online 0.0 credit course). Students will have access to this course a minimum of two terms prior to their first work term and will be notified when to register.

Communication with the Co-op Office

Students must maintain contact with the co-op office during their job search and while on a work term. All email communication will be conducted via the students' Carleton email account.

Employment

Although every effort is made to ensure a sufficient number of job postings for all students enrolled in the co-op option of their degree program, no guarantee of employment can be made. Carleton's co-op program operates a competitive job search process and is dependent upon current market conditions. Academic performance, skills, motivation, maturity, attitude and potential will determine whether a student is offered a job. It is the student's responsibility to actively conduct a job search in addition to participation in the job search process operated by the co-op office. Once a student accepts a co-op job offer (verbally or written), his/her job search will end and access to co-op jobs will be removed for that term. Students that do not successfully obtain a co-op work term are expected to continue with their academic studies. The summer term is the exception to this rule. Students should also note that hiring priority is given to Canadian citizens for co-op positions in the Federal Government of Canada.

Registering in Co-op Courses

Students will be registered in a Co-op Work Term course while at work. The number of Co-op Work Term courses that a student is registered in is dependent upon the number of four-month work terms that a student accepts.

While on a co-op work term students may take a maximum of 0.5 credit throughout each four-month co-op work term. Courses must be scheduled outside of regular working hours.

Students must be registered as full-time before they begin their co-op job search (2.0 credits). All co-op work terms must be completed before the beginning of the final

academic term. Students may not finish their degree on a co-op work term.

Work Term Assessment and Evaluation

To obtain a Satisfactory grade for the co-op work term students must have:

1. A satisfactory work term evaluation by the co-op employer;
2. A satisfactory grade on the work term report.

Students must submit a work term report at the completion of each four-month work term. Reports are due on the 16th of April, August, and December and students are notified of due dates through their Carleton email account.

Workplace performance will be assessed by the workplace supervisor. Should a student receive an unsatisfactory rating from their co-op employer, an investigation by the co-op program manager will be undertaken. An unsatisfactory employer evaluation does not preclude a student from achieving an overall satisfactory rating for the work term.

Graduation with the Co-op Designation

In order to graduate with the co-op designation, students must satisfy all requirements for their degree program in addition to the requirements according to each co-op program (i.e. successful completion of three or four work terms).

Note: Participation in the co-op option will add up to one additional year for a student to complete their degree program.

Voluntary Withdrawal from the Co-op Option

Students may withdraw from the co-op option of their degree program during a study term ONLY. Students at work may not withdraw from the work term or the co-op option until s/he has completed the requirements of the work term.

Students are eligible to continue in their regular academic program provided that they meet the academic standards required for continuation.

Involuntary or Required Withdrawal from the Co-op Option

Students may be required to withdraw from the co-op option of their degree program for one or any of the following reasons:

1. Failure to achieve a grade of SAT in COOP 1000
2. Failure to pay all co-op related fees
3. Failure to actively participate in the job search process
4. Failure to attend all interviews for positions to which the student has applied
5. Declining more than one job offer during the job search process
6. Continuing a job search after accepting a co-op position
7. Dismissal from a work term by the co-op employer
8. Leaving a work term without approval by the Co-op manager

9. Receipt of an unsatisfactory work term evaluation
10. Submission of an unsatisfactory work term report

Standing and Appeals

The Co-op and Career Services office administers the regulations and procedures that are applicable to all co-op program options. All instances of a student's failure during a work term or other issues directly related to their participation in the co-op option will be reported to the academic department.

Any decision made by the Co-op and Career Services office can be appealed via the normal appeal process within the University.

International Students

All International Students are required to possess a Co-op Work Permit issued by Immigration, Refugees and Citizenship Canada before they can begin working. It is illegal to work in Canada without the proper authorization. Students will be provided with a letter of support to accompany their application. Students must submit their application for their permit before being permitted to view and apply for jobs on the Co-op Services database. Confirmation of a position will not be approved until a student can confirm they have received their permit. Students are advised to discuss the application process and requirements with the International Student Services Office.

B.A. Honours Geography, Geography with Concentration in Physical Geography, B.Sc. Honours Physical Geography: Co-op Admission and Continuation Requirements

- Maintain full-time status in each study term (2.0 credits);
- Be eligible to work in Canada (for off-campus work)
- Have successfully completed COOP 1000 [0.0]

In addition to the following:

1. Registered in B.A. Honours Geography, Geography with a Concentration in Physical Geography, Geography with a Concentration in Urban Geography, or B.Sc. Honours Physical Geography;
2. Obtained and maintained an overall minimum CGPA of 9.5 and a minimum major CGPA of 9.5;
3. Have obtained third-year standing;
4. Successfully completed, by the start date of the first work term:
 - a. the required second-year methods courses in their program (GEOG 2005, GEOG 2006)
 - b. the required field course in their program (GEOG 3000, GEOG 3010, GEOG 3030)
5. Be registered as a full-time student.

B.A. Honours Geography, Geography with a Concentration in Physical Geography, Geography with a Concentration in Urban Geography, B.Sc. Honours Physical Geography students must successfully complete three (3) work terms to obtain the Co-op designation.

Co-op work term course: GEOG 3999

Work/Study Pattern:

Year 1		Year 2		Year 3		Year 4		Year 5	
Term	Pattern	Term	Pattern	Term	Pattern	Term	Pattern	Term	Pattern
Fall	S	Fall	S	Fall	S	Fall	S/W	Fall	O
Winter	S	Winter	S	Winter	S	Winter	S/W	Winter	S
Summer		Summer		Summer	W	Summer	S/W		

Legend

S: Study

W: Work

O: Optional

* indicates recommended work study pattern

** student finds own employer for this work-term.

Admissions Information

Admission Requirements are for the 2020-21 year only, and are based on the Ontario High School System. Holding the minimum admission requirements only establishes eligibility for consideration. The cut-off averages for admission may be considerably higher than the minimum. See also the **General Admission and Procedures** section of this Calendar. An overall average of at least 70% is normally required to be considered for admission. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Higher averages are required for admission to programs for which the demand for places by qualified applicants exceeds the number of places available. The overall average required for admission is determined each year on a program by program basis. Consult admissions.carleton.ca for further details.

Note: Courses listed as *recommended* are not mandatory for admission. Students who do not follow the recommendations will not be disadvantaged in the admission process.

Admission Requirements

Degrees

- Bachelor of Arts (B.A.)(Honours)
- Bachelor of Arts (B.A.)(General)

First Year

For B.A. (General) and B.A. (Honours)

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. The six 4U or M courses must include a 4U course in English (or *anglais*). For applicants whose first language is not English, the requirement of English can also be met under the conditions outlined in the section "English Language Requirements" in the Admissions Requirements and Procedures section of this Calendar.

The cut-off average for admission will be set annually and will normally be above the minimum requirement. Applicants falling slightly below the cut-off average will be considered on an individual basis to determine whether there are special circumstances that would permit their admission. Students who feel that their high school grade average does not reflect their potential may apply to the Enriched Support Program (see the Enriched Support Program section of this Calendar).

Advanced Standing

B.A. (General and Honours) Program

Applications for admission to the second or subsequent years will be assessed on their merits. Advanced standing will be granted only for those courses that are determined to be appropriate.

Admissions Information

Admission Requirements are for the 2020-21 year only, and are based on the Ontario High School System. Holding the minimum admission requirements only establishes eligibility for consideration. The cut-off averages for admission may be considerably higher than the minimum. See also the **General Admission and Procedures** section of this Calendar. An overall average of at least 70% is normally required to be considered for admission. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Higher averages are required for admission to programs for which the demand for places by qualified applicants exceeds the number of places available. The overall average required for admission is determined each year on a program by program basis. Consult admissions.carleton.ca for further details.

Note: Courses listed as *recommended* are not mandatory for admission. Students who do not follow the recommendations will not be disadvantaged in the admission process.

Degrees

- B.Sc. (Honours)
- B.Sc. (General)
- B.Sc. (Major)

Admission Requirements

Honours Program

First Year

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. For most programs including Biochemistry, Bioinformatics, Biotechnology, Chemistry, Combined Honours in Biology and Physics, Chemistry and Physics, Computational Biochemistry, Food Science, Nanoscience, Neuroscience, Neuroscience and Mental Health, and Psychology, the six 4U or M courses must include Advanced Functions and two of Biology, Chemistry, Earth and Space Sciences or Physics. (Calculus and Vectors is strongly recommended).

Specific Honours Admission Requirements

For the Honours programs in Earth Sciences, Environmental Science, Geomatics, Interdisciplinary Science and Practice, and Physical Geography, Calculus and Vectors may be substituted for Advanced Functions.

For the Honours programs in Physics and Applied Physics and for double Honours in Mathematics and Physics, Calculus and Vectors is required in addition to Advanced Functions and one of 4U Physics Chemistry, Biology, or

Earth and Space Sciences. For all programs in Physics, 4U Physics is strongly recommended.

For the Combined Honours program in Chemistry and Computer Science, 4U Chemistry and Calculus and Vectors are strongly recommended.

For Honours in Psychology, a 4U course in English is recommended.

For Honours in Environmental Science, a 4U course in Biology and Chemistry is recommended.

Advanced Standing

For entry to an Honours program after the completion of 5.0 included credits, a student must have a major CGPA of 5.50 or higher, an overall CGPA of 4.50 or higher and the recommendation of the Honours department or committee. A student beginning the final 10.0 credits towards an Honours degree must present a major CGPA of 6.00 or higher, an overall CGPA of 5.00 or higher and the recommendation of the Honours department or committee. A student beginning the final 5.0 credits towards an Honours degree must present a major CGPA of 6.50 or higher and an overall CGPA of 5.00 or higher, as calculated for graduation. Advanced standing will be granted for studies undertaken elsewhere when these are recognized as the equivalent of subjects offered at Carleton University.

Major Program

General Program

First Year

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. The six 4U or M courses must include Advanced Functions and two of Calculus and Vectors, Biology, Chemistry, Earth and Space Science or Physics (Calculus and Vectors is strongly recommended). For the B.Sc. Major in Physics. 4U Physics is strongly recommended. Equivalent courses may be substituted between the old and new Ontario mathematics curriculum.

Advanced Standing

For entry to a General or Major program after the completion of 5.0 included credits, a student must have a major and core CGPA of 3.50 or higher and an overall CGPA of 3.50 or higher. A student beginning the final 5.0 credits towards a General or Major degree must present a major and core CGPA of 4.00 or higher and an overall CGPA of 4.00 or higher, as calculated for graduation. Advanced standing will be granted for studies undertaken elsewhere when these are recognized as the equivalent of subjects offered at Carleton University.

Co-op Option

Direct Admission to the First Year of the Co-op Option

Applicants must:

1. meet the required overall admission cut-off average and prerequisite course average. These averages may be higher than the stated minimum requirements;
2. be registered as a full-time student in the Bachelor of Science Honours program;

3. be eligible to work in Canada (for off-campus work placements).

Note that meeting the above requirements only establishes eligibility for admission to the program. The prevailing job market may limit enrolment in the co-op option.

Note: continuation requirements for students previously admitted to the co-op option and admission requirements for the co-op option after beginning the program are described in the Co-operative Education Regulations section of this Calendar.

Geography (GEOG) Courses

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.

Includes: Experiential Learning Activity

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

GEOG 1020 [0.5 credit]

People, Places and Environments

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

Includes: Experiential Learning Activity

Also listed as ENST 1020.

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

GEOG 1023 [0.5 credit]

Introduction to Cities and Urbanization

Introduction to the study of cities, urbanization and suburbanization. Geography of urban experience, development and change across an urbanizing planet. Urbanization processes, patterns and issues in different cities and regions; the relationships among urban areas.

Includes: Experiential Learning Activity

Precludes additional credit for GEOG 2400 (no longer offered).

Lectures two hours per week and tutorials one hour per week.

GEOG 2005 [0.5 credit]**Introduction to Qualitative Research**

Introduction to the research process, from generating questions to reporting results. Topics include intensive and extensive research approaches; the use of surveys, interviews and other data collection methods; the analysis of qualitative information; and the ethical dimensions of doing research with people and communities.

Includes: Experiential Learning Activity

Also listed as ENST 2005.

Prerequisite(s): 1.0 credit in GEOG or ENST 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]**Introduction to Quantitative Research**

Introduction to solving problems 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.

Includes: Experiential Learning Activity

Also listed as ENST 2006.

Precludes additional credit for BIT 2000, BIT 2100 (no longer offered), BIT 2300 (no longer offered), NEUR 2002, PSCI 2702, STAT 2507, STAT 2606.

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.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 1010 or EARTH 1006 or ISCI 1001.

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.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 1010 or EARTH 1006 or ISCI 1001.

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.

Prerequisite(s): GEOG 1010 or EARTH 1006 or EARTH 1010 or ISCI 1001.

Lectures three hours a week.

GEOG 2023 [0.5 credit]**Cities, Inequality and Urban Change**

Geographical perspectives on the uneven power relationships and politics that shape urban lives and urban space. Key topics may include housing and segregation, planning for sustainable cities, urban social movements, urban inequality and changing livelihoods.

Includes: Experiential Learning Activity

Precludes additional credit for GEOG 2400 (no longer offered).

Prerequisite(s): GEOG 1023, or second-year standing, or permission of the department.

Lectures two hours per week and tutorials one hour per 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): second-year standing or permission of the Department.

Lectures three hours a week.

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

Introduction to social and cultural geography, including how theories of space, place, landscape, power, and knowledge can be used to understand the geographic dimensions of social and cultural life. Topics include culture and identity, migration and transnationalism, nature, gender, sexuality, race, colonialism, consumption, and work.

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

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

GEOG 2500 [0.5 credit]**Climate Change: Social Science Perspectives**

An introduction to climate change as a political, economic and socio-cultural phenomenon, including the political-economic and world-historical causes of anthropogenic greenhouse gas emissions; variations in impact and vulnerability; climate justice and other political movements; global mitigation and adaptation strategies; and proposals for radical systemic change.

Includes: Experiential Learning Activity

Also listed as ENST 2500.

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

Lectures two hours a week, discussion groups 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**

Field research, with a focus on data collection methods, analysis and presentation of findings. Design and conduct research that links the human and biophysical environment. Topics may change from year to year. Includes: Experiential Learning Activity
Also listed as ENST 3900.

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

Prerequisite(s): GEOG 2005/ENST 2005 and GEOG 2006/ENST 2006, third-year Honours standing in Geography, Geomatics or Environmental Studies, or permission of the Department.

Normally consists of a multi-day field excursion in the Ottawa region. A supplementary charge may apply. Consult the department regarding course details.

GEOG 3001 [0.5 credit]**Doing Qualitative Research**

Theory and methods used in qualitative approaches to research in human geography; hands-on experience and discussion of beliefs and claims underlying scholarly work. Ethical and practical dilemmas confronting researchers. Gathering and interpreting qualitative information; representing knowledge.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 2005 or ENST 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.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 2006 or ENST 2006 or STAT 2507 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.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 2006 or ENST 2006 or STAT 2507 and GEOG 2013 or GEOG 2014 or permission of the Department.

Normally consists of a multi-day field camp, including lodging, during Fall or Winter Break, and regular classroom meetings. A supplementary charge will apply.

GEOG 3021 [0.5 credit]**Geographies of Culture and Identity**

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.

Includes: Experiential Learning Activity

Prerequisite(s): 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.

Includes: Experiential Learning Activity

Also listed as ENST 3022.

Prerequisite(s): third-year standing in Geography or Environmental Studies or BGIInS Specialization/Stream in Globalization and Environment 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.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 2023 and third-year standing, 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 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 BGIInS Specialization/Stream in Globalization and Environment 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 or ENST 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. Includes: Experiential Learning Activity Prerequisite(s): third-year Honours standing in Geography or BGIInS Specialization in Globalization and Environment or permission of the Department. A seven- to ten-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. Includes: Experiential Learning Activity 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. Includes: Experiential Learning Activity Prerequisite(s): GEOG 2013 or permission of the Department. Lectures three hours a week, laboratory two hours a week.

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. Includes: Experiential Learning Activity 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. Includes: Experiential Learning Activity Prerequisite(s): GEOG 2013 or permission of the Department. Lecture two hours a week, laboratory two hours a week.

GEOG 3106 [0.5 credit]**Aquatic Science and Management**

Fundamentals of aquatic science. The physical, chemical, and biotic aspects of lake, river, and estuary systems including human impacts, management and conservation. Includes: Experiential Learning Activity Also listed as ENSC 3106. Prerequisite(s): third-year standing and a second-year science or engineering course. Workshop four hours per 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. Includes: Experiential Learning Activity Prerequisite(s): GEOG 2013 or GEOG 2014 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. 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 ENST 2000 or ENST 2001 or 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]**Geographies of the Canadian North**

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 3999 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

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

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

Includes: Experiential Learning Activity

Also listed as ENST 4400.

Prerequisite(s): third-year Honours standing and 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.

Includes: Experiential Learning Activity

Also listed as ENST 4004.

Prerequisite(s): GEOG 3022 or ENST 3022, and 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.

Prerequisite(s): permission of the Department.

GEOG 4007 [0.5 credit]**Special Topics in Geography and Environmental Studies**

Selected topics in geography and/or environmental studies.

Also listed as ENST 4007.

Precludes additional credit for GEOG 4006.

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

Seminar three hours per week.

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 3108 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.

Also listed as ENST 4022.

Prerequisite(s): GEOG 3022 or ENST 3022 and fourth-year Honours standing in Geography or Environmental Studies or BGIInS Specialization in Globalization and Environment or permission of the Department.

Seminar three hours a week.

GEOG 4023 [0.5 credit]**Seminar in Special Topics on the City**

A selected topic or field of inquiry concerning urban geography.

Prerequisite(s): GEOG 3023 and fourth-year Honours standing in Geography or Environmental Studies or BGIInS Specialization in Globalization and Environment 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 BGIInS Specialization in Globalization and Environment or permission of the Department.

Seminar three hours week.

GEOG 4040 [0.5 credit]**Geographic Thought**

Major intellectual issues and debates in the development of contemporary human geography, including history of geographic thought, geographic responses to social and political movements and debates, and geographic engagement with contemporary critical theory.

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 theoretical and applied issues concerning environmental and geographic education.

Also listed as ENST 4050.

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

Seminar three hours per week.

GEOG 4101 [0.5 credit]**Two Million Years of Environmental Change**

Multidisciplinary scientific study of the changes in the physical environment of the Earth during the last two million years and methods of studying recent Earth history, with focus on current research.

Includes: Experiential Learning Activity

Prerequisite(s): third year standing in a B.Sc. program, or a third year Science Geography Elective or a third year EARTH course, or permission of the Department. Note: GEOG 3105 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): permission of the Department.

Recommended background: MAAE 2300.

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 2013 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 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 standing, or permission of the Department.

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

GEOG 4323 [0.5 credit]**Urban and Regional Planning**

History, theories, and practice of urban planning, as well as the policies, plans, and programs developed and implemented in diverse communities. Course topics may include the integration of community development and social planning, urban design, transportation and infrastructure, and environmental management.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 3023 and fourth-year standing in Geography or Environmental Studies, or permission of the department.

Lectures three hours per week.

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/GEOM 4408.

Includes: Experiential Learning Activity

Also listed as GEOM 4406.

Prerequisite(s): fourth-year Honours standing in Geography or Geomatics 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/GEOM 4406.

Includes: Experiential Learning Activity

Also listed as GEOM 4408.

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

Field placement of one day a week.

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

A research project based on a modeling, laboratory or field problem. The project is supervised by a member of the department and a written thesis and poster must be submitted.

Includes: Experiential Learning Activity

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

Prerequisite(s): fourth-year Honours standing in B.Sc. Geography, and an approved research topic and adviser. Hours to be arranged with faculty adviser.

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

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.

Includes: Experiential Learning Activity

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

Prerequisite(s): fourth-year Honours standing in B.A. Geography or B.Globalization and International Studies, a minimum CGPA of 9.00 in the major or permission of the Department, and an approved research topic and adviser. Hours to be arranged with faculty adviser.