



<p>1.0 Degree Title Specify the two degrees for concurrent degree programs</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">B.Sc.</div> <p>1.1 Major (Legacy= Subject) (30-char. max.)</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Earth System Science</div> <p>1.2 Concentration (Legacy = Concentration/Option) If applicable (30 char. max.)</p> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <p>1.3 Minor (with Concentration, if applicable) (30 char. max.)</p> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <p>1.4 Category</p> <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Faculty Program (FP)</td> <td><input type="checkbox"/> Honours (HON)</td> </tr> <tr> <td><input checked="" type="checkbox"/> Major</td> <td><input type="checkbox"/> Joint Honours Component (HC)</td> </tr> <tr> <td><input type="checkbox"/> Joint Major</td> <td><input type="checkbox"/> Internship/Co-op</td> </tr> <tr> <td><input type="checkbox"/> Major Concentration (CON)</td> <td><input type="checkbox"/> Thesis (T)</td> </tr> <tr> <td><input type="checkbox"/> Minor</td> <td><input type="checkbox"/> Non-Thesis (N)</td> </tr> <tr> <td><input type="checkbox"/> Minor Concentration (CON)</td> <td><input type="checkbox"/> Other</td> </tr> <tr> <td></td> <td style="text-align: center;">Please specify</td> </tr> <tr> <td></td> <td style="text-align: center;"><div style="border: 1px solid black; height: 20px; width: 100%; margin: 0 auto;"></div></td> </tr> </table> <p>1.5 Complete Program Title</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Major in Earth System Science</div>	<input type="checkbox"/> Faculty Program (FP)	<input type="checkbox"/> Honours (HON)	<input checked="" type="checkbox"/> Major	<input type="checkbox"/> Joint Honours Component (HC)	<input type="checkbox"/> Joint Major	<input type="checkbox"/> Internship/Co-op	<input type="checkbox"/> Major Concentration (CON)	<input type="checkbox"/> Thesis (T)	<input type="checkbox"/> Minor	<input type="checkbox"/> Non-Thesis (N)	<input type="checkbox"/> Minor Concentration (CON)	<input type="checkbox"/> Other		Please specify		<div style="border: 1px solid black; height: 20px; width: 100%; margin: 0 auto;"></div>	<p>2.0 Administering Faculty/Unit</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">Science</div> <p>Offering Faculty/Department</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">AOS/EPS/GEOG</div> <p>3.0 Effective Term of revision or retirement Please give reasons in 5.0 "Rationale" in the case of retirement (Ex. Sept. 2004 = 200409) <input type="checkbox"/> Retirement</p> <p>Term: <div style="border: 1px solid black; padding: 2px; margin-left: 20px;">200709</div></p> <p>4.0 Existing Credit Weight Proposed Credit Weight</p> <div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <div style="border: 1px solid black; padding: 2px; width: 40%;">57</div> <div style="border: 1px solid black; padding: 2px; width: 40%;">57</div> </div> <p>5.0 Rationale for revised program</p> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>These changes were required by MELS before approval of the program was granted. They include incorporation of a course dealing with social science issues in the Required List, removal of a set of complementary courses to the more general list and inclusion of several courses in Resources and Natural Risks and Hazards.</p> </div>
<input type="checkbox"/> Faculty Program (FP)	<input type="checkbox"/> Honours (HON)																
<input checked="" type="checkbox"/> Major	<input type="checkbox"/> Joint Honours Component (HC)																
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<input type="checkbox"/> Minor Concentration (CON)	<input type="checkbox"/> Other																
	Please specify																
	<div style="border: 1px solid black; height: 20px; width: 100%; margin: 0 auto;"></div>																
<p>6.0 Revised Program Description (Maximum 150 words)</p> <div style="border: 1px solid black; height: 250px; width: 100%; margin-top: 10px;"></div>																	

7.0 List of existing program and proposed program

Existing program (list courses as follows: Subj Code/Crse Num, Title, Credit weight, under the headings of: Required Courses,

Complementary Courses, Elective Courses)

MAJOR IN EARTH SYSTEM SCIENCE

(57 credits)

(Awaiting approval of the Ministère de l'Éducation, du Loisir, et du Sport)

Required Courses

(33 credits)

- ATOC 214 (3) Introduction: Physics of the Atmosphere
- BIOL 215 (3) Introduction to Ecology and Evolution
- ENVR 200 (3) The Global Environment
- ESYS 200 (3) Earth System Processes
- GEOG 203 (3) Environmental Systems
- MATH 203 (3) Principles of Statistics 1 (or equivalent course)
- MATH 222 (3) Calculus 3
- ATOC 308 (3) Principles of Remote Sensing or GEOG 308
- ESYS 300 (3) Investigating the Earth System
- ESYS 301 (3) Earth System Modelling
- ESYS 500 (3) Earth Systems Applications

Complementary Courses

(24 credits)

3 credits, one of the following courses:

- EPSC 210 (3) Introductory Mineralogy
- EPSC 220 (3) Principles of Geochemistry

3 credits, one of the following courses:

- ATOC 215 (3) Oceans, Weather and Climate
- EPSC 212 (3) Introductory Petrology
- GEOG 272 (3) Earth's Changing Surface

18 credits from the following course list, with at least 3 credits from each of subject codes ATOC, EPSC, and GEOG. At least 9 of the 18 credits must be at the 400 level or higher.

- ATOC 309 (3) Weather Radars and Satellites
- ATOC 315 (3) Water in the Atmosphere
- ATOC 412 (3) Atmospheric Dynamics
- ATOC 419 (3) Advances in Chemistry of Atmosphere
- ATOC 512 (3) Atmospheric and Oceanic Dynamics
- ATOC 513 (3) Waves and Stability
- ATOC 530 (3) Climate Dynamics 1
- ATOC 531 (3) Climate Dynamics 2
- ATOC 540 (3) Synoptic Meteorology 1
- ATOC 541 (3) Synoptic Meteorology 2
- BIOL 308 (3) Ecological Dynamics
- BIOL 309 (3) Mathematical Models in Biology
- BIOL 432 (3) Limnology
- BIOL 441 (3) Biological Oceanography
- BIOL 465 (3) Conservation Biology
- BIOL 534 (3) Theoretical Ecology
- BIOL 540 (3) Ecology of Species Invasions
- BREE 319 (3) Engineering Mathematics (*offered on Macdonald Campus*)

Proposed program (list courses as follows: Subj Code/Crse Num, Title, Credit weight, under the headings of: Required Courses, Complementary Courses, Elective Courses)

MAJOR IN EARTH SYSTEM SCIENCE

(57 credits)

(Awaiting approval of the Ministère de l'Éducation, du Loisir, et du Sport)

Required Courses

(36 credits)

- ATOC 214 (3) Introduction: Physics of the Atmosphere
- BIOL 215 (3) Introduction to Ecology and Evolution
- ENVR 200 (3) The Global Environment
- ENVR 201 (3) Society and Environment**
- ESYS 200 (3) Earth System Processes
- GEOG 203 (3) Environmental Systems
- MATH 203 (3) Principles of Statistics 1 (or equivalent course)
- MATH 222 (3) Calculus 3
- ATOC 308 (3) Principles of Remote Sensing or GEOG 308
- ESYS 300 (3) Investigating the Earth System
- ESYS 301 (3) Earth System Modelling
- ESYS 500 (3) Earth Systems Applications

Complementary Courses

(21 credits)

3 credits, one of the following courses:

- EPSC 210 (3) Introductory Mineralogy
- EPSC 220 (3) Principles of Geochemistry

~~3 credits, one of the following courses:~~

- ~~ATOC 215 (3) Oceans, Weather and Climate~~
- ~~EPSC 212 (3) Introductory Petrology~~
- ~~GEOG 272 (3) Earth's Changing Surface~~

18 credits from the following course list, with at least 3 credits from each of subject codes ATOC, EPSC, and GEOG. At least 9 of the 18 credits must be at the 400 level or higher.

- ATOC 215 (3) Oceans, Weather and Climate**
- ATOC 309 (3) Weather Radars and Satellites
- ATOC 315 (3) Water in the Atmosphere
- ATOC 412 (3) Atmospheric Dynamics
- ATOC 419 (3) Advances in Chemistry of Atmosphere
- ATOC 512 (3) Atmospheric and Oceanic Dynamics
- ATOC 513 (3) Waves and Stability
- ATOC 530 (3) Climate Dynamics 1
- ATOC 531 (3) Climate Dynamics 2
- ATOC 540 (3) Synoptic Meteorology 1
- ATOC 541 (3) Synoptic Meteorology 2
- BIOL 308 (3) Ecological Dynamics
- BIOL 309 (3) Mathematical Models in Biology
- BIOL 432 (3) Limnology
- BIOL 441 (3) Biological Oceanography
- BIOL 465 (3) Conservation Biology
- BIOL 534 (3) Theoretical Ecology
- BIOL 540 (3) Ecology of Species Invasions
- BREE 319 (3) Engineering Mathematics (*offered on Macdonald Campus*)

EPSC 312	(3)	Spectroscopy of Minerals
EPSC 320	(3)	Elementary Earth Physics
EPSC 331	(3)	Field School 2
EPSC 334	(3)	Invertebrate Paleontology
EPSC 341	(3)	Field School 3
EPSC 350	(3)	Tectonics
EPSC 423	(3)	Igneous Petrology
EPSC 425	(3)	Sediments to Sequences
EPSC 445	(3)	Metamorphic Petrology
EPSC 452	(3)	Mineral Deposits 2
EPSC 455	(3)	Sedimentary Geology
EPSC 519	(3)	Isotope Geology
EPSC 530	(3)	Volcanology
EPSC 542	(3)	Chemical Oceanography
EPSC 549	(3)	Hydrogeology
EPSC 580	(3)	Aqueous Geochemistry
EPSC 590	(3)	Applied Geochemistry Seminar
GEOG 305	(3)	Soils and Environment
GEOG 306	(3)	Raster Geo-Information Science
GEOG 307	(3)	Socioeconomic Applications of GIS
GEOG 321	(3)	Climatic Environments
GEOG 322	(3)	Environmental Hydrology
GEOG 350	(3)	Ecological Biogeography
GEOG 351	(3)	Quantitative Methods
GEOG 372	(3)	Running Water Environments
GEOG 380	(3)	Adaptive Environmental Management
GEOG 495	(3)	Field Studies - Physical Geography
GEOG 499	(3)	Subarctic Field Studies
GEOG 505	(3)	Global Biogeochemistry
GEOG 506	(3)	Advanced Geographic Information Science
GEOG 522	(3)	Advanced Environmental Hydrology
GEOG 535	(3)	Remote Sensing and Interpretation
GEOG 536	(3)	Geocryology
GEOG 537	(3)	Advanced Fluvial Geomorphology
GEOG 550	(3)	Historical Ecology Techniques
MATH 314	(3)	Advanced Calculus
MATH 315	(3)	Ordinary Differential Equations
MATH 317	(3)	Numerical Analysis
MATH 319	(3)	Partial Differential Equations
MATH 323	(3)	Probability
MATH 326	(3)	Nonlinear Dynamics and Chaos
MATH 423	(3)	Regression and Analysis of Variance
MATH 437	(3)	Mathematical Methods in Biology
MATH 447	(3)	Stochastic Processes
MATH 525	(3)	Sampling Theory and Applications
NRSC 540	(3)	Socio-Cultural Issues in Water
PHYS 331	(3)	Topics in Classical Mechanics
PHYS 332	(3)	Physics of Fluids
PHYS 340	(3)	Electricity and Magnetism
PHYS 342	(3)	Electromagnetic Waves

Note: Courses at the 300 level or higher in other departments in the Faculties of Science and Engineering may also be used as complementary credits, with the permission of an academic adviser. Please see the list posted on the Departmental webpage.

ECON 347	(3)	Economics of Climate Change
ECON 405	(3)	Natural Resource Economics
EPSC 212	(3)	Introductory Petrology
EPSC 312	(3)	Spectroscopy of Minerals
EPSC 320	(3)	Elementary Earth Physics
EPSC 330	(3)	Earthquakes and Earth Structure
EPSC 331	(3)	Field School 2
EPSC 334	(3)	Invertebrate Paleontology
EPSC 341	(3)	Field School 3
EPSC 350	(3)	Tectonics
EPSC 423	(3)	Igneous Petrology
EPSC 425	(3)	Sediments and Sequences
EPSC 445	(3)	Metamorphic Petrology
EPSC 451	(3)	Hydrothermal Mineral Deposits
EPSC 452	(3)	Mineral Deposits 2
EPSC 455	(3)	Sedimentary Geology
EPSC 519	(3)	Isotope Geology
EPSC 525	(3)	Subsurface Mapping
EPSC 530	(3)	Volcanology
EPSC 542	(3)	Chemical Oceanography
EPSC 549	(3)	Hydrogeology
EPSC 580	(3)	Aqueous Geochemistry
EPSC 590	(3)	Applied Geochemistry Seminar
GEOG 272	(3)	Earth's Changing Surface
GEOG 305	(3)	Soils and Environment
GEOG 306	(3)	Raster Geo-Information Science
GEOG 307	(3)	Socioeconomic Applications of GIS
GEOG 321	(3)	Climatic Environments
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Note: Courses at the 300 level or higher in other departments in the Faculties of Science and Engineering may also be used as complementary credits, with the permission of an academic adviser. Please see the list posted on the Departmental webpage.

8.0 Consultation with
Related Units

Yes

No

Financial Consult

Yes

No

Attach list of consultations

9. Approvals

Routing Sequence

Name

Signature

Date

Department

AOS/EPS/GEOG Profs. Gvakum/Moore/Stix

Curric/Acad Committee

Faculty 1

Faculty 2

Faculty 3

SCTP

GS

APPC

Senate

Submitted by

Name

Phone

Email

Submission Date

To be completed by ARR:

CIP Code