

UNIVERSITY OF MASSACHUSETTS AT AMHERST
OFFICE OF THE SECRETARY
THE FACULTY SENATE

PROGRAM REVISION APPROVAL FORM

50 COPIES REQUIRED

PROGRAM TITLE: Environmental Science

PLEASE CHECK: GRADUATE _____ UNDERGRADUATE X

DEPARTMENT Interdisciplinary HEAD/CHAIR: Curtice Griffin; Richard Yuretich; Anne Averill

SCHOOL OR COLLEGE Natural Sciences DEAN: Stephen Goodwin

Submission Date: _____ Proposed Starting Date: September 1, 2012

I. PROPOSAL DEVELOPMENT

A. Describe the Proposal.

This proposal requests changes to the 1) administrative structure, 2) concentrations offered, 3) curriculum requirements for the Environmental Science (ENVIRSCI) major, and 4) curriculum requirements for the ENVIRSCI minor. These proposed changes will ensure that the necessary human and capital resources are available for the interdisciplinary ENVIRSCI curriculum, attract outstanding students to the program, and assist with the management of increased enrollments. The proposed changes will also provide students with a more comprehensive understanding of the breadth of Environmental Science, including the geological, physical, chemical, biological, and societal aspects of the field, thereby improving their professional training for employment and graduate school. There are four components to this proposed revision:

1. Modify the administrative structure of the Environmental Science program. In 2008, the administrative home of Environmental Science was transferred from the former College of Natural Resources and the Environment (NRE) to the Dept. of Natural Resource Conservation (now Environmental Conservation). However, with the subsequent reorganization of the College of Natural Sciences that merged many programs in the natural and physical sciences and the growth of the Environmental Science major from 150 to 250+ students, it is clear that no single department has all the necessary resources to support the diverse multi-disciplinary ENVIRSCI program. Teaching and advising within ENVIRSCI draws upon faculty from several departments to satisfy the multi-disciplinary aspects of the major. Consequently, it is proposed that
 - a. The ENVIRSCI major be jointly administered by the three academic departments that support the majority of the core teaching and advising of ENVIRSCI students: Environmental Conservation, Geosciences, and Plant, Soil & Insect Sciences.
 - b. ENVIRSCI majors be apportioned equally among the collaborating departments, such that each department receives an equal share of FTEs of ENVIRSCI majors.
2. Discontinue the four formal concentrations now in place (Environmental Biology, Environmental Policy, Environmental Toxicology & Chemistry, and General). Ninety percent of all majors are in the General concentration while the other three concentrations attract only 12 or fewer students each. With no concentrations in the major, students will be able to

develop their skills and knowledge base in a broad range of disciplines related to Environmental Science. This will be accomplished through the selection of their upper level elective courses facilitated through consultation with their ENVIRSCI advisors and via a new curriculum-planning seminar (ENVIRSCI 294A) requirement.

3. Modify the ENVIRSCI curriculum requirements to broaden the exposure of students to additional fields necessary for a comprehensive Environmental Science education. The last major revision to the ENVIRSCI curriculum was in 1995. Since then the nature of the field has expanded, encompassing a wider integration of Earth systems, environmental policy & economics, climate science, conservation science, global change, land-use planning, and human dimensions. This curriculum revision would

- a. Strengthen the curriculum in earth, conservation and physical sciences;
 - b. Allow students greater flexibility to develop knowledge and skills in emerging fields; and
 - c. Provide students with opportunities to acquire more field or laboratory skills.
4. Modify the curriculum requirements for the minor in ENVIRSCI to provide students a stronger foundation in the core courses of ENVIRSCI and to broaden the opportunity for students to choose from a wider array of courses at the lower and upper levels to satisfy the minor.
- B. Provide a brief overview of the process for developing the Proposal.

The reorganization of the College of Natural Sciences in 2009 provided an opportunity to evaluate the structure and curriculum of the ENVIRSCI program. In 2010, the Dean of CNS appointed new Co-Directors of the program, an ENVIRSCI Executive Committee comprised of the department heads of ECO, GEOSCI, and PSIS, and reorganized the ENVIRSCI Steering Committee with broad representation across academic units within and outside of CNS. The Steering Committee has 12 members representing the Departments of Environmental Conservation, Plant, Soil, & Insect Sciences, Geosciences, Microbiology, Resource Economics, Civil and Environmental Engineering, Public Health, and Landscape Architecture & Regional Planning.

This proposal is the result of a nearly year-long process that involved the ENVIRSCI Executive Committee, ENVIRSCI Steering Committee, the Dean of CNS, and the Co-Directors of ENVIRSCI. Further, a MOU outlining the proposed administrative restructuring of ENVIRSCI by collaborating departments has been signed by the department heads of ECO, GEOSCI and PSIS, the Dean of CNS, and the Co-Directors of ENVIRSCI (Attachment 1). With the guidance of the Environmental Science Steering Committee, the proposed curriculum was developed and subsequently approved by the Dean of CNS and the ENVIRSCI Executive Committee.

II. PURPOSE AND GOALS

Describe the Proposal's purpose and the particular knowledge and skills to be acquired.

ADMINISTRATIVE RESTRUCTURING

The purpose for converting ENVIRSCI into a program administered by collaborating departments is to ensure that the necessary human and capital resources are available for the interdisciplinary ENVIRSCI major. This is essential considering no faculty members are specifically assigned to ENVIRSCI. Consequently, the major must depend on the willingness of faculty and department heads across several departments to meet the instructional and advising needs of ENVIRSCI.

Having the FTEs of ENVIRSCI majors be equally apportioned among the collaborating departments will also ensure that the teaching and advising needs for ENVIRSCI are met. Thus, departments that are contributing the resources for a successful ENVIRSCI program will benefit directly via the FTEs that are generated from a major with 250+ students.

The ENVIRSCI Executive Committee, comprising the department heads from Environmental Conservation (ECO), Geosciences (GEO-SCI, and Plant, Soil & Insect Sciences (PSIS), will ensure that sufficient resources are allocated for the success of the ENVIRSCI program, including: student advising, assignment of faculty to teach core and elective ENVIRSCI courses, allocation of sufficient enrollment capacity in required and elective courses, and facilitating adequate teaching assistant support for core ENVIRSCI courses. A Memorandum of Understanding (MOU) to provide these resources for the ENVIRSCI program was signed by the department heads on the ENVIRSCI Executive Committee, the Dean of CNS and Co-Directors of ENVIRSCI (Attachment 1).

DISCONTINUANCE OF CONCENTRATIONS

Within the four current ENVIRSCI concentrations (Environmental Biology, Environmental Policy, Environmental Toxicology & Chemistry, and General), 90% of all majors are in the General concentration while the other three concentrations attract only 12 or fewer students each. With no concentrations in the major, students will be able to develop their skills and knowledge base in the very broad array of disciplines related to Environmental Science. This will be accomplished through 1) exposing students to the wide breadth of Environmental Science via the two existing introductory ENVIRSCI seminars (ENVIRSCI 191A & 194A), and 2) selection of their upper level elective courses (Attachment 2) facilitated through consultation with their faculty ENVIRSCI advisors, and 3) a new curriculum-planning seminar (ENVIRSCI 294C) course required of all ENVIRSCI majors. This curriculum-planning seminar will familiarize students with: the wide variety of environmentally related courses within the Five College community; opportunities for minors, second majors, certificates, and 5th year Masters' programs; and research and internship opportunities in the environmental field. A requirement of the course will be for the students to develop an individualized study plan for their junior and senior years, including initial selection of their upper-level environmental science elective courses and praxes.

CURRICULUM REVISION FOR MAJORS

From its inception at UMass Amherst, the centerpiece of the ENVIRSCI major has been an exceptionally strong foundation in the natural and physical sciences and mathematics. This proposed curriculum revision (Attachment 3) builds upon this strong foundation by broadening the exposure of students to additional fields necessary for a comprehensive Environmental Science education. Specifically, we propose the following:

1. Replace ENVIRSCI 112 with ENVIRSCI 101 or NRC 100);
2. Rename ENVIRSCI 101 *Introduction to Environmental Biology* as *Introduction to Environmental Science*;
3. Provide flexibility of course selection for the following courses:
 - a. statistics (RES-ECON 211, 212 or STATISC 240)
 - b. environmental economics (RES-ECON 262 or 263)
4. Add a Geoscience course (GEO-SCI 100 or 101) to the Basic Science and Math requirements;
5. Add Physics 131 to the Basic Science and Math requirements;
6. Add a 1-credit curriculum planning seminar (ENVIRSCI 291C);
7. Expand the list of upper level environmental science elective courses for students to choose from (Attachment 2);
8. Require students to obtain at least two “hands-on” field or laboratory experiences (praxes) relating to Environmental Science. These *Environmental Science Praxes (ESP)* are intended to provide students with practical skill sets and can be satisfied through a variety of mechanisms, including: a) designated upper-level elective courses, b) specialized field or lab courses, or c) independent study or internships when they contain approved field or lab experience components.

CURRICULUM REVISION FOR THE MINOR

The central foundation for the minor in ENVIRSCI has been the core ENVIRSCI courses. This proposed curriculum revision (Attachment 4) builds upon this strong foundation by a) broadening the opportunity for students to choose from a wider variety of core courses, b) requiring three core courses instead of two, c) expanding the opportunity for students to choose from a wider array of courses at the upper level, and d) requiring only two upper level course electives instead of three. Specifically, we propose the following:

1. Replace ENVIRSCI 112 with ENVIRSCI 101 or NRC 100 or GEO-SCI 100 (Note; ENVIRSCI 112 is no longer offered);
2. Add RES-ECON 262 or 263 as option for students to take as a core course;
3. Expand the list of upper level environmental science elective courses for students to choose from (Attachment 2);

III. RESOURCES

If this proposal requires no additional resources, say so and briefly explain why. If this proposal requires additional resources, explain how they will be paid for. For proposals involving instruction, indicate how many new enrollments are expected and whether the courses have room to accommodate them.

Currently, all operating expenses for ENVIRSCI are shared among the three collaborating departments (ECO, GEOSCI, PSIS) and the College of Natural Sciences as outlined in the ENVIRSCI Memorandum of Understanding (MOU) signed by the department heads on the ENVIRSCI Executive Committee, the Dean of CNS and Co-Directors of ENVIRSCI (Attachment 1). Consequently, no additional resources are required to implement the proposed changes to the ENVIRSCI program.

ADMINISTRATIVE RESTRUCTURING

No additional resources will be needed to implement the restructuring of ENVIRSCI. No new faculty or staff positions are required. The three collaborating departments of ECO, GEO-SCI, and PSIS are committed to allocating sufficient resources for the success of the ENVIRSCI program, including: student advising, assignment of faculty to teach core and elective ENVIRSCI courses, enrollment capacity in required and elective courses, and teaching assistant support for core ENVIRSCI courses. A MOU to provide these resources for the ENVIRSCI program was signed by the department heads on the ENVIRSCI Executive Committee, the Dean of CNS and Co-Directors of ENVIRSCI (Attachment 1).

DISCONTINUANCE OF CONCENTRATIONS

No additional resources will be needed to discontinue the current concentrations in ENVIRSCI. Currently, enrolled ENVIRSCI majors will have the option of choosing to graduate with these concentrations if they choose. All new students, including transfers, will choose their focus area in Environmental Science via selection of their upper-level elective courses and praxes.

CURRICULUM REVISION FOR MAJORS

1. Replace ENVIRSCI 112 with ENVIRSCI 101 or NRC 100 (*no new resources required*):

No additional resources will be needed for this curriculum change. ENVIRSCI 101 and NRC 100 are existing courses, and both ECO and ENVIRSCI programs have agreed to allocate space for ENVIRSCI majors in these two courses (Attachment 5). Neither course plans to expand enrollment for these two courses.

2. Rename ENVIRSCI 101 *Introduction to Environmental Biology* as *Introduction to Environmental Science* (*no new resources required*):

This title change is requested to reflect the course content that is much broader than Environmental Biology. No additional resources needed for this curriculum change.

3. Provide flexibility of course selection for the following courses (*no new resources required*):
 - a. statistics (RES-ECON 211, 212 or STATISC 240)
 - b. environmental economics (RES-ECON 262 or 263)

ENVIRSCI majors are currently required to take RES-ECON 211 and 262. Thus, expanding the course options will not add any net student numbers to RES-ECON courses. The Dept. of Resource Economics concurs with this suggested curriculum modification and no additional resources are needed for this modification (Attachment 6).

With the option of RES-ECON 211 and 212, we expect relatively few students to enroll in STATISC 240. Thus, providing this course option for ENVIRSCI majors should not require any additional resources from the Dept. of Mathematics & Statistics and the department concurs with our curriculum modification (Attachment 7).

4. Add a Geoscience course (GEO-SCI 100 or 101) to the Basic Science and Math requirements (*no new resources required*):

We expect to see an annual increase of 30 to 40 students in these two GEO-SCI courses. As a collaborating department, the GeoSciences Department has agreed to expand their capacity in these two courses for ENVIRSCI majors and will provide the necessary resources to accommodate the increased enrollment (Attachment 8).

5. Add Physics 131 to the Basic Science and Math requirements:

With this new requirement, we anticipate upwards of 60 ENVIRSCI majors will need to enroll in PHYSICS 131. The Physics Department anticipates that it will be able to accommodate ENVIRSCI majors in the course (Attachment 9).

6. Add a 1-credit curriculum planning seminar (ENVIRSCI 294C)(*no new resources required*):

This new 1-credit curriculum-planning seminar will be coordinated by the existing ENVIRSCI Program Manager and will require no new resources.

7. Add a 3-credit Integrative Experience course (*no new resources required*);

To meet the new IE General Education requirement for our juniors beginning 2012-2013, we will need to add this to the ENVIRSCI curriculum. We plan to coordinate with other departments, especially the three academic departments with administrative authority for ENVIRSCI (ECO, GEO-SCI, and PSIS). Thus, no new resources will be required for this new curriculum requirement.

8. Expand the list of upper level environmental science elective courses for students to choose from (*no new resources required*):

The current ENVIRSCI curriculum requires 4 upper-level electives distributed between several focus areas depending on a student's concentration. With discontinuance of the concentrations, we propose that ENVIRSCI majors take 12 credits from a list of approved upper-level (300 or above) electives (Attachment 2). Thus, the students will be able to develop their own preferred concentrations if they so choose. This list of upper-level courses was compiled by the Environmental Science Steering Committee, which expanded the current list for ENVIRSCI majors. Additionally, this list is considered dynamic and subject to change when the ENVIRSCI Steering Cmt approves new courses for inclusion and existing courses are discontinued. We also plan to add additional courses offered at other institutions within the Five College community. These are all active courses and no new resources will be required for this new curriculum requirement.

9. Require students to obtain at least two "hands-on" field or laboratory experiences (praxes) relating to Environmental Science (*no new resources required*):

These *Environmental Science Praxes (ESP)* can be satisfied through a variety of mechanisms, including: a) designated upper-level elective courses that provide "hands-on" experiences (Attachment 2), b) specialized field/lab courses (Attachment 2), or c) independent study or internships when they contain approved field/lab experience components. The Environmental Science Steering Committee in consultation with their department heads compiled this list of ESP courses. These are all active courses and no new resources will be required for this new curriculum requirement.

CURRICULUM REVISION FOR MINOR

1. Replace ENVIRSCI 112 with ENVIRSCI 101 or NRC 100 or GEO-SCI 100 (*no new resources required*):

No additional resources will be needed for this curriculum change. ENVIRSCI 101, NRC 100 and GEO-SCI 100 are existing courses, and both ECO and GEO-SCI programs have agreed to allocate space for ENVIRSCI minors in these two courses (Attachments 5 & 8).

2. Add RES-ECON 262 or 263 as an option for core courses for the minor (*no new resources required*):

No additional resources will be needed for this curriculum change. The Dept. of Resource Economics concurs with this suggested curriculum modification and no additional resources are needed for this modification (Attachment 6).

3. Expand the list of upper level environmental science elective courses for students to choose from (*no new resources required*):

The current curriculum requirement for the ENVIRSCI minor requires 3 upper-level electives. For the revised minor, we propose that ENVIRSCI majors take 2 upper level courses from a list of approved upper-level (300 or above) (Attachment 2). Thus, the students will be able to develop their own preferred concentrations if they so choose. This list of upper-level courses was compiled by the Environmental Science Steering Committee, which expanded the current list for ENVIRSCI majors. Additionally, this list is considered dynamic and subject to change when the ENVIRSCI Steering Cmt approves new courses for inclusion and existing courses are discontinued. We also plan to add additional courses offered at other institutions within the Five College community. These are all active courses and no new resources will be required for this new curriculum requirement.

Attachments

1. MOU for administrative restructuring
2. List of upper level electives and praxes courses
3. Proposed Environmental Science Curriculum for Majors
4. Proposed Environmental Science Curriculum for the Minors

Letters of support on file in Faculty Senate Office:

5. Letter from Environmental Conservation
6. Letter from Resource Economics
7. Letter from Mathematics & Statistics
8. Letter from Geosciences
9. Letter from Physics
10. Letter from Biology
11. Letter from Chemistry

**Attachment 1
Memorandum of Understanding**

University of Massachusetts
Amherst
Holdsworth Hall
160 Holdsworth Way
AMHERST, MA 01003-9285

Environmental Science Program

voice: 413-454-2665

fax: 413-545-4358

<http://www.umass.edu/eco>

MEMORANDUM OF UNDERSTANDING

This memorandum constitutes an agreement between the Environmental Science program, Dean of the College of Natural Sciences, and departments of Environmental Conservation, Geosciences, and Plant, Soil & Insect Sciences at the University of Massachusetts Amherst. This agreement establishes that:

1. The Environmental Science Program (ENVIRSCI) is a multi-departmental program jointly administered by the three departments of Environmental Conservation, Geosciences, and Plant, Soil & Insect Sciences (collaborating departments):
2. ENVIRSCI majors will be apportioned equally between the three collaborating departments, such that each department receives a one-third share of the FTEs of ENVIRSCI majors.
3. The department head from each of the collaborating departments will serve on an executive committee that is responsible for ensuring that sufficient departmental and University resources are allocated for successful operation of the ENVIRSCI program including:
 - a. Assignment of faculty from each department to advise up to one-third of ENVIRSCI majors (currently – 85 students per department);
 - b. Facilitate assignment of departmental faculty for teaching core ENVIRSCI courses;
 - c. Allocate sufficient enrollment capacity in required core courses to accommodate ENVIRSCI majors;
 - d. Advocate and facilitate adequate TA support for teaching core courses.
4. Contingent upon available resources, the College of Natural Sciences will provide necessary TA support to departments to accommodate additional enrollment and sections for the core ENVIRSCI courses.

Signed by:

Curtice Griffin, Co-Director, Environmental Science 9/21/11
Richard Yuretich, Co-Director, Environmental Science 9/28/11
Anne Averill, Co-Director, Environmental Science 9/28/11
Paul Fisette, Head, Environmental Conservation 9/21/11
Mark Leckie, Head, Geosciences 9/28/11
Stephen Rich, Head, Plant, Soil & Insect Sciences 9/29/11
Steve D. Goodwin, Dean, Natural Sciences 9/22/11

Attachment 2 ENVIRSCI Upper-Level Electives

The following courses meet the ENVIRSCI curriculum requirements for Upper-Level Electives and Praxis (^{ESP}). With approval by your ENVIRSCI advisor, other unlisted courses within the Five College community may also be considered for meeting upper-level elective and praxis requirements. Please submit a completed **Upper-Level/Praxis Request** form for approval.

ESP = course also meets the ENVIRSCI Praxis requirement for field/lab experiences

Earth Science

GEO-SCI 354 Climatology
GEO-SCI 415 Introduction to Geochemistry
GEO-SCI 458 Climate Change
GEO-SCI 468 GIS and Spatial Analysis^{ESP}
GEO-SCI 485 Applied Environmental Geology
GEO-SCI 519 Aqueous and Environmental Geochemistry^{ESP}
GEO-SCI 557 Coastal Processes
GEO-SCI 560 Geomorphology^{ESP}
GEO-SCI 563 Glacial Geology^{ESP}
GEO-SCI 587 Hydrogeology^{ESP}
GEO-SCI 591CP Colorado Plateau Field Trip^{ESP}
PLSOIL 565 Soil Formation & Classification^{ESP}

Ecology and Conservation Science

ENVIRSCI 504 Air Pollution & Climate Change Biology
ENVIRSCI 515 Microbiology of Soil
NRC 570 Ecology of Fish^{ESP}
NRC 528 Forest & Wetland Hydrology
NRC 540 Forest Management
NRC 564 Wildlife Habitat Management^{ESP}
NRC 565 Dynamics and Management of Wildlife Populations^{ESP}
NRC 571 Fisheries Science and Management^{ESP}
NRC 597GAB Global Change Ecology
NRC 597AE Aquatic Ecology
NRC 597F Conservation Genetics^{ESP}
NRC 597R Watershed Science & Mgt
PLSOILIN 326 Insect Biology
PLSOILIN 397K Insect Ecology and Management
PLSOIL 555 Urban Plant Biology
PLSOIL 597D Wetland Plant Identification & Ecology^{ESP}
BIOLOGY 421 Plant Ecology^{ESP}
BIO 497H Tropical Field Biology^{ESP}
BIOLOGY 540 Herpetology^{ESP}
BIOLOGY 544 Ornithology^{ESP}
BIOLOGY 548 Mammalogy^{ESP}
BIOLOGY 550 Animal Behavior
LA 547 Landscape Pattern and Process^{ESP}
LA 592A Plants in the Landscape^{ESP}
MICROBIO 390E Microbial Ecology

Environmental Policy & Land Use

ENVIRDES/REGIONPL 574 City Planning
ENVIRDES/REGIONPL 577 Urban Policies
GEO-SCI 360 Economic Geography
GEO-SCI 362 Conservation Geography
GEO-SCI 370 Urban Geography
GEO-SCI 372 Urban Issues
GEO-SCI 380 Political Geography
GEO-SCI 420 Political Ecology
GEO-SCI 497E Geography, Policy & the Environment
GEO-SCI 497WG Water Geographies: Conflict & Sustainability
GEO-SCI 510 Natural Hazards
GEO-SCI 592N National Parks & Protected Areas
NRC 382 Human Dimensions of Natural Resource Mgt
NRC 409 Natural Resources Policy and Administration

NRC 597WR Water Resources Mgt & Policy
PLSOILIN 397M Applied Marketing for Green Industry
POLISCI 382 Environmental Policy

Environmental Quality, Planning & Assessment

CE-ENGIN 370 Introduction to Environmental & Water Resources^{ESP}
ENVIRSCI 452 Hazardous Waste Operations & Emergency Response^{ESP}
ENVIRSCI 465 Principles of Environmental Site Assessment^{ESP}
ENVIRSCI 535 Methods in Environmental Toxicology & Chemistry^{ESP}
ENVIRSCI 575 Environmental Soil Chemistry^{ESP}
ENVIRSCI 585 Animal & Environmental Toxicology
GEO-SCI 331 Geological Mapping^{ESP}
GEO-SCI 352 Computer Mapping^{ESP}
GEO-SCI Transportation Geography
GEO-SCI 468 GIS & Spatial Analysis^{ESP}
GEO-SCI 591CM Introduction to Climate & Environmental Monitoring
NRC 534 Forest Measurements^{ESP}
NRC 577 Ecosystem Modeling & Simulation^{ESP}
NRC 587 Digital Remote Sensing^{ESP}
NRC 592G Introduction to GIS^{ESP}
NRC 597C Case Studies in Land Conservation
NRC 597I Natural Resource Inventory of Local Lands^{ESP}
NRC 597W Wetlands Assessment^{ESP}
PLSOILIN 375 Soil & Water Conservation
PLSOILIN 491B Climate, Energy, Biochar & Agriculture
PLSOIL 585 Inorganic Contaminants in Soil, Water & Sediment
PLSOIL 597A Phyto/Bioremediation
PLSOIL 597L Wetland Delineation^{ESP}
PLSOIL 597O Organic Contaminants
PLSOIL 597W Artificial Treatment Wetlands
PUBHLTH 590N Indoor Environment & Health
PUBHLTH 592A Bioaerosol Exposures
REGIONPL 553 Resource Policy and Planning

Attachment 3
PROPOSED ENVIRONMENTAL SCIENCE CURRICULUM FOR MAJORS

Existing
Natural Sciences & Mathematics

Proposed
Natural Sciences & Mathematics

Biology 100, 101 Introductory Biology I, II
or equivalent (*Credits: 8*)

No Change

CHEM 111, 112 General Chemistry I,II
(*Credits: 8*)

No Change

CHEM 250 Organic Chemistry or CHEM
261 Org. Chem I (*Credits: 3*)

No Change

MATH 127, 128 Calculus I,II (*Credits: 6*)

No Change

RES-ECON 211 Introductory Statistics for
the Life Sciences (*Credits: 4*)

RES-ECON 211 Introductory Statistics for the Life
Sciences (*Credits: 4*) *OR* RES-ECON 212
Introductory Statistics for the Social Sciences
(*Credits: 4*) *OR* STATISC 240 Introduction to Statistics
(*Credits: 3*)

RES-ECON 262 Environmental Economics
(*Credits: 4*)

RES-ECON 262 Environmental Economics (SB)
(*Credits: 4*) *OR* RES-ECON 263 Natural Resource
Economics (*Credits: 4*) (SB)

GEO-SCI 101 The Earth (PS) (includes lab) (*Credits: 4*)
OR GEO-SCI 100 Global Environmental Change
(*Credits: 4*) (PS)

PHYSICS 131 Introductory Physics I (*Credits: 4*)

Total credits = 33

Total credits = 40-41

ENVIRSCI Core Courses

ENVIRSCI Core Courses

ENVIRSCI 112 Fundamentals of the

ENVIRSCI 101 Introduction to Environmental
Environment (*Credits: 3*) Science (BS)¹ (*Credits: 4*) *OR*
NRC 100 Environment and Society (I) (*Credits: 4*)

ENVIRSCI 191A, 194A Introductory
Seminar I, II (*Credits: 2*)

No Change

ENVIRSCI 213 Introduction to
Environmental Policy (*Credits: 3*)

No Change

ENVIRSCI 214 Principles of
Environmental Biology (*Credits: 3*)

ENVIRSCI 214 Ecosystems, Biodiversity, &
Global Change² (*Credits: 3*)

ENVIRSCI 315 Principles of
Environmental Toxicology and Chemistry
(*Credits: 3*)

No Change

ENVIRSCI 294A Seminar – Curriculum Planning
(*Credit: 1*)

Total credits = 14

Total credits = 16

ENVIRSCI Upper-Level Electives

Four upper-level courses in Environmental Science or related fields

Total Credits =12-16

ENVIRSCI Upper-Level Electives

Twelve credits from approved courses (300-level or above) in one or more of the following areas: Earth Science; Ecology & Conservation Science; Environmental Policy & Land Use; Environmental Quality, Planning & Assessment

Total Credits =12

Environmental Science Praxes (ESP)

None

Environmental Science Praxes (ESP)

II majors are required to obtain at least two "hands-on" field or laboratory experiences relating to Environmental Science. These field/lab praxes can be satisfied through a variety of mechanisms, including: a) designated upper-level elective courses, b) specialized field/lab courses, or c) Independent study or internships when they contain approved field/lab experience components.

Concentrations

Four concentrations available: Environmental Biology, Environmental Policy, Environmental Toxicology & Chemistry, General

Concentrations

One single curriculum. No formal concentrations, but students may focus via their upper-level elective courses and praxes

***Total credits required for major = 59-63
Other General Education Requirements***

NAT-SCI 397A Junior Writing Course
(Credits: 3)

***Total credits required for major = 68-69
Other General Education Requirements***

No Change

ENVIRSCI Integrative Experience (Credits: 3)

Additional Remarks:

¹ proposed name change for ENVIRSCI 101

² name change for ENVIRSCI 214 already approved

Attachment 4
PROPOSED ENVIRONMENTAL SCIENCE CURRICULUM FOR THE MINOR

Select two of four core courses

ENVIRSCI 112 Fundamentals of the Environment

Select three courses

ENVIRSCI 101 Intro. To Environ. Science

OR

NRC 100 Environment and Society

OR

GEO-SCI 100 Global Environmental Change

ENVIRSCI 213 Introduction to Environmental Policy

ENVIRSCI 213 Introduction to Environmental Policy

ENVIRSCI 214 Principles of Environmental Biology

ENVIRSCI 214 Ecosystems, Biodiversity, & Global Change

ENVIRSCI 315 Principles of Environmental Toxicology and Chemistry

ENVIRSCI 315 Principles of Environmental Toxicology and Chemistry

RES-ECON 262 Environmental Economics

OR

RES-ECON 263 Natural Resources Economics

Select one upper-level course from each of the three Concentration areas

Select two courses from approved list of Upper-Level ENVIRSCI elective courses

Total credits = 15

Total credits = minimum of 15