



<p>1.0 Degree Title Specify the two degrees for concurrent degree programs</p> <div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">Bachelor of Science</div> <p>1.1 Major (Legacy= Subject) (30-char. max.)</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">Major 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: 10px;"></div> <p>1.3 Minor (with Concentration, if applicable) (30 char. max.)</p> <div style="border: 1px solid black; height: 20px; margin-bottom: 10px;"></div> <p>1.4 Category</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top; padding-right: 10px;"> <input type="checkbox"/> Faculty Program (FP) <input checked="" type="checkbox"/> Major X <input type="checkbox"/> Joint Major <input type="checkbox"/> Major Concentration (CON) <input type="checkbox"/> Minor <input type="checkbox"/> Minor Concentration (CON) </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Honours (HON) <input type="checkbox"/> Joint Honours Component (HC) <input type="checkbox"/> Internship/Co-op <input type="checkbox"/> Thesis (T) <input type="checkbox"/> Non-Thesis (N) <input type="checkbox"/> Other Please specify <div style="border: 1px solid black; height: 20px; margin-left: 20px;"></div> </td> </tr> </table> <p>1.5 Complete Program Title</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">B.Sc. Major Earth System Science</div>	<input type="checkbox"/> Faculty Program (FP) <input checked="" type="checkbox"/> Major X <input type="checkbox"/> Joint Major <input type="checkbox"/> Major Concentration (CON) <input type="checkbox"/> Minor <input type="checkbox"/> Minor Concentration (CON)	<input type="checkbox"/> Honours (HON) <input type="checkbox"/> Joint Honours Component (HC) <input type="checkbox"/> Internship/Co-op <input type="checkbox"/> Thesis (T) <input type="checkbox"/> Non-Thesis (N) <input type="checkbox"/> Other Please specify <div style="border: 1px solid black; height: 20px; margin-left: 20px;"></div>	<p>2.0 Administering Faculty/Unit</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">Science</div> <p>Offering Faculty/Department</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">EPSC / ATOC / 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; display: inline-block; margin-left: 20px;">201309</div></p> <p>4.0 Existing Credit Weight Proposed Credit Weight</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: 1px solid black; padding: 2px; text-align: center;">57</td> <td style="width: 50%; border: 1px solid black; padding: 2px; text-align: center;">57</td> </tr> </table> <p>5.0 Rationale for revised program</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>(1) More quantitative tools: COMP 202 was added so that students will have a greater array of quantitative tools available to them for other courses and research projects. (2) Increased choice: Students now can take either GEOG 308 or GEOG 306, as well as BIOL 215 or ENVR 202. (3) Reduced course overlap: ATOC 214, ENVR 200, and GEOG 203 have some overlaps. To reduce this, we are requiring students to take only two of the three courses, instead of all three courses. (4) Increased societal content: In the complementary courses, there is now a requirement for a student to select one course with societal content, to expand the breadth of a student's appreciation for the Earth System.</p> </div>	57	57
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57	57				
<p>6.0 Revised Program Description (Maximum 150 words)</p> <div style="border: 1px solid black; height: 250px; margin-top: 10px;"></div>					

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

Major Earth System Science (57 credits)

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, Environment and Sustainability
ESYS 200 (3) Earth System Processes
ESYS 300 (3) Investigating the Earth System
ESYS 301 (3) Earth System Modelling
ESYS 500 (3) Earth System Applications
GEOG 203 (3) Environmental Systems
GEOG 308 (3) Principles of Remote Sensing
MATH 203 (3) Principles of Statistics 1
MATH 222 (3) Calculus 3

Complementary Courses (21 credits)

3 credits, one of the following courses:
EPSC 210 (3) Introductory Mineralogy
EPSC 220 (3) Principles of Geochemistry

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.

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 web page.

(see Appendix for list of complementary courses available)

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

Major Earth System Science (57 credits)

Required Courses (24 credits)

COMP 202 (3) Introduction to Computing 1
ENVR 201 (3) Society, Environment and Sustainability
ESYS 200 (3) Earth System Processes
ESYS 300 (3) Investigating the Earth System
ESYS 301 (3) Earth System Modelling
ESYS 500 (3) Earth System Applications
MATH 203 (3) Principles of Statistics 1
MATH 222 (3) Calculus 3

Complementary Courses (33 credits)

One of the following two courses:

ATOC 214 (3) Introduction: Physics of the Atmosphere
ATOC 219 (3) Introduction to Atmospheric Chemistry

One of the following two courses:

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

One of the following two courses:

GEOG 306 (3) Raster Geo-Information Sciences
GEOG 308 (3) Principles of Remote Sensing

One of the following two courses:

ENVR 200 (3) The Global Environment
GEOG 203 (3) Environmental Systems

One of the following two courses:

BIOL 215 (3) Introduction to Ecology and Evolution
ENVR 202 (3) The Evolving Earth

One of the following courses:

ANTH 339 (3) Ecological Anthropology
GEOG 217 (3) Cities in the Modern World
GEOG 221 (3) Environment and Health
GEOG 300 (3) Human Ecology in Geography
GEOG 310 (3) Development and Livelihoods
GEOG 382 (3) Principles of Earth Citizenship
GEOG 406 (3) Human Dimensions of Climate Change

15 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 15 credits must be at the 400 level or higher.

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 web page. See attached

Attach extra page(s) as needed

Major Earth System Science (Complementary Courses Continued)

ATOC 215 (3) Oceans, Weather and Climate
ATOC 309 (3) Weather Radars and Satellites
ATOC 315 (3) Thermodynamics and Convection
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 515 \(3\) Turbulence in Atmosphere and Oceans](#)
[ATOC 521 \(3\) Cloud Physics](#)
[ATOC 525 \(3\) Atmospheric Radiation](#)
ATOC 530 (3) Paleoclimate Dynamics
ATOC 531 (3) Dynamics of Current Climates
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 310 \(3\) Biodiversity and Ecosystems](#)
BIOL 432 (3) Limnology
BIOL 434 (3) Theoretical Ecology
BIOL 441 (3) Biological Oceanography
BIOL 465 (3) Conservation Biology
BIOL 540 (3) Ecology of Species Invasions
[BIOL 573 \(3\) Vertebrate Palaeontology Field Course](#)
[BREE 217 \(3\) Hydrology and Water Resources](#)
BREE 319 (3) Engineering Mathematics
[BREE 509 \(3\) Hydrologic Systems and Modelling](#)
[BREE 510 \(3\) Watershed Systems Management](#)
[BREE 515 \(3\) Soil Hydrologic Modelling](#)
[BREE 533 \(3\) Water Quality Management](#)
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 340 \(3\) Earth and Planetary Inference](#)
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
EPSC 455 (3) Sedimentary Geology
EPSC 519 (3) Isotope Geology
EPSC 530 (3) Volcanology
EPSC 542 (3) Chemical Oceanography
EPSC 549 (3) Hydrogeology
[EPSC 561 \(3\) Ore-forming Processes 1](#)
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 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

See attached

Major Earth System Science (Complementary Courses Continued)

GEOG 470 (3) Wetlands

GEOG 495 (3) Field Studies - Physical Geography

GEOG 499 (3) Subarctic Field Studies

GEOG 501 (3) Modelling Environmental Systems

GEOG 505 (3) Global Biogeochemistry

GEOG 506 (3) Advanced Geographic Information Science

GEOG 523 (3) Global Ecosystems and Climate

GEOG 530 (3) Global Land and Water Resources

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 (see note below)

MATH 317 (3) Numerical Analysis

MATH 319 (3) Introduction to 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) Introduction to Stochastic Processes

MATH 525 (4) Sampling Theory and Applications

NRSC 540 (3) Socio-Cultural Issues in Water

PHYS 331 (3) Topics in Classical Mechanics

PHYS 340 (3) Majors Electricity and Magnetism

PHYS 342 (3) Majors Electromagnetic Waves

PHYS 432 (3) Physics of Fluids

NOTE:

MATH 315 (3) Ordinary Differential Equations is a required course for the B.Sc. Honours Earth System Science

8.0 Consultation with
Related Units

Yes No

Financial Consult Yes No

Attach list of consultations

9. Approvals

Routing Sequence

Name

Signature

Date

Department

ANDREW HYNES

Andrew Hynes

2012 NOV 27

Curric/Acad Committee

Faculty 1

Faculty 2

Faculty 3

SCTP

GS

APPC

Senate

Submitted by

Name

To be completed by ARR:

Phone

CIP Code

Email

Submission Date