

# UNIVERSITY FACULTY SENATE FORMS

## Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: Nancy Targett phone number 831-2841

Department: \_\_\_\_\_ email address ntargett@udel.edu

Action: Revise Major in Environmental Science (and concentrations)  
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term 09F  
(use format 04F, 05W)

Current degree \_\_\_\_\_  
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: BS  
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name: Environmental Science  
Proposed new name for revised or new major / minor / concentration / academic unit  
(if applicable)

### Revising or Deleting:

Undergraduate major / Concentration: Environmental Science  
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: \_\_\_\_\_  
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: \_\_\_\_\_  
(**Must attach** your Graduate Program Policy Statement)

Graduate Program of Study: \_\_\_\_\_  
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: \_\_\_\_\_

**Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.**

**List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?**

(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter “None”)

**ENSC 101 Introduction to the Environment** - This course provides students with a broad overview of the fields of environmental science and environmental studies. Students will be introduced to the spectrum of science and policy that is associated with environmental work and explore specific issues, perspectives, and approaches from these varied areas.

**ENSC 450: ProSeminar: The Environment**- Designed as a capstone, this course will engage students in an exploration and discussion of the history and state of environmental science and environmental studies and the connection to local, regional, national and global scale environmental issues. Students will develop and refine critical thinking skills and interdisciplinary problem-solving strategies. The course serves as a culminating experience for students on the “science-side” and the “studies-side”, providing them with the opportunity to collaboratively solve problems and discuss current issues in the environmental literature.

**Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education:** <http://www.ugs.udel.edu/gened/>

The Environmental Science Curriculum supports the 10 goals of undergraduate education in the following ways:

1. Courses in the major require that students communicate effectively in verbal and written ways.
2. Students will need to use information technologies, use quantitative reasoning and critical thinking skills.
3. Students will be asked to integrate in-class learning in solving real life problems.
4. Students will understand the impact of humans on the environment and *vice versa* locally and globally.
5. Students will work and learn independently and collaboratively, integrating various concentrations, perspectives and diverse ways of thinking that underlie the search for knowledge in the arts, humanities, sciences and social sciences.
6. Students will explore environmentally related ethical questions and implications of individual and societal choices on individuals, communities, and the planet.
7. Students will develop intellectual curiosity, confidence, and understand the need for lifelong engagement in learning.
8. Students will develop an integrated, international perspective regarding countries, populations and the environment.
9. Students will integrate and demonstrate classroom skills and knowledge in at least one field related experience.

**Identify other units affected by the proposed changes:**

(Attach permission from the affected units. If no other unit is affected, enter “None”)

College of Agriculture and Natural Resources  
College of Arts and Sciences  
Department of Biological Sciences  
Department of Bioresources Engineering  
Department of Chemistry/Biochemistry  
Department of Chemical Engineering  
Department of Civil and Environmental Engineering  
College of Engineering  
Department of Electrical and Computer Engineering  
Department of Entomology and Wildlife Conservation

Environmental Science Program  
Department of Food and Resource Economics  
Department of Geography  
Department of Geological Sciences  
College of Marine and Earth Studies  
Department of Mathematics  
Department of Mechanical Engineering  
Department of Physics and Astronomy  
Department of Political Science and International Relations  
Department of Plant and Soil Sciences

**Describe the rationale for the proposed program change(s):**

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

As a part of its Path to Prominence™, the University of Delaware is focused on becoming a greener, more environmentally aware campus and on highlighting and enhancing opportunities for undergraduates to engage in environmental degree programs. Specifically, the goals outlined in the P2P state that UD will:

- Strive to make environmental awareness and stewardship an integral part of every student's educational experience.
- Develop environmental degree programs that promote cross-fertilization of science and policy.
- Define additional degree tracks and concentrations as well as opportunities for self-designed programs.
- Develop environmentally focused study abroad programs.
- Enhance UD's emphasis on interdisciplinary graduate programs
- Cultivate opportunities for science and engineering to interact with emerging business, social, and cultural issues of an environmentally aware world.

A broad-based faculty committee was convened by the Provost and charged with developing recommendations for 1. how to better highlight breadth of current environmental offerings at UD and the faculty assets that support them and 2. enhancing environmental offerings at UD. This proposal addresses the second of the committee's charges.

Committee members include:

- Tracy Deliberty (Geography)
- Steve Dentel (Civil and Environmental Engineering)
- Jan Johnson (Political Science and International Relations)
- Murray Johnston (Chemistry and Biochemistry)
- John Madsen (Geological Sciences)
- Tom Sims (Plant and Soil Science)
- Nancy Targett (Chair of Committee, CMES)

Frank Newton, CMES Assistant Dean for Student Services staffed the committee.

The University of Delaware currently offers many environmentally-related degrees in a number of colleges including Agriculture and Natural Resources, Arts and Sciences, Engineering, and Marine and Earth Studies. In addition to these numerous degree offerings in environmentally-related areas, UD also offers an interdisciplinary Bachelor of Science degree in Environmental Sciences. This program is a collaborative effort involving the Department of Geography, the Department of Geological Sciences, the College of Marine and Earth Studies, and the Department of Biological Sciences. It is a BS degree program that is rigorous in both math and science. Majors choose one of four specialized foci: the atmospheric environment, the biological environment, the geological environment, or the marine environment. The *ad hoc* University environmental curriculum committee recognized the strengths of this interdisciplinary model and recommended that it be modified/expanded with additional concentrations and also that the model be applied to a new BA degree program in Environmental Studies (separate proposal). An overview of the committee process and recommendations is attached (Attachment 1)

Nationally there are 652 institutions that award 804 undergraduate interdisciplinary environmental degrees (Vincent, personal communication). Of these, 373 (46%) are Environmental Science(s) programs, 255 (32%) are Environmental Studies, and 176 (22%) had other names such as environmental policy and management and water resources. Environmental Science programs on average graduate 26 students. Environmental Studies programs graduate, on average, more than twice that number (54).

In seeking to broaden the Environmental Science degree options at UD, this proposal maintains and builds upon the strengths of the current UD BS in Environmental Science, expanding offerings and options for students interested in studying the environment. It aligns with the goals of the UD strategic plan in 3 ways:

1. It is more broadly interdisciplinary, integrated across academic units and includes concentrations in Agriculture and Natural Resources, Arts and Sciences, Engineering, and Marine and Earth Studies.

2. It includes courses in social science and policy that will help the environmental science major understand the societal context of his/her work. This foundation helps students appreciate the interconnectedness between understanding natural science processes and their applications and the social, political, and institutional frameworks in which environmental issues are considered.
3. It connects students majoring in Environmental Science and Environmental Studies (see separate proposal for a BA in Environmental Studies).

The goal is to give students in the program a broad-based, interdisciplinary introduction to the scientific concepts, policies, and issues; the common analytical tools needed to explore environmental issues in depth through their specific concentration areas; and the ability to integrate and synthesize information from a multidisciplinary perspective in oral and written format through the capstone course.

In this proposal, the introductory course (ENSC101 Introduction to the Environment) and a capstone course (ENSC 450 Proseminar: The Environment) would be required for both the BS in Environmental Science and the proposed BA in Environmental Studies programs. One of the outcomes from such a requirement would be the exposure of students to a more integrated perspective toward the development of strategies, policies and approaches aimed at addressing complex environmental issues.

In this “distributed” degree program model, students can either:

1. Enter the program as an Environmental Science major with a concentration already declared, OR
2. Enter the program as a general Environmental Science major and select a specific concentration after taking some of the initial courses required for the major. Students **MUST** ultimately select a concentration.

Students’ “home” college will be located where their concentration originates. There are 10 science concentrations situated as follows:

| <b><u>Concentration</u></b>           | <b><u>Home College</u></b>        |
|---------------------------------------|-----------------------------------|
| Atmospheric Science                   | Marine & Earth Studies            |
| Ecology and Organismal Biology        | Agriculture and Natural Resources |
| Environmental Chemistry               | Arts & Sciences                   |
| Environmental Soil Science            | Agriculture and Natural Resources |
| GeoScience                            | Marine & Earth Studies            |
| Hydrology                             | Marine & Earth Studies            |
| Marine Science                        | Marine & Earth Studies            |
| Pollution Control                     | Engineering                       |
| Sustainable Energy Technology         | Engineering                       |
| Water Resources, Quality & Technology | Engineering                       |

Students will be assigned an advisor from their area of concentration. In those cases where the student has not yet selected a concentration, students will be assigned an academic advisor from one of the concentrations and that college will be afforded appropriate allocation of needed resources to manage that load. Until the student declares a concentration, the student's home will be in the Environmental Science Program that resides in the Department of Geography.

Recognizing that this is a degree program that is distributed across the University we recommend that a board, appointed by the Provost and composed of faculty from participating programs, provide oversight for curricular matters and student advisement within the program. The chair of the board will be designated by the Provost. Day-to-day operations will be administered by the faculty director of the Environmental Science/Studies Program who resides in the Department of Geography.

Upon completion of degree requirements, students will receive a Bachelor of Science in Environmental Science with a specific concentration. The degree will be from their home college. A separate,

multidisciplinary convocation will recognize Environmental Science and Environmental Studies degree recipients.

## Program Requirements:

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

***Bachelor of Science in Environmental Science (BS ENSC):*** The BS in Environmental Science emphasizes a broad scientific understanding of the character, function, and analysis of environmental systems. Environmental Science BS students will be able to contribute to society's understanding of and solutions to problems that arise from human occupancy and use of the planet and environment.

| CURRENT  | PROPOSED   |
|--|--|
| <b>UNIVERSITY REQUIREMENTS</b><br>ENGL 110 Critical Reading & Writing (min grade C-) . . . 3<br>First Year Experience (see page 68). . . . . 0-4<br>Discovery Learning Experience (see page 68) . . . . . 3<br>Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 69-71) . . . . . 3   | <b><u>General and University Requirements:</u></b><br>ENGL 110 Critical Reading & Writing (min grade C-) 3<br>First Year Experience (fulfilled by ENSC 101 + FYE Seminar) 4<br>Discovery Learning Experience (fulfilled by field course) 3<br>Multicultural requirement 3<br>Second Writing Course (fulfilled by ENSC 450) 3<br>Foreign Language 0-8<br>Math requirement (fulfilled by MATH 241/242) 0-4   |
| <b>COLLEGE REQUIREMENTS</b><br>Writing: (minimum grade C-) . . . . . 3<br>A second writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content. This course must be taken after completion of 60 credit hours. Appropriate writing courses are normally designated in the semester's Registration Booklet. (See list of courses approved for second writing requirement, pages 93-95.)<br>Foreign Language: . . . . . 0-12<br>Completion of the intermediate-level course (107 or 112 or 214) in a given language. Number of credits needed and initial placement will depend on number of years of high school study of foreign language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination. | <b><u>Program Breadth Requirements:</u></b><br><i>(At least two different areas must be represented in each group.)</i><br><b>Group A</b> Understanding and appreciation of the creative arts and humanities. 6<br><b>Group B</b> The study of culture and institutions over time 6<br><b>Group C</b> Empirically based study of human beings and their environment. 6   |
| <b>BREADTH REQUIREMENTS</b> (See pages 95-99)<br>Group A . . . . . 6<br>Understanding and appreciation of the creative arts and humanities.<br>Group B . . . . . 6<br>The study of culture and institutions over time.<br>Group C . . . . . 6<br>Empirically based study of human beings and their environment.  | <b><u>Core Requirements:</u></b><br>ENSC 101 Introduction to the Environment 4<br>BISC 207 Introductory Biology I 4<br>BISC 208 Introductory Biology II 4<br>ENWC 201 Wildlife Conservation and Ecology 3<br>CHEM 103 General Chemistry I 4<br>CHEM 104 General Chemistry II 4<br>GEOL 107 General Geology 4<br>PHYS 201 Introductory Physics I <b>OR</b><br>PHYS 207 Fundamentals of Physics* 4<br>GEOG 220 Meteorology 3<br>GEOG 412 Physical Climatology 4<br>MAST 482 Introduction to Ocean Science 3<br>POSC350 Politics and the Environment 3<br>FREC 100 Sustainable Development 3<br>MATH 241 Analytical Geometry & Calculus A 3<br>MATH 242 Analytical Geometry & Calculus B 3<br>GEOG 271 Introduction to Geographic Data Analysis 4 |
| <b>MAJOR REQUIREMENTS</b><br>GEOL 107 General Geology . . . . . 4<br>BISC 207/208 Introductory Biology I and II . . . . . 8<br>GEOG 220 Meteorology . . . . . 3<br>GEOG 250 Computer Methods for Geography . . . . . 4<br>BISC 302 General Ecology . . . . . 3<br>GEOG 412 Physical Climatology . . . . . 4<br>GEOL 303 Earth Surface I: Surficial Processes . . . . . 4<br>MAST 482 Introduction to Ocean Sciences . . . . . 3<br>ENSC 450 Proseminar in Environmental Science . . . . 3  | *Dependent on concentration, see concentration details for specifics<br><b><u>Field Experience: (3-6 cr)</u></b><br>An approved science field experience in which the student integrates the components of his or her concentration in an experiential learning environment. Experience MUST include data collection, manipulation of data sets and weekly reports/field notes. This requirement could be  |

One course from among the following courses. (GEOL 306 or GEOL 451 may be applied to this field course requirement or to a concentration below, but not to both simultaneously.)

BISC 312 General Ecology Lab

GEOL 306 Earth's Lithosphere II: Field Geology

ENSC 425 Environmental Field Methods

GEOG 451 Microclimatology

MAST 621 Coastal Field Biology

MAST 464 Marine Science Summer Internship (at least 3 cr)

MAST 468 Undergraduate Research (at least 3 credits)

Two additional courses from within one of the following three areas of concentration: . . . . . 6-8

#### **Atmospheric Environment**

GEOG 343 Climatic Geomorphology

GEOG 420 Atmospheric Physics

GEOG 423 Atmospheric Dynamics

GEOG 451 Microclimatology

GEOG 453 Synoptic Climatology

GEOG 456 Hydroclimatology

#### **Biological Environment**

BISC 300 Introduction to Microbiology

BISC 306 General Physiology

BISC 495 Evolution

BISC 637 Population Ecology

BISC 641 Microbial Ecology

#### **Geological Environment**

GEOL 300 Earth's Materials I: Minerals

GEOL 302 Earth's Materials II: Rocks

GEOL 304 Earth's Surface II: Stratigraphy

GEOL 305 Earth's Lithosphere I: Structural Geology and Plate Tectonics

GEOL 306 Earth's Lithosphere II: Field Geology

GEOL 307 Earth's History I: Paleobiology

GEOL 308 Earth's History II: Earth System Science

#### **Marine Environment**

ENWC/MAST 314 Comparative Terrestrial and Marine Ecology

GEOL 431 Marine Geology

GEOL 434 The Geology of Coasts

MAST 602 Physical Oceanography

MAST 621 Coastal Field Biology

MAST 627 Marine Biology

MAST 646 Chemical Oceanography

Two additional courses taken from the following list or from the courses listed under the four areas of concentration above . . . . . 8-12 At least one course must be outside the chosen area of concentration.

BISC 301 Molecular Biology of the Cell

BISC 317 Tropical Ecology (Costa Rica)

BISC 321 Environmental Biology

BISC 660 Environmental Physiology

CHEM 213 Elementary Organic Chemistry

CIEG 331 Introduction to Environmental Engineering

ENWC 620 Behavioral Ecology of Insects

FREC 450 Topics in Environmental Law

GEOG 230 Humans and the Earth Ecosystem

GEOG 235 Conservation of Natural Resources

GEOG 236 Conservation: Global Issues

GEOG 255 Applied Climatology

GEOG 320 Water and Society

GEOG 330 Biogeography

GEOG 357 Paleoclimatology

GEOG 372 Geographic Information Systems

GEOG 422 Resources, Development, and the Environment

GEOG 449 Environment and Society

GEOG 471 Advanced Geographic Information Systems

GEOG 474 Introduction to Environmental Remote Sensing

fulfilled by an internship, study abroad experience and/or a research experience so long as the above criteria are met.

#### **Science Concentrations: (15-18 cr)**

5-6 courses clustered in concentrations that are distributed throughout the colleges and across disciplines (see listings below)

#### **Capstone Course:**

ENSC 450: Proseminar: The Environment 3  
A capstone course that serves to be a culminating experience and is to be completed during the last semester of the senior year. This course will engage students in an exploration and discussion of the history and state of environmental studies and its connection to local, regional, national and global scale environmental issues. Students will develop and refine critical thinking skills and interdisciplinary problem-solving strategies. It serves to be a culminating experience for students on the "science-side" and the "studies-side" to collaboratively solve problems and discuss issues in the current environmental literature.

**Electives:** After required courses are completed, sufficient credits must be taken to meet the total minimum credits required for the degree.

**Total Credits for Degree:** 124

#### **CONCENTRATIONS:**

**Concentration in Atmospheric Science** *study how energy and moisture are transferred among the environment systems and humans impact our weather and climate processes.*

-MATH243 Analytical Geometry and Calculus C

*One of the following:*

MATH 302 Ordinary Differential Equations

MATH 349 Elementary Linear Algebra

MATH 450 Statistics for Engineering & Physical Sciences

ENSC 475 Statistics for Environmental Science

STAT 657 Statistics for Earth Sciences

*Three of the following:*

GEOG 342 Bioclimatology

GEOG 420 Atmospheric Physics

GEOG 423 Atmospheric Dynamics

GEOG 451 Microclimatology

GEOG 453 Synoptic Climatology

GEOG 456 Hydroclimatology

**Concentration in Environmental Chemistry** *study chemical and biochemical phenomena that help shape the natural environment and the human impact upon it. (also fulfills requirements for a Minor in Chemistry, College of Arts and Sciences)*

-CHEM 220/221 Quantitative Analysis with Laboratory

-CHEM 321 Organic Chemistry I

*One of the following:*

-CHEM 418 and 445 or 446 Physical Chemistry with Lab

-CHEM 457/458 Inorganic Chemistry with Laboratory

-CHEM 527 Introductory Biochemistry

*One of the following:*

-CHEM 608 Environmental Soil Chemistry

-CHEM 683 Environmental Chemistry

-CIEG 632 Chemical Aspects of Environmental Engineering



GEOG/MAST 681 Remote Sensing of Environment  
 GEOL/GEOG 385 Geomorphology  
 GEOL 407 Igneous and Metamorphic Petrology  
 GEOL/GEOG 411 Fluvial Geomorphology  
 GEOL 412 Geological Approaches to Archeology and History  
 GEOL 414 Quaternary Geology and Geochronology  
 GEOL 416 Paleocology  
 GEOL 421 Environmental and Applied Geology  
 GEOL 428 Hydrogeology  
 GEOL 446 General Geochemistry  
 GEOL 453 Elementary Geophysics I  
 GEOL 454 Elementary Geophysics II  
 GEOL/GEOG 482 Physical Geography of Cold Environments  
 MAST 606 Ocean and Atmospheric Remote Sensing  
 MAST 620 Energy Policy and Administration  
 MAST 670 United States Ocean and Coastal Policy  
 MAST 671 Coastal Processes and Management  
 MAST 678 Coastal and Maritime Law  
 PHYS 208 Fundamentals of Physics II  
 PLSC 204 Introduction to Soil Science  
 POSC 350 Politics and the Environment

With the exception of related work, all courses in the major require a grade of C or better.

MATH 241/242/243 Analytic Geometry and Calculus . . . . 12  
 CHEM 103/104 General Chemistry . . . . . 8  
 PHYS 207 Fundamentals of Physics I . . . . . 4  
 or  
 PHYS 201 Introductory Physics I  
 One of the following five courses: . . . . . 3  
 MATH 302 Ordinary Differential Equations  
 MATH 349 Elementary Linear Algebra  
 MATH 450 Statistics for Engineering & Physical Sciences  
 STAT/ENSC 475 Statistics for Environmental Sciences  
 STAT 657 Statistics for Earth Sciences

#### ELECTIVES

After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

-MAST 646 Chemical Oceanography

**Concentration in Environmental Soil Science** study our expansive soil system and its relationship to environmental quality, plant growth and quality of life.

(also fulfills requirements for a Minor in Environmental Soil Science, College of Agriculture and Natural Resources)

-PLSC 204 Introduction to Soil Science  
 -PLSC 205 Introduction to Soil Science Lab  
 -PLSC 305 Soil Fertility and Plant Nutrition

Three of the following courses:

-PLSC 151 Introduction to Crop Science  
 -PLSC 319 Environmental Soil Microbiology  
 -PLSC 401 Agronomic Crop Science  
 -PLSC 603 Soil Physics  
 -PLSC 608 Environmental Soil Chemistry

**Concentration in GeoScience** explore how earth materials and processes impact the environment over both human and geologic time scales. (also fulfills requirements for a Minor in Geology, College of Marine and Earth Studies)

One of the following year-long sets:

-GEOL 300 The Earth's Materials I: Minerals  
 GEOL 302 The Earth's Materials II: Rocks

or

-GEOL 303 The Earth's Surface I: Surficial Processes  
 GEOL 304 Earth's Surface II: Stratigraphy

or

-GEOL 305 Earth's Lithosphere I: Structural Geology & Plate Tectonics  
 GEOL 306 Earth's Lithosphere II: Field Geology

or

-GEOL 307 Earth's History I: Paleobiology  
 GEOL 308 Earth's History II: Earth System Science

And 6-8 credits of additional Geology courses at the 300-level or above

**Concentration in Hydrology** study the movement, distribution, quantity and quality of water on the Earth.

-MATH243 Analytical Geometry and Calculus C

One of the following:

MATH 302 Ordinary Differential Equations  
 MATH 349 Elementary Linear Algebra  
 MATH 450 Statistics for Engineering & Physical Sciences  
 ENSC 475 Statistics for Environmental Science  
 STAT 657 Statistics for Earth Sciences

Three of the following:

GEOL 428 Hydrogeology  
 GEOL411/611 Fluvial Geomorphology  
 GEOG 320 Water and Society  
 GEOG 431 Watershed Ecology  
 GEOG 456 Hydroclimatology  
 CIEG 443 Watershed Engineering, Planning and Design  
 BREG 321 Storm-Water Management (pre-requisite)  
 BREG 622 Watershed Modeling (pre-requisites)

**Concentration in Marine Science** study the role of the oceans in the biological, geological, chemical, and physical processes that affect the Earth's environment. (also fulfills requirements for a Minor in Marine Studies, College of Marine and Earth Studies)

Marine Ecosystems Track:

- MAST 427/627 Marine Biology
- MAST 492 Seminar: Marine Environmental Case Studies

Three of the following:

- BISC 302 General Ecology
- ENWC/MAST 314 Comparative Terrestrial and Marine Ecology
- MAST 421/621 Coastal Field Biology
- MAST 451/651 Marine Invertebrate Diversity
- MAST 629-011 Topics in Marine Ecology: Ichthyology
- BISC 637 Population Ecology

OR

Physical Ocean Science Track:

- MAST 402/602 Introduction to Physical Ocean Science
- MAST 492 Seminar: Marine Environmental Case Studies

Three of the following:

- GEOG 420 Atmospheric Physics
- GEOG 357 Paleoclimatology
- GEOL 414/614 Quaternary Geology and Geochronology
- GEOL 434/634 Geology of Coasts
- MAST 437/637 Geological Oceanography
- MAST 628 Offshore Wind Power: Science, Engineering and Policy

**Concentration in Ecology and Organismal Biology** study the interaction of organisms with their physical and biological environment.

- BISC 302 General Ecology
- BISC 495 Evolution
- ENWC 205 Elements of Entomology
- ENWC 325 Wildlife Management

-Six additional credit hours from the following:

- BISC 317 Tropical Ecology
- BISC 321 Environmental Biology
- ENWC 418 Ornithology
- ENWC 419 Biological Control
- ENWC 425 Mammalogy
- ENWC 435 Wildlife Population Dynamics
- ENWC 444/BISC440 Conservation of Tropical Biodiversity
- ENWC 456 Conservation Biology
- ENWC 620 Behavioral Ecology
- MAST 427/627 Marine Biology
- MAST 629 Topics in Marine Ecology

**Concentration in Pollution Control** explore the strategies used to clean our air, water and soil, using chemical, physical, and biological technologies.

- MATH243 Analytical Geometry and Calculus C
- CIEG 233 Environmental Engineering Processes OR  
CHEG112 Introduction to Chemical Engineering

Three of the following:

- CIEG 438 Water and Wastewater Engineering
- CIEG 433 Hazardous Waste Management
- CIEG 436 Processing, Recycling, Management of Solid Wastes
- CIEG 4xx Environmental Sustainability/Industrial Ecology



BREG 424 Wastewater Supply and Water Treatment Systems

**Concentration in Sustainable Energy Technology** *learn the engineering approaches to sustainability, particularly toward increased energy efficiency and the use of renewable sources of energy like wind power, photovoltaic (solar) technology, and biofuels. (also fulfills requirements for a minor in Sustainable Energy Technology, College of Engineering)*

-POSC424/UAPP625 Energy Policy and Administration

-Three (9 credits or more) out of the following set of courses (\*including any required prerequisites):

CHEG616 Chemistry and Physics of Surfaces and Interfaces\*

CHEG625 Green Engineering

CIEG351 Transportation Engineering

MEEG425 Automotive Powertrain Theory\*

MEEG442 Introduction to Fuel Cells\*

MEEG435 Wind Power Engineering\*

EGTE456 Fundamentals of Heating, Ventilation and Air Conditioning\*

ELEG620 Solar Electric Systems

ELEG415/615 Electric Power and Renewable Energy Systems\*

ELEG467/667 Low Power Electronics and Lighting

CHEG612 Applied Process Heat Transfer\*

CHEG614 Special Topics in Energy (course number is being processed)

CHEG468 Research (3 cr)

-One course from the following list:

GEOG622 Resources, Development & the Environment

GEOG236 Conservation: Global Issues

MAST675 Economics of Natural Resources

MAST628 Offshore Wind Power: Science, Engineering, and Policy

GEOG617 Seminar in Climate Change\*

**Concentration in Water Quality and Resources** *apply science and engineering principles to assure that the world's water needs are met while adapting to effects of future climate change.*

-MATH243 Analytical Geometry and Calculus C

-MATH 302 Differential Equations

-CIEG 223 Environmental Engineering Processes

or CHEG112 Introduction to Chemical Engineering

or CIEG331 Environmental Engineering

-CIEG 305 Fluid Mechanics

or MEEG331 Fluid Mechanics I

or CHEG341 Fluid Mechanics

-Two of the following:

CIEG 430 Water Quality Modeling

CIEG 438 Water and Wastewater Engineering

CIEG 440 Water Resources Engineering (requires CIEG305/6)

CIEG 468 Principles of Water Quality Criteria

CIEG 498 Groundwater Flow and Contaminant Transport

BREG 423 Advanced Storm-Water Management

BREG 621 Nonpoint Source Pollution

**ROUTING AND AUTHORIZATION:** (Please do not remove supporting documentation.)

Department Chairperson Nancy M. Gargiulo Date 2-23-09

Dean of College Nancy M. Gargiulo Date 2-23-09

Chairperson, College Curriculum Committee C. E. Egan Date 2-23-09

Chairperson, Senate Com. on UG or GR Studies \_\_\_\_\_ Date \_\_\_\_\_

Chairperson, Senate Coordinating Com. \_\_\_\_\_ Date \_\_\_\_\_

Secretary, Faculty Senate \_\_\_\_\_ Date \_\_\_\_\_

Date of Senate Resolution \_\_\_\_\_ Date to be Effective \_\_\_\_\_

Registrar \_\_\_\_\_ Program Code \_\_\_\_\_ Date \_\_\_\_\_

Vice Provost for Academic Affairs & International Programs \_\_\_\_\_ Date \_\_\_\_\_

Provost \_\_\_\_\_ Date \_\_\_\_\_

Board of Trustee Notification \_\_\_\_\_ Date \_\_\_\_\_

Revised 10/23/2007 /khs

# ATTACHMENT 1

## Report of the *ad hoc* Committee on UD Academic Environmental Programs

# UD's Strategic Plan: Integrate Environmental Programs within the Curriculum (*May 08, p. 16*)

- Strive to make environmental awareness and stewardship an integral part of every student's educational experience.
- Develop environmental degree programs that promote cross-fertilization of science and policy.
- Define additional degree tracks and concentrations as well as opportunities for self-designed programs.
- Develop environmentally focused study abroad programs.
- Enhance UD's emphasis on interdisciplinary graduate programs
- Cultivate opportunities for science and engineering to interact with emerging business, social, and cultural issues of an environmentally aware world.
- **Action Step**: A university-wide faculty committee is now developing proposals to strengthen environmental studies programs and curricula and to evaluate new environmental studies and environmental science degree options that can both build upon and extend beyond the University's current offerings.

# Committee

- **Tracy Deliberty (Geography)**
- **Steve Dentel (Civil and Environmental Engineering)**
- **Jan Johnson (Political Science)**
- **Murray Johnston (Chemistry and Biochemistry)**
- **John Madsen (Geological Sciences)**
- **Tom Sims (Plant and Soil Science)**
- **Nancy Targett (Chair of Committee, CMES)**
  
- **Frank Newton (CMES Assistant Dean for Students staffed the committee)**

# The Process

- **Provost convenes committee of Deans, Vice Provosts, and senior Professors to consider graduate and undergraduate programs related to the environment at UD. (Summer 07)**
  - Review of about 25 extramural programs to identify key components
  - Review CEDD study of environmental programs
- **Faculty Committee formed by Provost to consider undergraduate environmental programs at UD. (Spring 08)**
  - How to better highlight breadth of current environmental offerings at UD and the faculty assets that support them
  - Make recommendations for enhancing environmental offerings at UD



# Current UD Program Portfolio

- **FINDING:** UD has significant strengths in the environmental domain, including: B.S. degree, courses, research, outreach, and student activities. However, these strengths are not always easily identified by students or by others who are external to UD.

- **RECOMMENDATION:** Cluster current majors, minors, and concentrations that are related to environment under headers that are more easily recognized by students.
  - **ACTION:** Committee developed a template that represents current major/minor and concentration options at UD. *(Handout)*
- 
- **RECOMMENDATION:** Develop a display to promote UD's environmental options venues such as Discovery Days, Blue and Gold Days, and Parents' Weekend.
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  - **ACTION:** The committee is gathering information for a web portal that is underdevelopment by UD PR. The portal will link environmentally related academics, research, activities and practices at UD. *(Handout)*

## ARE YOU INTERESTED IN STUDYING THE ENVIRONMENT?

Well, you're in luck! In addition to the degree in **Environmental Science**, the University of Delaware offers the following environmentally focused majors (M), minors (m) and concentrations (conc) that undergraduate students can choose. There are also many environmentally focused courses across many interest areas. You can start right away to explore and better understand the environment and our connection to it!

|   |  |  |
|---|--|--|
| <b><u>Environment and Earth</u></b> <ul style="list-style-type: none"> <li>• Coastal &amp; Marine Geoscience (conc/m)</li> <li>• Environmental Chemistry (conc)</li> <li>• Environmental Science (M)</li> <li>• Environmental Soil Science (M/m)</li> <li>• Geology (M/m)</li> <li>• Landscape Horticulture &amp; Design (M)</li> <li>• Marine Studies (m)</li> <li>• Paleobiology (Geological) (conc)</li> </ul> | <b><u>Environment and Policy</u></b> <ul style="list-style-type: none"> <li>• Natural Resource Management (M)</li> <li>• Wildlife Conservation (M/m)</li> <li>• Emergency &amp; Environmental Management (Sociology) (conc)</li> </ul>   | <b><u>Environment and Education</u></b> <ul style="list-style-type: none"> <li>• Agricultural Education (M)</li> <li>• Biology Education (M)</li> <li>• Chemistry Education (M)</li> <li>• Earth Science Education (M)</li> <li>• Geography Education (M)</li> </ul> |
| <b><u>Environment and Society</u></b> <ul style="list-style-type: none"> <li>• Geography (M/m)</li> <li>• Emergency and Environmental Management (Sociology) (conc)</li> </ul>  | <b><u>Environment and Living Things</u></b> <ul style="list-style-type: none"> <li>• Animal and Food Science (M/m)</li> <li>• Pre-Vet Medicine/Animal Biosci (M)</li> <li>• Environmental Chemistry (conc)</li> <li>• Entomology (M/m)</li> <li>• Landscape Horticulture &amp; Design (M)</li> <li>• Marine Studies (m)</li> <li>• Paleobiology (Geological) (conc)</li> <li>• Plant Protection (M)</li> <li>• Plant Science (M)</li> <li>• Wildlife Conservation (M/m)</li> </ul> | <b><u>Environment and Economics</u></b> <ul style="list-style-type: none"> <li>• Resource Economics (M/m)</li> <li>• (conc: Sustainable development; Environmental Econ)</li> <li>• Natural Resource Mgmt (M)</li> </ul>   |
| <b><u>Environment and Energy</u></b> <ul style="list-style-type: none"> <li>• Sustainable Energy Technology (m)</li> </ul>  |  |  |
| <b><u>Environment and Technology</u></b> <ul style="list-style-type: none"> <li>• Engineering Technology (M/m)</li> <li>• Environmental Engineering (M/m)</li> <li>• Sustainable Energy Technology (m)</li> </ul>   |  |  |

## YOU CAN BE GREEN WHEN YOU'RE OUT OF THE CLASSROOM TOO!

Being green at UD is not just an academic or intellectual activity...it's a way of life! Students from all majors, colleges and programs can get involved in clubs, organizations and activities that help the planet by informing the campus community and beyond about the ways individuals can be good stewards of the planet and its resources!

Some of the Student Environmental Clubs at UD include:

- *Students for the Environment (S4E)*
- *Ducks Unlimited (UDDU)*
- *Environmental Engineering Student Association*
- *The Outing Club*
- *Wildlife Conservation Club (WCC)*
- *Engineers Without Borders*
- *ECO-House Special Interest Housing group*
- *Geology Club*

# Current UD Program Portfolio

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# Go "green"!

## Study the environment at UD

Interested in an environmental career? You've come to the right place. The University of Delaware is a leader in environmental research, education, and policy.

Depending on your career interests, your path to discovery may take you to a nearby farm or the frozen ends of the Earth, a high-tech lab or a corporate boardroom, the coastal ocean or the halls of Congress.

- UD students can pursue eco-focused studies in a wide array of areas:
- ◆ Biological Sciences
  - ◆ Chemistry & Biochemistry
  - ◆ Coastal & Marine Science
  - ◆ Energy Technology & Policy
  - ◆ Entomology
  - ◆ Environmental Engineering
  - ◆ Environmental Policy
  - ◆ Environmental Science
  - ◆ Geography
  - ◆ Geology
  - ◆ Natural Resource Management
  - ◆ Plant & Soil Science
  - ◆ Resource Economics
  - ◆ Sustainable Apparel Business
  - ◆ Sustainable Development
  - ◆ Wildlife Conservation

Through the "Initiative for the Planet," UD is promoting resource stewardship and developing solutions to problems facing our world. Join us!

This zero-emission, fuel-cell bus operates on campus as part of a major UD energy research initiative.



Student members of the Wildlife Conservation Club plant trees on the UD farm.



The world is our environmental classroom! Through UD's award-winning study abroad program, students can visit sites like Mt. Fitz Roy in Argentina.

UD's top-notch facilities such as our 146-foot research vessel *Hugh R. Sharp* provide the latest technology for exploring the sea.



UD students involved in Engineers Without Borders are helping to bring clean drinking water to Bakang, a village in Cameroon.

Let the sun shine! A leader in solar energy research, UD is advancing the development of high-efficiency solar cells.



John Line (left) and Frederick "Fritz" Nelson are members of the Intergovernmental Panel on Climate Change, which won the 2007 Nobel Prize for Peace.





# Current UD Program Portfolio

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# environmental portal

PARTNERSHIP ACADEMICS RESEARCH CLUBS INITIATIVES EVENTS

## Welcome

The University of Delaware's Environmental Portal is a central place for future and current students, faculty, staff and the public to connect to the many environmentally focused programs the university has to offer.

Hear you will find connections to our top-notch academic programs for undergraduate and graduate students. You can also connect to environmental student clubs and organizations. If you are interested in the kinds of research taking place at UD, be sure to browse our Research and Centers pages. If you have questions or want additional information about what you discover here, click here to contact us.



Plants grow in virtually every habitat on Earth, producing oxygen and helping to sustain life.  
[Learn more>>](#)

This environmental portal is an eco-partnership by the following UD Colleges

- Agriculture & Natural Resources
- Art & Design
- Earth & Environmental Sciences
- Marine & Earth Studies

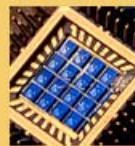
**ECO TIP:**  
Turn off your computer and monitor when not in use.



UD is advancing solar energy research.

## Enviro News

September 15, 2008



**Scientists are pioneering a new age of discovery**

Electrical engineers from UD and Cambridge NanoTech have demonstrated for the first time how the spin proper of electrons in silicon-can be measured and controlled.  
[Read More>>](#)

UD's Kempton a featured speaker at Offshore Wind Power workshop

## UD INITIATIVES



recycling



## GET CONNECTED

SEE WHAT WE'VE BEEN UP TO LATELY



## COMMITMENT

COMMITMENT TO CLEAN, MOST CLEAN, MORE GREEN



DRAFT Splash Page for UD Environmental Web Portal



# The Academic Curriculum

- **FINDING:** B.S. in Environmental Science is strong but could be enhanced by including more options that facilitate broader participation from across the University.
- **FINDING:** Lack of Environmental Studies option is a weakness.
  - o **RECOMMENDATION:** Develop Environmental Studies option to complement Environmental Science option.
  - o **ACTION:** Committee develops a proposal for a B.A. in Environmental Studies.
  - o **RECOMMENDATION:** Broaden and integrate curriculum for both Environmental Science and Studies Options.
  - o **ACTION:** The committee develops a proposal to modify and broaden the B.S. in Environmental Science curriculum and integrates it with the proposed Environmental Studies curriculum.

# *Highlights*

- **B.S. Environmental Science** (124 credits)
  - GOAL: No compromise in quantitative aspects of the curriculum
- **B.A. Environmental Studies** (124 credits)
  - GOAL: Not just a science-lite curriculum but one focused on environmental policy and economics
- **Some Common Elements:** Introductory course, Capstone course
- **Additional Areas of Concentration**
- **Field Requirement for Both Degrees**
- **Clearer Path for students who desire a Double Major**

# Complementary External Activities

- **Finding:** UD has recently established its presence in national and international University-based environmental initiatives (AUPCC, AULSF, CEDD).
- **Recommendation:** Further enhance our status by taking a leadership role in the Salzburg Academy on Sustainable Futures, a project currently under development by the Salzburg Global Seminar Series.
  - Annual 2-3 week international program
  - Involves students, faculty, and administrators from universities across the world
  - Join effort to
    - Develop new interdisciplinary curricula and new energy conservation projects
    - Explore and improve the role of universities as sites for the advancement of comprehensive sustainability education and practice




OFFICE OF THE DEAN

113 Townsend Hall  
University of Delaware  
Newark, Delaware 19716-2103  
Ph: 302/831-2501  
Fax: 302/831-6758

February 17, 2009

**MEMORANDUM**

To: Nancy Targett  
Dean, College of Marine and Earth Studies  
Chair, UD Undergraduate Environmental Studies Program and Curriculum Committee

From: Robin Morgan   
Dean, College of Agriculture and Natural Resources

Re: Letter of Support for Proposed Environmental Science and Environmental Studies Degrees

On behalf of the College of Agriculture and Natural Resources, I write to express our college's support for your proposed new BA in Environmental Studies and recommended revisions to the existing BS in Environmental Science degree. The University of Delaware's continued focus on environmental issues and the distributed nature of these degrees are of benefit to the University and our students, and I believe these proposed changes will be of long-term value to our college.

I understand that primary support for these proposed changes will come from four departments in our college (Bioresources Engineering, Entomology and Wildlife Ecology, Food and Resource Economics, and Plant and Soil Sciences) and that you will be requesting letters of support from each department. To the extent possible, I will work with these departments to ensure that they have the resources needed to make these proposed changes succeed in the future.

Therefore, we offer our college's support of these proposed programs and are willing to have our courses included as outlined in the main core and concentrations, within the limits of the resources we have available to support new initiatives in undergraduate education at the University.

We wish you the best of luck with these new and newly enhanced programs.

## Letters/Messages of Support

### Department of Chemistry

From: Klaus Theopold [mailto:theopold@UDel.Edu]  
Sent: Friday, February 13, 2009 5:30 PM  
To: fanewt@UDel.Edu  
Cc: Murray Johnston; ntargett; John Burmeister  
Subject: Re: Environmental Science and Studies Proposals

Dear Frank,

I am responding to Dean Targett's message quoted below. The Department of Chemistry and Biochemistry is of course very much supportive of any efforts to address environmental concerns and curricula addressing these issues.

We take note of the proposed degree programs (BS in Environmental Science and BA in Environmental Studies), and we strongly feel that the only way we might have been less than enthusiastic would be if they did not require some exposure to chemistry. I believe that the inclusion of CHEM 100 for the BA and CHEM 103/104 for the BS is very much appropriate. Thus we wholeheartedly support the establishment of these degree programs.

While it may not be entirely germane to your purpose, I must add the caution that the addition of large numbers of students to either CHEM 100 or CHEM 103/104 may cause capacity problems on our end. Thus I wish to state that we may have to request additional resources from the University to accommodate the new customers. However, that does not detract from the obvious merit of your proposal.

Klaus Theopold

Regards,

~~~~~  
Klaus H. Theopold, Professor and Chair  
Department of Chemistry and Biochemistry,  
University of Delaware, Newark, DE 19716, USA.  
Phone: (302)831-1546 (or 1247); Fax: (302)831-6335  
<http://www.udel.edu/theopold/index.html>

## College of Marine and Earth Studies

From: Charles E. Epifanio  
Sent: Saturday, February 14, 2009 10:30 AM  
To: Nancy Targett  
Subject: Environmental Curricula

Dear Nancy,

Thank you for sending detailed information concerning the proposed BS in Environmental Science and the proposed BA in Environmental Studies.

Core requirements for the BS ENSC include MAST 482 Introduction to Ocean Science. The subject matter and depth-of-presentation of this course are appropriate for students matriculated in the BS program. MAST 482 is offered once a year and has a typical class size ~15. The CMES has sufficient resources to accommodate increased enrollment in this course.

Core requirements for the BA ENSC include MAST 200 The Oceans. The subject matter and depth-of-presentation of this course are appropriate for students matriculated in the BA program. MAST 200 is offered once a year and has a typical class size ~100. The CMES has sufficient resources to handle increased enrollment in this course.

By my count, an additional 11 MAST courses are part of the curricula in the various concentrations in the BS program, and another five MAST courses are part of the curricula in the different concentrations in the BA program. The CMES has sufficient resources to accommodate increased enrollment in these courses.

On behalf of the non-departmental academic programs in the CMES, I am happy to support the proposed BS ENSC and BA ENSC.

Best regards,

Chuck

Charles E. Epifanio  
Associate Dean  
Harrington Professor of Marine Studies  
College of Marine and Earth Studies  
University of Delaware  
Lewes, DE 19958  
302-645-4263 (Office)  
302-645-4213 (FAX)  
<http://www.ocean.udel.edu/cms/cepifanio/index.html>



## **College of Arts and Sciences**

**From:** Apple, Tom [mailto:tapple@art-sci.udel.edu]  
**Sent:** Tuesday, February 17, 2009 6:40 PM  
**To:** Targett  
**Cc:** Watson, George H.  
**Subject:**

Nancy,

I support both the modified BS in Environmental Sciences and the proposed BA in Environmental Studies. The College will do all it can to make sure that the necessary courses to support these programs are offered in a timely manner.

Best regards,

Tom

Tom Apple, PhD  
Dean of Arts & Sciences  
Professor of Chemistry  
University of Delaware  
4 Kent Way  
Newark, DE 19716  
(302) 831-2793 - ph  
(302) 831-6398 - FAX

## **College of Engineering**

**From:** Chajes, Michael J. [mailto:chajes@udel.edu]  
**Sent:** Tuesday, February 24, 2009 2:54 PM  
**To:** Nancy Targett  
**Subject:** Environmental Curricula

Nancy,

Having reviewed the materials, the College of Engineering is please dot support the proposed Environmental Curricula. We are also happy to be supporting the three concentrations within the Environmental Science major.

Michael

Michael J. Chajes, Dean  
102 DuPont Hall  
College of Engineering  
University of Delaware  
Newark, DE 19716

302-831-8017 (Phone)  
302-831-6751 (FAX)

chajes@udel.edu  
[www.ce.udel.edu/faculty/chajes](http://www.ce.udel.edu/faculty/chajes)

## Department of Electrical and Computer Engineering

**From:** Gonzalo R Arce [mailto:arce@ece.udel.edu]  
**Sent:** Thursday, February 19, 2009 12:32 AM  
**To:** Nancy Targett; arce@ee.udel.edu  
**Cc:** dentel@udel.edu; 'Nancy Targett'; 'fanewt@udel.edu'  
**Subject:** RE: Proposed Environmental Science Curriculum

Nancy,

The proposed set of concentrations look very good. Our department supports the inclusion of the mentioned courses. Thank you for including us in this effort.

Best regards,

Gonzalo

## Department of Chemical Engineering

**From:** Wagner, Norman J. [mailto:wagnernj@udel.edu]  
**Sent:** Wednesday, February 18, 2009 1:18 PM  
**To:** Nancy Targett; Raul Lobo  
**Cc:** dentel@udel.edu; Nancy Targett; fanewt@udel.edu  
**Subject:** Re: Proposed Environmental Science Curriculum

Nancy, at first glance, this looks just fine. I need to run this by our undergrad studies advisor, Raul Lobo, copied on this reply.

Norm

## Department of Civil and Environmental Engineering

**From:** Shenton, Tripp [mailto:shenton@udel.edu]  
**Sent:** Thursday, February 19, 2009 11:19 AM  
**To:** Nancy Targett  
**Cc:** Chajes, Michael J.; 'Steve Dentel'; Shenton, Tripp  
**Subject:** RE: Proposed BS in Environmental Science

Dean Targett

Thank you for your email. I am writing to say that the Department of Civil and Environmental Engineering supports the proposed changes to the BS in Environmental Science, and in particular, to the inclusion of the CIEG courses outlined in the proposal, in the program requirements.

Sincerely

Tripp Shenton

Harry W. "Tripp" Shenton III, Ph.D.  
Professor and Chair  
Department of Civil and Env. Engineering

301-B Dupont Hall  
University of Delaware  
Newark, Delaware 19716  
(302)831-2447  
(302)831-3640 Fax  
Email: shenton@udel.edu

Department of Mathematics

**Sent:** Thursday, February 19, 2009 9:07 PM  
**To:** Nancy Targett  
**Subject:** Re: Environmental Science Curriculum

Dear Nancy

The Mathematical Sciences Department is happy to support your proposal.

If you need more, please let me know.

Sincerely  
Peter Monk

## Department of Geological Sciences



COLLEGE OF MARINE AND EARTH STUDIES

DEPARTMENT OF  
GEOLOGICAL SCIENCES

101 Penny Hall  
University of Delaware  
Newark, Delaware 19716-2544  
Ph: 302/831-2569  
Fax: 302/831-4158  
<http://www.geosci.udel.edu>

Dear Dean Targett,

With an appreciation for the hard work and creative effort of the committee, the faculty of the Department of Geological Sciences support the proposed revision and expansion of the Environmental Science degree program and the formation of a new Environmental Studies degree program. The Earth's environmental systems are complex, and an understanding of these systems and the feedback between human activity and the environment requires a broad-based multidisciplinary approach. These new programs will better highlight the considerable existing environmental offerings at the university and expand the options available to students, while providing a clear curricular path for students interested in environmental problems. We look forward to working with our colleagues across campus to effectively educate students about the Earth's natural environment and how it changes over time.

Our support for this new initiative assumes that adequate resources and personnel will be made available to support the anticipated interest in these degrees and the growth in the courses and departments associated with them. Since much of the curriculum will be based on people-intensive discovery learning in the form of labs, field work, group projects, and problem-solving, there will need to be sufficient professors, teaching assistants, and staff to make it work.

The Geological Sciences faculty are particularly interested in making sure that all ENSC students develop an understanding of not just Earth's existing natural environments but also the processes that have created Earth's surface environments over time. Environmental processes and rates of change vary with time and space, and the records of these processes provide an important perspective on current natural and anthropogenic changes. We expect multiple opportunities to provide this geologic perspective within the proposed curriculum, at the introductory level of the core requirements, as well as within the field experience and capstone proseminar courses. We also anticipate designing a new upper-level course with a focus on these topics that we will propose be added to the ENSC core curriculum.

We are excited about the opportunity to participate in these new degree programs and to actively contribute to their evolution over the next few years.

Sincerely,

Sue McGeary (on behalf of the Geological Sciences faculty)  
Chair and Associate Professor  
19 February 2009

## Department of Physics and Astronomy

From: hadji [mailto:hadji@UDel.Edu]  
Sent: Friday, February 20, 2009 4:31 PM  
To: Nancy Targett  
Cc: Nancy Targett; 'fanewt@udel.edu'  
Subject: Re: Proposed Curriculum in Environmental Science

Dear Nancy,

This is to tell you that I support your proposed Curriculum in Environmental Science. Since the students must take MATH241 and MATH242, they will have the appropriate background for PHYS201 and PHYS207. Good luck.

Best regards,

George

## Department of Political Science and International Relations

**From:** Julio F. Carrion [mailto:jcarrion@UDel.Edu]  
**Sent:** Tuesday, February 24, 2009 12:46 PM  
**To:** Nancy Targett  
**Subject:** RE: Environmental Studies/Science Curricular Proposals

Dear Nancy,

I wanted to let you know that we'll be happy to support the proposal. Please let me know what I can do to move this forward

Julio

---

Julio F. Carrión  
Associate Professor and Acting Chair  
Political Science and International Relations,  
Director, Latin American Studies  
Phone: (302)831-2355  
Fax: (302)831-4452

## Department of Plant and Soil Sciences

**From:** Blake Meyers [meyers@dbi.udel.edu]  
**Sent:** Tuesday, February 24, 2009 4:20 PM  
**To:** Nancy Targett  
**Cc:** Nancy Targett; 'Sims, Tom'; 'fanewt@udel.edu'; Charlotte McDermitt  
**Subject:** Re: Request for Support for Environmental Curricula at UD

Nancy,

I discussed this with Tom last week and I think it sounds like a good program. I do support it, and I

hope that it will attract more students to our courses and draw more students into our regular majors as well.

best,  
Blake

-----  
Blake C. Meyers, Ph.D.  
Associate Professor  
and Interim Department Chair  
Dept. of Plant & Soil Sciences  
University of Delaware

Delaware Biotechnology Institute  
15 Innovation Way, Room 230  
Newark, DE 19711

Telephone: (302) 831-3418  
Email: [meyers@dbi.udel.edu](mailto:meyers@dbi.udel.edu)





DEPARTMENT OF FOOD  
AND RESOURCE ECONOMICS

Thomas W. Ilvento  
213 Townsend Hall  
University of Delaware  
Newark, DE 19716-2130  
Ph: 302-831-6773  
Fax: 302-831-6243  
Ilvento@udel.edu

February 24, 2009

MEMORANDUM

To: Nancy Targett  
Dean, College of Marine and Earth Studies  
Chair, UD Undergraduate Environmental Studies Program and Curriculum Committee

From: Thomas W. Ilvento  
Chair, Department of Food and Resource Economics

A handwritten signature in blue ink that reads "Thomas W. Ilvento".

Re: Letter of Support for Proposed Environmental Science and Environmental Studies Degrees

On behalf of the Department of Food and Resource Economics Department, I am writing to express our department's support for your proposed new BA in Environmental Studies and recommended revisions to the existing BS in Environmental Science degree. While we are concerned about the impact the new Environmental Studies major will have on our two existing environmental majors, Resource Economics and Natural Resource Management, in the end we welcome the shared goals of expanding awareness and opportunities for the environment at the University of Delaware. We look forward to working with you on promoting all the environmental majors on campus. We believe the University of Delaware's continued focus on environmental issues and the distributed nature of these degrees are of benefit to the University and our students, and we believe these proposed changes will be of long-term value to our majors, college and university.

Our department will support the demand of Environmental Science and Environmental Studies students for our courses (primarily FREC 100, FREC 150, FREC/ECON 343, and STAT 200) and we will make sure these students have access to these courses. We already offer, or will offer by Fall 2009, all these courses in both semesters and are prepared to provide extra offerings or increase the size of these classes as demand warrant. We also are prepared to advise our share of incoming students into these majors and in particular support the Environmental Economics and Policy concentration in the Environmental Studies major.

We wish you the best of luck with these new and newly enhanced programs.