# 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 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:**
   - 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:**
   - GEOG 2020 [0.5] Ecosystems of Canada
   - GEOG 2013 [0.5] Weather and Water
   - GEOG 2014 [0.5] The Earth's Surface

3. **1.0 credit in:**
   - GEOG 2005 [0.5] Introduction to Qualitative Research
   - GEOG 2006 [0.5] Introduction to Quantitative Research

4. **1.5 credits from:**
   - 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:**
   - GEOG 3000 [0.5] Honours Field Course
   - GEOG 3030 [0.5] Regional Field Excursion

6. **0.5 credit from:**
   - GEOG 3001 [0.5] Doing Qualitative Research
   - GEOG 3003 [0.5] Quantitative Geography
   - GEOM 2007 [0.5] Vector GIS: Points, Lines and Polygons
   - GEOM 3002 [0.5] Introduction to Remote Sensing
   - GEOM 3007 [0.5] Cartographic Theory and Design

7. **1.0 credit from:**
   - 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**

9. **2.5 credits from:**
   - 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**

11. **2.0 credits in free electives**

**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:**
   - 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:**
   - 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:**
   - 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. **2.0 credits from:**
   - 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

5. **0.5 credit in:**
   - GEOG 3000 [0.5] Honours Field Course
   - GEOG 3010 [0.5] Field Methods in Physical Geography
GEOG 3106 [0.5] Aquatic Science and Management
GEOG 3108 [0.5] Soil Properties
GEOM 3002 [0.5] Introduction to Remote Sensing

6. 0.5 credit in:
   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:
   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 4406 [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:
   GEOG 1010 [0.5] Global Environmental Systems
   GEOG 1023 [0.5] Introduction to Cities and Urbanization
2. 0.5 credit from:
   GEOM 1004 [0.5] Maps, Satellites and the Geospatial Revolution
   GEOG 1020 [0.5] People, Places and Environments

3. 0.5 credit from:
   GEOG 2013 [0.5] Weather and Water
   GEOG 2014 [0.5] The Earth's Surface
   GEOG 2020 [0.5] Ecosystems of Canada

4. 1.0 credit in:
   GEOG 2005 [0.5] Introduction to Qualitative Research
   GEOG 2006 [0.5] Introduction to Quantitative Research

5. 0.5 credit in:
   GEOG 2023 [0.5] Cities, Inequality and Urban Change

6. 1.0 credit from:
   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:
   GEOG 3000 [0.5] Honours Field Course
   GEOG 3030 [0.5] Regional Field Excursion

8. 0.5 credit from:
   GEOG 3001 [0.5] Doing Qualitative Research
   GEOG 3002 [0.5] Introduction to Quantitative Research
   GEOG 3003 [0.5] Quantitative Geography
   GEOG 3007 [0.5] Cartographic Theory and Design

9. 0.5 credit in:
   GEOG 3023 [0.5] Cities in a Global World

10. 0.5 credit from:
    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:
    GEOG 4023 [0.5] Seminar in Special Topics on the City
    GEOG 4323 [0.5] Urban and Regional Planning

12. 0.5 credit from:
    AFRI 3004 [0.5] The African City
    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:
    ARCH 4201 [0.5] History of Modern Housing
    ARCH 4103 [0.5] Cities
    ARCU 4300 [0.5] Theories of Urbanism
    ARCU 4600 [0.5] Post-WWII Urbanism
    ARCU 4700 [0.5] Urban Utopias
    ARCU 4801 [0.5] Topics in Urbanism
    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

INDG 4001 [0.5] Indigeneity in the City

14. 2.5 credits from:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>GEOG 4909 [1.0] Honours Research Thesis (in GEOG/GEOM and/or ENST at the 4000 level)</td>
</tr>
<tr>
<td>2.5</td>
<td>GEOG 4909 [1.0] Honours Research Thesis (in GEOG/GEOM and/or ENST at the 4000 level)</td>
</tr>
</tbody>
</table>

B. Credits Not Included in the Major CGPA (9.0 credits)

15. 7.5 credits in electives not in GEOG

16. 1.5 credits in free electives

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:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>GEOG 1010 [0.5] Global Environmental Systems</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 1020 [0.5] People, Places and Environments</td>
</tr>
</tbody>
</table>

2. 0.5 credit from:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>GEOG 2020 [0.5] Ecosystems of Canada</td>
</tr>
<tr>
<td>0.5</td>
<td>GEOG 2013 [0.5] Weather and Water</td>
</tr>
<tr>
<td>0.5</td>
<td>GEOG 2014 [0.5] The Earth's Surface</td>
</tr>
</tbody>
</table>

3. 1.0 credit from:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>GEOG 2023 [0.5] Cities, Inequality and Urban Change</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 2200 [0.5] Global Connections</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 2300 [0.5] Space, Place and Culture</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 2500 [0.5] Climate Change: Social Science Perspectives</td>
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</tbody>
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4. 1.0 credit from:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>GEOG 2005 [0.5] Introduction to Qualitative Research</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 2006 [0.5] Introduction to Quantitative Research</td>
</tr>
</tbody>
</table>

5. 1.0 credit in GEOG and/or GEOM at the 2000- level or above

6. 2.5 credits in GEOG and/or GEOM at the 3000- level or above

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

7. 6.0 credits in electives not in GEOG

8. 2.0 credit in free electives.

Total Credits 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 Physical Geography

B.Sc. Combined Honours (20.0 credits)

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

1. 1.0 credit in:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>ERTH 1006 [0.5] Exploring Planet Earth</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 1010 [0.5] Global Environmental Systems</td>
</tr>
</tbody>
</table>

2. 1.0 credit in:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>GEOG 2013 [0.5] Weather and Water</td>
</tr>
<tr>
<td>1.0</td>
<td>GEOG 2014 [0.5] The Earth's Surface</td>
</tr>
</tbody>
</table>

3. 2.0 credits in:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>2.0</td>
<td>ERTH 2102 [0.5] Mineralogy to Petrology</td>
</tr>
<tr>
<td>2.0</td>
<td>ERTH 2104 [0.5] Igneous Systems, Geochemistry and Processes</td>
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</tbody>
</table>

4. 0.5 credit in:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>ERTH 2314 [0.5] Sedimentation and Stratigraphy</td>
</tr>
<tr>
<td>0.5</td>
<td>ERTH 2406 [0.5] Geology and Map Interpretation</td>
</tr>
</tbody>
</table>

5. 1.5 credits in:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>ERTH 2802 [0.5] Field Geology I</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>ERTH 3003</td>
<td>Geochemistry and Geochronology</td>
</tr>
<tr>
<td>ERTH 3405</td>
<td>Geophysical Methods</td>
</tr>
<tr>
<td>ERTH 3806</td>
<td>Structural Geology</td>
</tr>
<tr>
<td>6. 0.5 credit from:</td>
<td></td>
</tr>
<tr>
<td>ERTH 3205</td>
<td>Physical Hydrogeology</td>
</tr>
<tr>
<td>GEOG 3103</td>
<td>Watershed Hydrology</td>
</tr>
<tr>
<td>7. 1.0 credit in:</td>
<td></td>
</tr>
<tr>
<td>ERTH 2004</td>
<td>Maps, Satellites and the Geospatial Revolution</td>
</tr>
<tr>
<td>GEOM 3002</td>
<td>Introduction to Remote Sensing</td>
</tr>
<tr>
<td>8. 2.0 credits from:</td>
<td></td>
</tr>
<tr>
<td>GEOG 3003</td>
<td>Quantitative Geography</td>
</tr>
<tr>
<td>GEOG 3010</td>
<td>Field Methods in Physical Geography</td>
</tr>
<tr>
<td>GEOG 3102</td>
<td>Geomorphology</td>
</tr>
<tr>
<td>GEOG 3104</td>
<td>Principles of Biogeography</td>
</tr>
<tr>
<td>GEOG 3105</td>
<td>Climate and Atmospheric Change</td>
</tr>
<tr>
<td>GEOG 3106</td>
<td>Aquatic Science and Management</td>
</tr>
<tr>
<td>GEOG 3108</td>
<td>Soil Properties</td>
</tr>
<tr>
<td>9. 0.5 credit from:</td>
<td></td>
</tr>
<tr>
<td>ERTH 3203</td>
<td>Sedimentology</td>
</tr>
<tr>
<td>ERTH 3206</td>
<td>Sedimentary Depositional Systems</td>
</tr>
<tr>
<td>10. 1.0 credit in:</td>
<td>Science Geography or Geomatics courses at the 2000-level or above</td>
</tr>
<tr>
<td>11. 1.0 credit in:</td>
<td>Earth Sciences, Science Geography or Geomatics courses at the 4000-level</td>
</tr>
<tr>
<td>12. 1.0 credit from:</td>
<td></td>
</tr>
<tr>
<td>ERTH 4908</td>
<td>Honours Thesis</td>
</tr>
<tr>
<td>OR</td>
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<tr>
<td>ERTH 4909</td>
<td>Research in Earth Sciences</td>
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<tr>
<td>and 0.5 credit in ERTH, GEOG or GEOM at the 4000-level</td>
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<td>OR</td>
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<tr>
<td>GEOG 4005</td>
<td>Directed Studies in Geography</td>
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<tr>
<td>and 0.5 credit in ERTH, GEOG or GEOM at the 4000-level</td>
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<tr>
<td>OR</td>
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<tr>
<td>GEOG 4906</td>
<td>Honours Research Project</td>
</tr>
<tr>
<td>B. Credits Not Included in the Major CGPA (7.0 credits)</td>
<td></td>
</tr>
<tr>
<td>13. 1.0 credit in:</td>
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</tr>
<tr>
<td>MATH 1007</td>
<td>Elementary Calculus I</td>
</tr>
<tr>
<td>MATH 1107</td>
<td>Linear Algebra I</td>
</tr>
<tr>
<td>14. 1.0 credit from:</td>
<td></td>
</tr>
<tr>
<td>CHEM 1001</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>&amp; CHEM 1002</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>CHEM 1005</td>
<td>Elementary Chemistry I</td>
</tr>
<tr>
<td>&amp; CHEM 1006</td>
<td>Elementary Chemistry II</td>
</tr>
<tr>
<td>15. 1.0 credit in:</td>
<td>Elementary University Physics I</td>
</tr>
<tr>
<td>PHYS 1007</td>
<td>Elementary University Physics I</td>
</tr>
<tr>
<td>&amp; PHYS 1008</td>
<td>Elementary University Physics II</td>
</tr>
<tr>
<td>16. 0.5 credit from:</td>
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</tr>
<tr>
<td>GEOG 2006</td>
<td>Introduction to Quantitative Research</td>
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<tr>
<td>STAT 2507</td>
<td>Introduction to Statistical Modeling I</td>
</tr>
<tr>
<td>17. 0.5 credit in:</td>
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<tr>
<td>COMP 1005</td>
<td>Introduction to Computer Science I</td>
</tr>
<tr>
<td>18. 0.5 credit in:</td>
<td>approved electives (see list below)</td>
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<tr>
<td>19. 0.5 credit in:</td>
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<tr>
<td>NSCI 1000</td>
<td>Seminar in Science (or approved course outside of the faculties of Science and Engineering and Design)</td>
</tr>
<tr>
<td>20. 1.5 credits in approved courses outside of the faculties of Science and Engineering and Design</td>
<td>1.5</td>
</tr>
<tr>
<td>21. 0.5 credit in free elective</td>
<td>0.5</td>
</tr>
<tr>
<td>Total Credits</td>
<td>20.0</td>
</tr>
</tbody>
</table>

### 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)
- 1.0 credit from: GEOG 1010 [0.5] Global Environmental Systems or ERTH 1006 [0.5] Exploring Planet Earth
- GEOM 1004 [0.5] Maps, Satellites and the Geospatial Revolution

##### B. Credits Not Included in the Major CGPA (7.0 credits)
- 1.0 credit in: MATH 1007 [0.5] Elementary Calculus I
- MATH 1107 [0.5] Linear Algebra I
- 1.0 credit from: 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
- 1.0 credit in: PHYS 1007 [0.5] Elementary University Physics I & PHYS 1008 [0.5] Elementary University Physics II
- 0.5 credit from: GEOG 2006 [0.5] Introduction to Quantitative Research
- STAT 2507 [0.5] Introduction to Statistical Modeling I
- 0.5 credit from: GEOG 3000 [0.5] Honours Field Course
- GEOG 3010 [0.5] Field Methods in Physical Geography
- 2.5 credits from: 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

### Physical Geography

#### B.Sc. Honours (20.0 credits)

##### A. Credits Included in the Major CGPA (10.0 credits)
- 1.0 credit from: GEOG 1010 [0.5] Global Environmental Systems or ERTH 1006 [0.5] Exploring Planet Earth
- GEOM 1004 [0.5] Maps, Satellites and the Geospatial Revolution

##### B. Credits Not Included in the Major CGPA (7.0 credits)
- 1.0 credit in: MATH 1007 [0.5] Elementary Calculus I
- MATH 1107 [0.5] Linear Algebra I
- 1.0 credit from: 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
- 1.0 credit in: PHYS 1007 [0.5] Elementary University Physics I & PHYS 1008 [0.5] Elementary University Physics II
- 0.5 credit from: GEOG 2006 [0.5] Introduction to Quantitative Research
- STAT 2507 [0.5] Introduction to Statistical Modeling I
- 0.5 credit from: GEOG 3000 [0.5] Honours Field Course
- GEOG 3010 [0.5] Field Methods in Physical Geography
- 2.5 credits from: 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. 1.5 credits from:
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:
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:
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:
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:
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

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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:
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

3. 7.5 credits in: the Specialization
a. 0.5 credit from: Foundations I 0.5
   ENST 1000 [0.5] Introduction to Environmental Studies
b. 1.0 credit in: Foundations II 1.0
   ENST 2005 [0.5] Introduction to Environmental Studies
   OR
   GEOS 1020/ ENST 1020 [0.5] People, Places and Environments
   GINS 1000 [0.5] Town Planning
   OR
   GINS 1020/ ENST 1020 [0.5] People, Places and Environments
   GINS 1000 [0.5] Town Planning
   OR
   MATH 1007 [0.5] Elementary Calculus I
   MATH 2007 [0.5] Calculus I
   OR
   MATH 1007 [0.5] Elementary Calculus I
   MATH 2007 [0.5] Calculus I
   GINS 1000 [0.5] Town Planning
   GINS 1020/ ENST 1020 [0.5] People, Places and Environments
   GINS 1000 [0.5] Town Planning
c. 1.5 credits from: Globalization 1.5
   GEG 2023 [0.5] Cities, Inequality and Urban Change
   GEG 2300 [0.5] Space, Place and Culture
   GEG 3203 [0.5] Cities in a Global World
   GEG 3204 [0.5] Understanding Globalization
   GEG 3205 [0.5] Geographies of Selected Regions
   GEG 3030 [0.5] Regional Field Excursion
   GEG 3404 [0.5] Geographies of Economic Development
d. 2.0 credits from: Global Environment 2.0
   ANTH 3355 [0.5] Anthropology and the Environment
   GEG 2500/ ENST 2500 [0.5] Perspectives
   GEG 3022/ ENST 3022 [0.5] Resources
   GEG 3206 [0.5] Health, Environment, and Society
   GEG 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
e. 1.0 credit in: Research Methodologies 1.0
   GEG 2005/ ENST 2005 [0.5] Introduction to Quantitative Research
   GEG 2006/ ENST 2006 [0.5] Introduction to Quantitative Research

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**Stream in Globalization and the Environment**

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

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GINS 1000</td>
<td>Global History</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 1010</td>
<td>International Law and Politics</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 1020</td>
<td>Ethnography, Globalization and Culture</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 2000</td>
<td>Ethics and Globalization</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 2010</td>
<td>Globalization and International Economic Issues</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 2020</td>
<td>Global Literatures</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 3010</td>
<td>Global and International Theory</td>
<td>0.5</td>
</tr>
<tr>
<td>GINS 3020</td>
<td>Places, Boundaries, Movements and Global Environmental Change</td>
<td>0.5</td>
</tr>
</tbody>
</table>

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

**C. Additional Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 2023</td>
<td>Cities, Inequality and Urban Change</td>
<td>0.5</td>
</tr>
<tr>
<td>GEOG 2300</td>
<td>Space, Place and Culture</td>
<td>0.5</td>
</tr>
<tr>
<td>GEOG 2500</td>
<td>Climate Change: Social Science Perspectives</td>
<td>0.5</td>
</tr>
<tr>
<td>GEOG 4909</td>
<td>Honours Research Thesis (topic in Globalization and the Environment)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 1010</td>
<td>Global Environmental Systems</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 1020</td>
<td>People, Places and Environments</td>
<td>0.5</td>
</tr>
</tbody>
</table>

2. 0.5 credit from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 2013</td>
<td>Weather and Water</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2014</td>
<td>The Earth's Surface</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2020</td>
<td>Ecosystems of Canada</td>
<td>0.5</td>
</tr>
</tbody>
</table>

3. 0.5 credit from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 2005</td>
<td>Introduction to Qualitative Research</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2006</td>
<td>Introduction to Quantitative Research</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 1004</td>
<td>Maps, Satellites and the Geospatial Revolution</td>
<td>0.5</td>
</tr>
</tbody>
</table>

4. 0.5 credit from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 2023</td>
<td>Cities, Inequality and Urban Change</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2200</td>
<td>Global Connections</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2300</td>
<td>Space, Place and Culture</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2500</td>
<td>Climate Change: Social Science Perspectives</td>
<td>0.5</td>
</tr>
</tbody>
</table>

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

6. 0.5 credit in GEG or GEOM

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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 1010</td>
<td>Global Environmental Systems</td>
<td>0.5</td>
</tr>
<tr>
<td>ERT 1006</td>
<td>Exploring Planet Earth</td>
<td>0.5</td>
</tr>
</tbody>
</table>

2. 0.5 credit in:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 2013</td>
<td>Weather and Water</td>
<td>0.5</td>
</tr>
<tr>
<td>GEG 2014</td>
<td>The Earth's Surface</td>
<td>0.5</td>
</tr>
</tbody>
</table>

3. 2.5 credits from:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 3002</td>
<td>Introduction to Remote Sensing</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**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:**
   - 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:**
   - GEOG 2023 [0.5] Cities, Inequality and Urban Change
   - GEOG 2200 [0.5] Global Connections
   - GEOM 2007 [0.5] Vector GIS: Points, Lines and Polygons

3. **0.5 credit in:**
   - GEOG 3023 [0.5] Cities in a Global World

4. **0.5 credit from:**
   - AFRI 3004 [0.5] The African City
   - 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:**
   - GEOG 4023 [0.5] Seminar in Special Topics on the City
   - GEOG 4323 [0.5] Urban and Regional Planning

6. **0.5 credit from:**
   - ARCH 4201 [0.5] History of Modern Housing
   - ARCU 4103 [0.5] Cities
   - ARCU 4300 [0.5] Theories of Urbanism
   - ARCU 4600 [0.5] Post-WWII Urbanism
   - ARCU 4700 [0.5] Urban Utopias
   - ARCU 4801 [0.5] Topics in Urbanism
   - GEOG 4000 [0.5] Field Studies (when offered with an urban theme)
   - GEOG 4005 [0.5] Directed Studies in Geography (with urban theme)

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

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 Continuation 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), the Indigenous Enriched Support Program (IESP), 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. and the B.A. Honours degrees and B.Co.M.S. are required to include 3.0 breadth credits, which must include 1.0 credit in three of the four breadth areas identified below. Credits that fulfill requirements in the Major, Minor, Concentration, Specialization, or Stream may also be used to fulfill 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, 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

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Breadth Area 2: Humanities

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

Breadth Area 3: Science, Engineering, and Design

Subject codes: ACSE, AERO, ARCC, ARCH, ARCN, ARCS, ARCU, BIOC, BIOL, BIT, CHEM, CIVE, CMPS, COMP, ECON, 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

Subject codes: ANTH, BUSI, CGSC, CRCJ, ECON, ENST, GECG, GEOM, GINS, GPOL, INAF, IPAF, LAWS, MGDS, PADM, PAPM, 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. Undeclared students must apply to enter a program upon or before completing 3.5 credits.

Change of Program Within the B.A. Degree
To transfer to a program within the B.A. degree, applicants must normally be Eligible to Continue (EC) in the new program, by meeting the CGPA thresholds described in Section 3.1.9 of the Academic Regulations of the University.

Applications to declare or change programs within the B.A. degree online 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 enrollment limitations, as well as 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 normally requires that the student be Eligible to Continue (EC) and is subject to any specific requirements of the intended Minor, Concentration, or Specialization as published in the relevant Calendar entry and in Section 3.1.9 of the Academic Regulations of the University.

Mention : français
Students registered in certain B.A. programs may earn the diploma notation Mention : français by completing part of their program requirements in French, and by demonstrating 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 in the Honours discipline taken in French; and
4. 1.0 credit at the 4000-level in the Honours discipline taken in French.

Students in a B.A. 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 fulfill the Mention : français requirement in both disciplines.

Courses taught in French (Items 3 and 4, 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 Continuation Evaluation (see the Academic Regulations of the University section of this Calendar).

**Breadth Requirement for the B.Sc.**

Students in a Bachelor of Science program 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 (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 (may include NSCI 1000) if the student received fewer than 10.0 transfer credits; or,
2. 1.0 credit in courses outside of the faculties of Science and Engineering and Design (may include NSCI 1000) if the student received 10.0 or more transfer credits.

**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. Undeclared students must apply to enter a program upon or before completing 3.5 credits.

**Change of Program within the B.Sc. Degree**

To transfer to a program within the B.Sc. degree, applicants must normally be Eligible to Continue (EC) in the new program, by meeting the CGPA thresholds described in Section 3.1.10 of the Academic Regulations of the University.

Applications to declare or change programs 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 limitations, 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 normally requires that the student be Eligible to Continue (EC) and is meeting the minimum CGPAs described in Section 3.1.9 of the Academic Regulations of the University, as well as being subject to any specific requirements of the intended Minor, Concentration, or Specialization as published in the relevant Calendar entry.

**Experimental Science Requirement**

Students in a B.Sc. degree program 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**

<table>
<thead>
<tr>
<th>Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 2200 [0.5]</td>
</tr>
<tr>
<td>BIOC 4001 [0.5]</td>
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<tr>
<td>BIOC 4201 [0.5]</td>
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</table>

<table>
<thead>
<tr>
<th>Biology</th>
</tr>
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<tbody>
<tr>
<td>BIOL 1103 [0.5]</td>
</tr>
<tr>
<td>BIOL 1104 [0.5]</td>
</tr>
<tr>
<td>BIOL 2001 [0.5]</td>
</tr>
<tr>
<td>BIOL 2002 [0.5]</td>
</tr>
<tr>
<td>BIOL 2104 [0.5]</td>
</tr>
<tr>
<td>BIOL 2200 [0.5]</td>
</tr>
<tr>
<td>BIOL 2600 [0.5]</td>
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<table>
<thead>
<tr>
<th>Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1001 [0.5]</td>
</tr>
<tr>
<td>CHEM 1002 [0.5]</td>
</tr>
<tr>
<td>CHEM 1005 [0.5]</td>
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<td>CHEM 1006 [0.5]</td>
</tr>
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<td>CHEM 2103 [0.5]</td>
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<td>CHEM 2203 [0.5]</td>
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<td>CHEM 2204 [0.5]</td>
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<td>CHEM 2302 [0.5]</td>
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<td>CHEM 2303 [0.5]</td>
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<td>CHEM 2800 [0.5]</td>
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<table>
<thead>
<tr>
<th>Earth Sciences</th>
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</thead>
<tbody>
<tr>
<td>ERTH 1006 [0.5]</td>
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<td>ERTH 1009 [0.5]</td>
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<td>ERTH 2102 [0.5]</td>
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<td>ERTH 2404 [0.5]</td>
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<td>ERTH 2802 [0.5]</td>
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<td>ERTH 3111 [0.5]</td>
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<table>
<thead>
<tr>
<th>Food Sciences</th>
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<tbody>
<tr>
<td>FOOD 3001 [0.5]</td>
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<tr>
<td>FOOD 3002 [0.5]</td>
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<tr>
<td>FOOD 3005 [0.5]</td>
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<table>
<thead>
<tr>
<th>Geography</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEG 1010 [0.5]</td>
</tr>
<tr>
<td>GEG 3108 [0.5]</td>
</tr>
</tbody>
</table>
### Course Categories for B.Sc. Programs

#### Science Geography Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 1010</td>
<td>Global Environmental Systems</td>
</tr>
<tr>
<td>GEOG 2006</td>
<td>Introduction to Quantitative Research</td>
</tr>
<tr>
<td>GEOG 2013</td>
<td>Weather and Water</td>
</tr>
<tr>
<td>GEOG 2014</td>
<td>The Earth's Surface</td>
</tr>
<tr>
<td>GEOG 3003</td>
<td>Quantitative Geography</td>
</tr>
<tr>
<td>GEOG 3010</td>
<td>Field Methods in Physical Geography</td>
</tr>
<tr>
<td>GEOG 3102</td>
<td>Geomorphology</td>
</tr>
<tr>
<td>GEOG 3103</td>
<td>Watershed Hydrology</td>
</tr>
<tr>
<td>GEOG 3104</td>
<td>Principles of Biogeography</td>
</tr>
<tr>
<td>GEOG 3105</td>
<td>Climate and Atmospheric Change</td>
</tr>
<tr>
<td>GEOG 3106</td>
<td>Aquatic Science and Management</td>
</tr>
<tr>
<td>GEOG 3108</td>
<td>Soil Properties</td>
</tr>
<tr>
<td>GEOG 4000</td>
<td>Field Studies</td>
</tr>
<tr>
<td>GEOG 4005</td>
<td>Directed Studies in Geography</td>
</tr>
<tr>
<td>GEOG 4013</td>
<td>Cold Region Hydrology</td>
</tr>
<tr>
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<td>GEOG 4101</td>
<td>Two Million Years of Environmental Change</td>
</tr>
<tr>
<td>GEOG 4103</td>
<td>Water Resources Engineering</td>
</tr>
<tr>
<td>GEOG 4104</td>
<td>Micrometeorology</td>
</tr>
<tr>
<td>GEOG 4108</td>
<td>Permafrost</td>
</tr>
</tbody>
</table>

#### Neuroscience

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEUR 3206</td>
<td>Sensory and Motor Neuroscience</td>
</tr>
<tr>
<td>NEUR 3207</td>
<td>Systems Neuroscience</td>
</tr>
<tr>
<td>NEUR 4600</td>
<td>Advanced Lab in Neuroanatomy</td>
</tr>
</tbody>
</table>

#### Neurosience

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>NEUR 3206</td>
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</tr>
</tbody>
</table>

#### Physics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 1001</td>
<td>Foundations of Physics I</td>
</tr>
<tr>
<td>PHYS 1002</td>
<td>Foundations of Physics II</td>
</tr>
<tr>
<td>PHYS 1003</td>
<td>Introductory Mechanics and Thermodynamics</td>
</tr>
<tr>
<td>PHYS 1004</td>
<td>Introductory Electromagnetism and Wave Motion</td>
</tr>
<tr>
<td>PHYS 1007</td>
<td>Elementary University Physics I</td>
</tr>
<tr>
<td>PHYS 1008</td>
<td>Elementary University Physics II</td>
</tr>
<tr>
<td>PHYS 2202</td>
<td>Wave Motion and Optics</td>
</tr>
<tr>
<td>PHYS 2604</td>
<td>Modern Physics I</td>
</tr>
<tr>
<td>PHYS 3007</td>
<td>Third Year Physics Laboratory: Selected Experiments and Seminars</td>
</tr>
<tr>
<td>PHYS 3606</td>
<td>Modern Physics II</td>
</tr>
<tr>
<td>PHYS 3608</td>
<td>Modern Applied Physics</td>
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#### Course Categories for B.Sc. Programs

#### Science Geography Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 1010</td>
<td>Global Environmental Systems</td>
</tr>
<tr>
<td>GEOG 2006</td>
<td>Introduction to Quantitative Research</td>
</tr>
<tr>
<td>GEOG 2013</td>
<td>Weather and Water</td>
</tr>
<tr>
<td>GEOG 2014</td>
<td>The Earth's Surface</td>
</tr>
<tr>
<td>GEOG 3003</td>
<td>Quantitative Geography</td>
</tr>
<tr>
<td>GEOG 3010</td>
<td>Field Methods in Physical Geography</td>
</tr>
<tr>
<td>GEOG 3102</td>
<td>Geomorphology</td>
</tr>
<tr>
<td>GEOG 3103</td>
<td>Watershed Hydrology</td>
</tr>
<tr>
<td>GEOG 3104</td>
<td>Principles of Biogeography</td>
</tr>
<tr>
<td>GEOG 3105</td>
<td>Climate and Atmospheric Change</td>
</tr>
<tr>
<td>GEOG 3106</td>
<td>Aquatic Science and Management</td>
</tr>
<tr>
<td>GEOG 3108</td>
<td>Soil Properties</td>
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#### Science Psychology Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PSYC 2001</td>
<td>Introduction to Research Methods in Psychology</td>
</tr>
<tr>
<td>PSYC 2002</td>
<td>Introduction to Statistics in Psychology</td>
</tr>
<tr>
<td>PSYC 2700</td>
<td>Introduction to Cognitive Psychology</td>
</tr>
<tr>
<td>PSYC 3000</td>
<td>Design and Analysis in Psychological Research</td>
</tr>
<tr>
<td>PSYC 3506</td>
<td>Cognitive Development</td>
</tr>
<tr>
<td>PSYC 3700</td>
<td>Cognition (Honours Seminar)</td>
</tr>
<tr>
<td>PSYC 3702</td>
<td>Perception</td>
</tr>
</tbody>
</table>

<table>
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<tr>
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<td>Introduction to Research Methods in Psychology</td>
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</tr>
<tr>
<td>PSYC 3702</td>
<td>Perception</td>
</tr>
</tbody>
</table>

#### 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)** Biochemistry students may use BIO 2005 only as a free elective.
- **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)**
- **ISAP (Interdisciplinary Science Practice)**
- **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 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 BIOC 1002 and BIOC 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)**
- **ISAP (Interdisciplinary Science Practice)**
- **MATH (Mathematics)**
The following courses are not acceptable for credit in any B.Sc. program:

**Prohibited Courses**

Science Geography (see list above)
Science Psychology (see list above)
STAT (Statistics)
TSES (Technology, Society, Environment) Biology

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**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 4810 [0.5]</td>
<td>Education Research in Biology</td>
</tr>
<tr>
<td>CHEM 1003 [0.5]</td>
<td>The Chemistry of Food, Health and Drugs</td>
</tr>
<tr>
<td>CHEM 1004 [0.5]</td>
<td>Drugs and the Human Body</td>
</tr>
<tr>
<td>CHEM 1007 [0.5]</td>
<td>Chemistry of Art and Artifacts</td>
</tr>
<tr>
<td>ERTH 1010 [0.5]</td>
<td>Our Dynamic Planet Earth</td>
</tr>
<tr>
<td>ERTH 1011 [0.5]</td>
<td>Evolution of the Earth</td>
</tr>
<tr>
<td>ERTH 2415 [0.5]</td>
<td>Natural Disasters</td>
</tr>
<tr>
<td>ISCI 1001 [0.5]</td>
<td>Introduction to the Environment</td>
</tr>
<tr>
<td>ISCI 2000 [0.5]</td>
<td>Natural Laws</td>
</tr>
<tr>
<td>ISCI 2002 [0.5]</td>
<td>Human Impacts on the Environment</td>
</tr>
<tr>
<td>MATH 0107 [0.5]</td>
<td>Algebra and Geometry</td>
</tr>
<tr>
<td>PHYS 1901 [0.5]</td>
<td>Planetary Astronomy</td>
</tr>
<tr>
<td>PHYS 1902 [0.5]</td>
<td>From Our Star to the Cosmos</td>
</tr>
<tr>
<td>PHYS 1905 [0.5]</td>
<td>Physics Behind Everyday Life</td>
</tr>
<tr>
<td>PHYS 2903 [0.5]</td>
<td>Physics Towards the Future</td>
</tr>
</tbody>
</table>

**Prohibited Courses**

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

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>COMP 1001 [0.5]</td>
<td>Introduction to Computational Thinking for Arts and Social Science Students</td>
</tr>
<tr>
<td>MATH 0005 [0.5]</td>
<td>Precalculus: Functions and Graphs</td>
</tr>
<tr>
<td>MATH 0006 [0.5]</td>
<td>Precalculus: Trigonometric Functions and Complex Numbers</td>
</tr>
<tr>
<td>MATH 1009 [0.5]</td>
<td>Mathematics for Business</td>
</tr>
<tr>
<td>MATH 1119 [0.5]</td>
<td>Linear Algebra: with Applications to Business</td>
</tr>
</tbody>
</table>

**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 applies to a degree program with a Co-op option from high school, their university grades will be reviewed two terms to one year prior to their first work term to ensure they meet the academic requirements after their first or second year of study. The time at which the evaluation takes place depends on the program of study. Students will automatically receive an admission decision via their Carleton email account.

Students who did not request Co-op at the time they applied to Carleton can request Co-op after they begin their university studies. To view application instructions and deadlines, please visit carleton.ca/co-op.

To be admitted to Co-op, a student must successfully complete 5.0 or more credits that count towards their degree, meet the minimum CGPA requirement(s) for the student's Co-op option, and fulfil any specified course prerequisites. To see the unique admission and continuation requirements for each Co-op option, please refer to the specific degree programs listed in the Undergraduate Calendar.

**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
1. 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 9.50 and a minimum major CGPA of 9.50;
3. Have obtained third-year standing;
4. Successfully completed, by the start date of the first work term:
   b. the required field course in their program (GEOG 3000, GEOG 3010, or 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:

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Summer</td>
<td>Summer</td>
<td>Summer</td>
<td>W</td>
<td>Summer</td>
</tr>
</tbody>
</table>

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 2022-23 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.

Admissions Information

Admission requirements are based on the Ontario High School System. Prospective students can view the admission requirements through the Admissions website at admissions.carleton.ca. The overall average required for admission is determined each year on a program-by-program basis. Holding the minimum admission requirements only establishes eligibility for consideration; higher averages are required for admission to programs for which the demand for places by qualified applicants exceeds the number of places available. All programs have limited enrolment and admission is not guaranteed. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Consult admissions.carleton.ca for further details.

Note: If a course is listed as recommended, it is 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.)

First Year

For B.A. 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). Applicants submitting an English language test to satisfy the requirements of the English Language Proficiency section of this Calendar may use that test to also satisfy the 4U English prerequisite requirement.

Biology

For the major in Biology in the B.A. program, in addition to the 4U English, a 4U course in Chemistry is required. Advanced Functions, and Calculus and Vectors are recommended.

Advanced Standing

Applications for admission beyond first year will be assessed on their merits. Applicants must normally be Eligible to Continue in their year level, in addition to meeting the CGPA thresholds described in Section 3.1.9 of the Academic Regulations of the University. Advanced standing will be granted only for those subjects assessed as being appropriate for the program and the stream selected.

Co-op Option

Direct Admission to the 1st Year of the Co-op Option

Co-op is available for the following Majors in the B.A. (Honours) degree: Anthropology, English, Environmental Studies, European and Russian Studies, French,
Geography, Geomatics, History, Law, Political Science, Psychology, Sociology.

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 Arts Honours with one of the majors listed above;
3. be eligible to work in Canada (for off-campus work placements).

Meeting the above requirements only establishes eligibility for admission to the program. The prevailing job market may limit enrolment in the co-op option. Students should also note that hiring priority is given to Canadian citizens for co-op positions in the Public Service Commission.

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.

Advanced Standing

B.A. and B.A. (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 2022-23 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. All programs have limited enrolment and admission is not guaranteed. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Consult admissions.carleton.ca for further details.

Note: If a course is listed as recommended, it is 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. (Major)
• B.Sc.

Admission Requirements

B. Sc. Honours

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 and Biology, 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 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

Applications for admission beyond first year will be assessed on their merits. Applicants must normally be Eligible to Continue in their year level, in addition to meeting the CGPA thresholds described in Section 3.1.9 of the Academic Regulations of the University. Advanced standing will be granted only for those subjects deemed appropriate for the program and stream selected.
B.Sc. Major and B.Sc.

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.

Advanced Standing
Applications for admission beyond first year will be assessed on their merits. Applicants must normally be Eligible to Continue (EC) in their year level. Advanced standing will be granted only for those subjects deemed appropriate for the program and stream selected.

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: 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 2009, 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 ERTH 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 ERTH 1006 or ISCI 1001.
Lectures three hours a week, laboratory three hours a week.

GEOG 2020 [0.5 credit]
Ecosystems of Canada
Introduction to world biomes and in-depth analysis of the distribution and development of Canada’s major ecosystems including the boreal forest, temperate forest, tundra, grasslands, wetlands, and aquatic environments; Current issues in ecosystem science and conservation such as agricultural management, forestry and urban ecology.
Prerequisite(s): GEOG 1010 or ERTH 1006 or ERTH 1010 or ISCI 1001.
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): second-year standing or permission of the Department.
Lectures three hours a week.

GEOG 2200 [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 2300 [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
Prerequisite(s): GEOG 1010 or ERTH 1006 or ERTH 1010 or ISCI 1001.
Lectures three hours a week.

GEOG 2400 [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 3009 [0.5 credit]
Special Topics in Human Geography
Selected topics concerning human geography not usually included in regular course offerings. Topic varies from year to year. Students should check with the Department for more information.
Precludes additional credit for GEOG 2505 (no longer offered).
Prerequisite(s): GEOG 1020 or ENST 1020 and third-year standing, or permission of the Department.
Lecture three hours per 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 BGInS 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 BGInS 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 BGInS 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisite(s)</th>
<th>Lectures or Seminars Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 3501</td>
<td>0.5</td>
<td>Geographies of the Canadian North</td>
<td>The physical characteristics, historical geography, economic resources, settlement patterns and problems and the future development of Arctic and Subarctic lands, focusing primarily on Canada.</td>
<td>third-year standing or permission of the Department.</td>
<td>3 hours a week</td>
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<tr>
<td>GEOG 3700</td>
<td>0.5</td>
<td>Population Geography</td>
<td>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.</td>
<td>GEOG 2200 or GEOG 2300, or permission of the Department.</td>
<td>3 hours a week</td>
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<tr>
<td>GEOG 3999</td>
<td>0.0</td>
<td>Co-operative Work Term</td>
<td>Included: Experiential Learning Activity</td>
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</tr>
<tr>
<td>GEOG 4000</td>
<td>0.5</td>
<td>Field Studies</td>
<td>Field observation and methodology in a selected region; individual or group basis.</td>
<td>GEOG 3108 or permission of the Department.</td>
<td>3 hours a week</td>
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<tr>
<td>GEOG 4004</td>
<td>0.5</td>
<td>Environmental Impact Assessment</td>
<td>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.</td>
<td>GEOG 3022 or ENST 3022, and fourth-year Honours standing in Geography or Environmental Studies or Environmental Science, or permission of the Department.</td>
<td>3 hours a week</td>
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<tr>
<td>GEOG 4005</td>
<td>0.5</td>
<td>Directed Studies in Geography</td>
<td>Students pursue their interest in a selected theme in geography on a tutorial basis with a member of the Department.</td>
<td>permission of the Department.</td>
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<tr>
<td>GEOG 4007</td>
<td>0.5</td>
<td>Special Topics in Geography and Environmental Studies</td>
<td>Selected topics in geography and/or environmental studies.</td>
<td>fourth-year Honours standing in the Department of permission of the Department.</td>
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<tr>
<td>GEOG 4013</td>
<td>0.5</td>
<td>Cold Region Hydrology</td>
<td>An examination of cold region hydrologic processes via experimental and observational studies; analysis of hydrologic data and application of hydrologic models.</td>
<td>GEOG 3103.</td>
<td>3 hours a week</td>
</tr>
<tr>
<td>GEOG 4017</td>
<td>0.5</td>
<td>Global Biogeochemical Cycles</td>
<td>Processes that control the fluxes and reservoirs of biologically active chemical constituents on land, in the atmosphere, and in the oceans.</td>
<td>GEOG 3108 or permission of the Department.</td>
<td>3 hours a week</td>
</tr>
<tr>
<td>GEOG 4021</td>
<td>0.5</td>
<td>Seminar in Culture, Identity and Place</td>
<td>Selected topic or field of inquiry concerning the geographic dimensions of culture, identity and place.</td>
<td>GEOG 3021 and fourth-year Honours standing in Geography or permission of the Department.</td>
<td>3 hours a week</td>
</tr>
<tr>
<td>GEOG 4022</td>
<td>0.5</td>
<td>Seminar in People, Resources and Environmental Change</td>
<td>A selected topic or field of inquiry concerning natural resource use and environmental change.</td>
<td>GEOG 3022 or ENST 3022 and fourth-year Honours standing in Geography or Environmental Studies or BGInS Specialization in Globalization and Environment or permission of the Department.</td>
<td>3 hours a week</td>
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<tr>
<td>GEOG 4023</td>
<td>0.5</td>
<td>Seminar in Special Topics on the City</td>
<td>A selected topic or field of inquiry concerning urban geography.</td>
<td>GEOG 3023 and fourth-year Honours standing in Geography or Environmental Studies or BGInS Specialization in Globalization and Environment or permission of the Department.</td>
<td>3 hours per week</td>
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</table>
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 BGInS 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 ERTH 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
Students apply their knowledge and research skills and gain experience through field placements in government, the private sector, non-government organisations and with community organisations in the environmental field.
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
Students apply their knowledge and research skills and gain experience through field placements in government, the private sector, non-government organisations and with community organisations in the environmental field.
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 4450 [0.5 credit]
Community-Engaged Research
Working in partnership with local organizations, students apply their geographical knowledge to conduct community-engaged research. Student projects will generate outputs for community partners. Research topics vary year to year.
Includes: Experiential Learning Activity
Also listed as ENST 4450.
Prerequisite(s): fourth-year standing, or permission of the department.
Lectures, discussion and project work three hours a week.

GEOG 4906 [1.0 credit]
Honours Research Project
A research project based on a modelling, 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), GEOM 4906, GEOM 4906, GEOM 4909, ENST 4906, and ENST 4907.
Prerequisite(s): fourth-year Honours standing in B.A. Geography or B.Globalisation 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.