1.0 Degree Title
Specify the two degrees for concurrent degree programs

Bachelor of Science

1.1 Major (Legacy = Subject) (30-char. max.)
Environment

1.2 Concentration (Legacy = Concentration/Option)
If applicable (30 char. max.)
Environmetrics

1.3 Minor (with Concentration, if applicable)
(30 char. max.)

1.4 Category

- Faculty Program (FP)
- Joint Major
- Major Concentration (CON)
- Minor
- Minor Concentration (CON)
- Honours (HON)
- Joint Honours Component (HC)
- Internship/Co-op
- Thesis (T)
- Non-Thesis (N)
- Other

Please specify

1.5 Complete Program Title
B.Sc.; Environment; Environmetrics

2.0 Administering Faculty/Unit

Arts

2.0 Offering Faculty/Department
Science

3.0 Effective Term of revision or retirement

Please give reasons in 5.0 “Rationale” in the case of retirement
(Ex. Sept. 2004 = 200409) □ Retirement

Term: 200609

4.0 Existing Credit Weight

63

Proposed Credit Weight

63

5.0 Rationale for revised program

Minor maintenance changes. See attached file “environmetrics_list.doc” for detailed rationale.

GEOG 351, SOCI 461 and AEMA 411 cannot both be taken for credit according to Faculty of Science regulations, so these courses are being made alternatives to each other.

BIOL 534 is a suitable addition to this program. Consultation with Professor Frederic Guichard (Biology Dept.) is attached in “environmetrics_list.doc”.

MIME 451 has been changed to a 500-level course with several prerequisites outside the scope of this program, and so it is no longer appropriate to list it here.

6.0 Revised Program Description (Maximum 150 words)

No change
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)

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

See attached file
“bsc_environment_environmentmetrics_list.doc”
8.0 Consultation with Related Units: □ Yes □ No
Financial Consult: □ Yes □ No

Attach list of consultations

9. Approvals
Routing Sequence

<table>
<thead>
<tr>
<th>Department</th>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curric/Acad Committee</td>
<td>Marilyn Scott, Director</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty 1</td>
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<td>Faculty 2</td>
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<tr>
<td>Senate</td>
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</table>

Submitted by

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone</th>
<th>Email</th>
<th>To be completed by ARR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pete Barry</td>
<td>4306</td>
<td><a href="mailto:Pete.barry@mcmill.ca">Pete.barry@mcmill.ca</a></td>
<td>CIP Code</td>
</tr>
<tr>
<td>Submission Date</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
To be appended to Program Change Proposals for:

**BSc; Environment; Environmetrics**  
(bsc_environment_environmetrics_revision_2005.doc)

**BSc (AgEnvSc); Environment; Environmetrics**  
(bsc_agenvsc_environment_environmetrics_revision_2005.doc)

Course list

Deleted courses shown as **strikeout**, added courses shown as *underlined italics*. Courses at Macdonald Campus are shown with (M). Superscript numbers refer to items in the Rationale.

<table>
<thead>
<tr>
<th>Current Program (63 credits)</th>
<th>Proposed Program (63 credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core: Required Courses</strong> (18 credits)</td>
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</tr>
<tr>
<td>ENVR 200 (3) The Global Environment</td>
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<tr>
<td>ENVR 201 (3) Society and Environment</td>
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</tr>
<tr>
<td>ENVR 202 (3) The Evolving Earth</td>
<td>ENVR 202 (3) The Evolving Earth</td>
</tr>
<tr>
<td>ENVR 203 (3) Knowledge, Ethics and Environment</td>
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</tr>
<tr>
<td>ENVR 301 (3) Environmental Research Design</td>
<td>ENVR 301 (3) Environmental Research Design</td>
</tr>
<tr>
<td>ENVR 400 (3) Environmental Thought</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Core: Complementary Course – Senior Research Project (3 credits*)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>AGRI 519 (6) Sustainable Development Plans (in Barbados)</td>
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</tr>
<tr>
<td>ENVR 401 (3) Environmental Research</td>
<td>ENVR 401 (3) Environmental Research</td>
</tr>
<tr>
<td>ENVR 451 (6) Research in Panama (in Panama)</td>
<td>ENVR 451 (6) Research in Panama (in Panama)</td>
</tr>
</tbody>
</table>
* Only 3 credits will be applied to the program; extra credits will count as electives. |

<table>
<thead>
<tr>
<th>Domain: Required Courses (6 credits)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>AEMA 403 (3) Environmetrics Stage (internship) (M)</td>
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</tr>
<tr>
<td>AEMA 414 (3) Temporal and Spatial Statistics (M)</td>
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<tr>
<th>Domain - Complementary Courses (36 credits, minimum)</th>
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<tbody>
<tr>
<td>15 credits from:</td>
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<tr>
<td>WILD 205 (3) Principles of Ecology (M)</td>
<td>WILD 205 (3) Principles of Ecology (M)</td>
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<tr>
<td>or BIOL 308 (3) Ecological Dynamics</td>
<td>or BIOL 308 (3) Ecological Dynamics</td>
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<tr>
<td>MIME 308 (3) Social and Economic Impacts of Technology</td>
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</tr>
<tr>
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<tr>
<td>or BIOL 309 (3) Mathematical Models in Biology</td>
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<td>BREE 430 (3) GIS for Bioresource Management (M)</td>
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</tr>
<tr>
<td>or GEOG 201 (3) Introductory Geo-Information Science</td>
<td>or GEOG 201 (3) Introductory Geo-Information Science</td>
</tr>
<tr>
<td>AEMA 411 (3) Experimental Designs (M)</td>
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<tr>
<td>or CIVE 555 (3) Environmental Data Analysis</td>
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</table>

3 credits of basic environmental science:  
BREE 217 (3) Hydrology and Water Resources (M)  
CIVE 323 (3) Hydrology and Water Resources
GEOG 305 (3) Soils and Environment
GEOG 322 (3) Environmental Hydrology
GEOG 350 (3) Ecological Biogeography
SOIL 210 (3) Principles of Soil Science (M)

6 credits of Statistics, one of the following two options:
Option 1:
MATH 323 (3) Probability Theory
MATH 324 (3) Statistics
Option 2:
AEMA 310 (3) Statistical Methods 1 (M)
or BIOL 373 (3) Biometry
plus one 3-credit complementary applied statistics course of the statistics and mathematics section.

12 credits total chosen from the following two lists:
3 credits, minimum, of statistics and mathematics chosen from:
BREE 252 (3) Computing for Engineers (or equivalent) (M)
BREE 319 (3) Engineering Mathematics (or equivalent) (M)
GEOG 351 (3) Quantitative Methods
GEOG 501 (3) Modelling Environmental Systems
MATH 223 (3) Linear Algebra
MATH 326 (3) Nonlinear Dynamics and Chaos
MATH 423 (3) Regression and Analysis of Variance
MATH 447 (3) Stochastic Processes
MATH 525 (4) Sampling Theory and Applications
SOCI 461 (3) Quantitative Data Analysis
SOCI 504 (3) Quantitative Methods 1
SOCI 505 (3) Quantitative Methods 2
SOCI 580 (3) Social Research Design and Practice.

3 credits, minimum, of environmental sciences chosen from:
AGRI 452 (3) Water Resources in Barbados (in Barbados)
AGRI 550 (3) Sustained Tropical Agriculture (in Panama)
BIOL 331 (3) Ecology/Behavior Field Course (at Mont St. Hilaire)
BIOL 553 (3) Neotropical Environments (in Panama)
GEOG 300 (3) Human Ecology in Geography
GEOG 302 (3) Environmental Management 1
GEOG 404 (3) Environmental Management 2 (in Panama)
GEOG 494 (3) Urban Field Studies
GEOG 497 (3) Ecology of Coastal Waters (at Bay of Fundy)
GEOG 499 (3) Subarctic Field Studies (in Schefferville)
MIME 451 (3) Environmental Controls: Met'l Plants
NRSC 333 (3) Physical and Biological Aspects of Pollution (M)

3 credits, minimum, of environmental sciences chosen from:
AGRI 452 (3) Water Resources in Barbados (in Barbados)
AGRI 550 (3) Sustained Tropical Agriculture (in Panama)
BIOL 331 (3) Ecology/Behavior Field Course (at Mont St. Hilaire)
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3AEMA 411 (3) Experimental Designs (M)
or CIVE 555 (3) Environmental Data Analysis
or GEOG 351 (3) Quantitative Methods
or SOCI 461 (3) Quantitative Data Analysis
plus one 3-credit complementary applied statistics course of the statistics and mathematics section.

3 credits, minimum, of statistics and mathematics chosen from:
BIO 534 (3) Theoretical Ecology
BREE 252 (3) Computing for Engineers (or equivalent) (M)
BREE 319 (3) Engineering Mathematics (or equivalent) (M)

GEOG 351 (3) Quantitative Methods
GEOG 501 (3) Modelling Environmental Systems
MATH 223 (3) Linear Algebra
MATH 326 (3) Nonlinear Dynamics and Chaos
MATH 423 (3) Regression and Analysis of Variance
MATH 447 (3) Stochastic Processes
MATH 525 (4) Sampling Theory and Applications
SOCI 461 (3) Quantitative Data Analysis
SOCI 504 (3) Quantitative Methods 1
SOCI 505 (3) Quantitative Methods 2
SOCI 580 (3) Social Research Design and Practice.

3 credits, minimum, of environmental sciences chosen from:
AGRI 452 (3) Water Resources in Barbados (in Barbados)
AGRI 550 (3) Sustained Tropical Agriculture (in Panama)
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MIME 451 (3) Environmental Controls: Met'l Plants
NRSC 333 (3) Physical and Biological Aspects of Pollution (M)
Rationale:

1. Credit count reduction for this section of complementary courses is offset by a 3 credit increase in the final two lists. Total credit count is unchanged.
2. Where appropriate, we are removing superfluous “or’s” in complementary lists for clarity.
3. GEOG 351, SOCI 461 and AEMA 411 cannot both be taken for credit according to Faculty of Science regulations, so these courses are being made alternatives to each other.
4. BIOL 534 is a suitable addition to this program. Consultation with Professor Frederic Guichard (Biology Dept.) is attached.

   BIOL 534  Theoretical Ecology (3 credits)  Prerequisites: BIOL 308 and either BIOL 309 or BIOL 373; and permission of instructor.
   Advanced topics in theoretical ecology. Mathematical and computational tools available to explore the dynamical behaviour of model populations and communities. Models addressing major ecological theories: population stability, diversity and community functioning, epidemic and disturbance dynamics; spatial models, game theory, complex-system theories.

5. MIME 451 has been changed to a 500-level course with several prerequisites outside the scope of this program, and so it is no longer appropriate to list it here.

Consultation for BIOL 534:

Dear Pete,

It looks like the students in the environmetrics would be a good fit for my course. However, they are certainly some overlaps with some other courses offered such as nonlinear dynamics or other modeling courses. Since they have to choose among these courses, I don't see any problem and I would be happy to have BIOL534 listed in your program.

Best,

Frederic

Frederic Guichard
Assistant Professor
McGill University
Department of Biology
1205 Penfield, Montreal, Qc, H3A1B1
tel. (514)-398-6464
fax. (514)-398-5069
http://falco.biol.mcgill.ca/~guichard/