

# 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:** \_\_\_\_\_ Delphis Levia \_\_\_\_\_ phone number \_\_831-3218\_\_\_\_\_

**Department:** \_\_\_\_\_ Geography \_\_\_\_\_ email address \_dlevia@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** \_\_\_\_\_ **14F** \_\_\_\_\_  
(use format 04F, 05W)

**Current degree** \_\_\_\_\_ **BS** \_\_\_\_\_  
(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 BS** \_\_\_\_\_  
(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 300 Earth Systems: Science and Policy** - This course provides students with an integrative framework necessary to understand the systems approach to environmental science and its intersection with environmental policy and management. Students will be introduced to systems theory within environmental science and its relevance to environmental policy to provide grounding to the interdisciplinarity to environmental science and environmental studies.

**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”)

Department of Applied Economics & Statistics  
Department of Biological Sciences  
School of Urban Affairs and Public Policy  
Department of Materials Science & Engineering  
Energy and Environmental Policy Program  
Department of Chemistry/Biochemistry  
Department of Chemical Engineering  
Department of Civil and Environmental Engineering  
Department of Electrical and Computer Engineering  
Department of Entomology and Wildlife Conservation

Department of Economics  
Environmental Humanities Program  
School of Marine Science and Policy  
Department of Political Science  
Department of Geography  
Department of Geological Sciences  
Department of Mathematics  
Department of Mechanical Engineering  
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.

The above text provides the framework and context under which the environmental science and environmental studies programs at UD were revised and created, respectively, in 2009. Building upon the success of the major programmatic revisions of 2009, and seeking to improve the programs based on the past four years of experience, the Environmental Council (formed by Provost Rich in 2008 to reflect the multiple units engaged in delivering degree content) sought to revise the Environmental Science Program. Armed with a strategic assessment of UD's Environmental Science and Studies Programs conducted by Dr. Shirley Vincent (Appendix A), an international authority on interdisciplinary environmental education from the National Council of Science and the Environment, the Environmental Council sought to revise the program. A primary goal of the Council was to utilize the constructive feedback contained within Dr. Vincent's strategic assessment, while optimizing the uniquely Delawarean aspects of the program. The other primary goal of the programmatic revision is to streamline the administration and structure of the program in order to make it more functional and less confusing for UD students. The Council met regularly over the 2012-2013 academic year to discuss programmatic revisions that would be best for UD students. It is a faculty based Council with the following members:

Council members include:

- Tracy Deliberty (Geography)
- Paul Imhoff (Civil and Environmental Engineering)
- Jan Johnson (Political Science and International Relations)
- Murray Johnston (Chemistry and Biochemistry)
- Gerald Kaufmann (Urban Affairs and Public Policy)
- John Madsen (Geological Sciences)
- Tom Sims (Plant and Soil Science)
- Steven Hastings (Applied Economics and Statistics)
- Franklin Newton (CEOE)
- Del Levia (Director, Environmental Science and Environmental Studies Programs)
- Nancy Targett (*Ex-officio*, CEOE)

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 an effort to improve the Environmental Science degree at UD and to make the program more accessible and less structurally confusing to students, this proposal builds upon the strengths of the existing program and restructures the program's administration. 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 cross-cutting themes which mirror the interdisciplinary core (explained in more detail in next section).
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. The new ENSC 300 course is a significant step in that direction.
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 themes; 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 required introductory course (ENSC101 Introduction to the Environment) and a capstone course (ENSC 450 Proseminar: The Environment) would be complemented by the ENSC/ENVR 300 course required for both the BS in Environmental Science and the 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.

The prior version of the program consisted of a core heavy major and concentrations. While the core heavy major is justified given the breadth and scope of environmental science, the concentrations experienced some problems. In some cases they were too narrowly focused and did not reinforce the true cross-cutting nature of environmental science. In other cases, students sometimes had trouble meeting concentration requirements since some courses were not offered on a regular basis (or at all), despite an initial nod of approval from those units. More fundamentally, concentrations did not reflect the intrinsic interdisciplinarity of environmental science and serve more as “silos” than areas of concentration.

This revision significantly enhances the interdisciplinarity of the core. For instance, Introduction to Soil Science and Geographic Information Systems have been added. To keep the core manageable, the tradeoff was one less semester of introductory chemistry OR biology. Thus, students take a full year of chemistry and one semester of biology or vice versa, depending on their chosen theme. Dr. Vincent’s report (Appendix A) argued that the present program has too many concentrations and fosters confusion among some students. As such, The Council has developed themes within the major that mirror the interdisciplinary core. The themes embrace the complex and varied nature of environmental science. They celebrate the cross-cutting activity which is the hallmark of environmental science. Arguably, such themes will better prepare students for careers and graduate school. Themes provide students more latitude to tailor their academic career and explore the cross-cutting issues of environmental science. While there were ten concentrations, there are only six themes. Nevertheless, the program offers more flexibility and student opportunities with the thematic approach. The revised symmetry between the core and themes puts UD at the forefront of environmental education. The idea was well received at an international meeting in Vienna, Austria from scientists and educators around the globe.

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

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

Students’ “home” college will be located within the College of Earth, Ocean and Environment. Dr. Vincent found that current UD students with varying concentrations identify CEOE as their “home College” and interdisciplinary programs benefit when students can form a cohort and benefit from social interactions. Many interdisciplinary programs face the challenge of creating a sense of identity among students since they take courses over multiple units; this sometimes prevents the growth of such programs. While students should and will take courses across UD, we can streamline processes, decrease their level of anxiety, and build a sense of community by housing them all in CEOE. This is consistent with Dr. Vincent’s recommendations (Appendix A).

Students will be assigned an advisor on the basis of their chosen theme. In those cases where the student has not yet selected a concentration, students will be assigned an academic advisor from one of the themes.

Recognizing that this is a degree program that leverages the expertise of many UD faculty members, the Environmental Council will continue to oversee the Program. The Council will continue to be composed of faculty from participating programs, provide oversight for curricular matters and student advisement within the program. The chair of the Council will be designated by the Dean of CEOE. 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 theme.

**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.

<u>CURRENT</u>	<u>PROPOSED</u>	
<b><u>General and University Requirements:</u></b>		
ENGL 110 Critical Reading & Writing (min grade C-) 3	ENGL 110 Critical Reading & Writing (min grade C-) 3	
First Year Experience (fulfilled by ENSC 101 + FYE Seminar) 4	First Year Experience (fulfilled by ENSC 101 + FYE Seminar) 4	
Discovery Learning Experience (fulfilled by field course) 3	University Breadth requirements 12	
Multicultural requirement 3	Discovery Learning Experience (fulfilled by field course) 3	
Second Writing Course (fulfilled by ENSC 450) 3	Multicultural requirement 3	
Foreign Language 0-8	Second Writing Course (fulfilled by ENSC 450) 3	
Math requirement (fulfilled by MATH 241/242) 0-4	Foreign Language 0-12	
<b><u>Program Breadth Requirements:</u></b> (At least two different areas must be represented in each group.)		
<b>Group A</b> Understanding and appreciation of the creative arts and humanities. 6	Math requirement (fulfilled by MATH 241/242) 0-4	
<b>Group B</b> The study of culture and institutions over time 6	<b><u>Program Breadth Requirements:</u></b> (At least two different areas must be represented in each group.)	
<b>Group C</b> Empirically based study of human beings and their environment. 6	Creative arts and humanities. 3	
<b><u>Core Requirements:</u></b>		
ENSC 101 Introduction to the Environment 4	History and cultural change 3	
BISC 207 Introductory Biology I 4	Social and behavioral sciences 3	
BISC 208 Introductory Biology II 4	<b><u>Core Requirements:</u></b>	
ENWC 201 Wildlife Conservation and Ecology 3	ENSC 101 Introduction to the Environment 4	
CHEM 103 General Chemistry I 4	BISC 207 Introductory Biology I 4	
CHEM 104 General Chemistry II 4	CHEM 103 General Chemistry I 4	
GEOL 107 General Geology 4	BISC 208 Introductory Biology II <b>OR</b> 4	
PHYS 201 Introductory Physics I <b>OR</b> 4	CHEM 104 General Chemistry II	
PHYS 207 Fundamentals of Physics* 4	ENWC 201 Wildlife Conservation and Ecology 3	
GEOG 220 Meteorology 3	PLSC 204/205 Introduction to Soil Science 4	
GEOG 412 Physical Climatology 4	ENSC 300 Earth Systems: Science and Policy 3	
MAST 482 Introduction to Ocean Science 3	GEOL 107 General Geology 4	
POSC350 Politics and the Environment 3	PHYS 201 Introductory Physics I <b>OR</b> 4	
FREC 100 Sustainable Development 3	PHYS 207 Fundamentals of Physics*	
MATH 241 Analytical Geometry & Calculus A 3	GEOG 220 Meteorology 3	
MATH 242 Analytical Geometry & Calculus B 3	GEOG 412 Physical Climatology 4	
GEOG 271 Introduction to Geographic Data Analysis 4	MAST 482 Introduction to Ocean Science 3	
<b>*Dependent on concentration, see concentration details for specifics</b>		
	POSC350 Politics and the Environment 3	
	ECON 151 Introduction to Microeconomics <b>OR</b> 3	
	APEC 150 Economics of Agriculture & Natural Resources	
	MATH 241 Analytical Geometry & Calculus A 4	
	MATH 242 Analytical Geometry & Calculus B 4	

**Field Experience: (3-6 cr)**

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 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

GEOG 372 Introduction to GIS OR

3/4

APEC 480 Geographic Information Systems in Natural Resource Management

\*Dependent on theme, see theme details for specifics

**Field Experience: (3-6 cr)**

An approved science field experience in which the student integrates the components of his or her theme in an experiential learning environment. Experience MUST include data collection, manipulation of data sets and weekly reports/field notes. This requirement could be fulfilled by an internship, study abroad experience and/or a research experience so long as the above criteria are met.

**Science Themes: (12-15 cr)**

4-5 courses clustered in themes that are distributed 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

**THEMES:**

**Theme in Atmospheric Science** *provides an opportunity for Environmental Science majors to study how energy and moisture are transferred among earth's environmental spheres (e.g., biosphere-atmosphere, hydrosphere-atmosphere) and how humans impact our weather and climate. Emphasis is placed on the physical climatology of interactions among spheres, although courses within ecological climatology are also offered. Individual courses delve into the intricacies of atmospheric science above (e.g., [GEOG 420](#), Atmospheric Dynamics) or within (e.g., [Geog 451](#), Microclimatology) the boundary layer. Many aspects of atmospheric science are quantitative in nature, requiring knowledge of advanced calculus and/or statistics; thus [MATH 243](#) is required, along with one additional course in differential equations, linear algebra, or statistics.*

-MATH243 Analytical Geometry and Calculus C

One of the following:

- MATH 302 Ordinary Differential Equations
- MATH 349 Elementary Linear Algebra
- MATH 351 Statistics for Engineering & Physical Sciences
- ENSC 475 Statistics for Environmental Science
- STAT 657 Statistics for Earth Sciences

Three of the following:

- GEOG 342 Bioclimatology
- MAST/GEOG 408 Radiative Transfer in Ocean & Atmosphere
- MAST/GEOG 409 The Ocean and Climate Variation
- GEOG 420 Atmospheric Physics
- GEOG 423 Atmospheric Dynamics

- 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  
 -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.

- GEOG 451 Microclimatology (cannot also count as field experience)  
 GEOG 453 Synoptic Climatology  
 GEOG 456 Hydroclimatology  
 GEOG/GEOL/MAST 458 Paleoclimatology

**Theme in Ecoscience** focuses on studying the nature of ecosystems as well as the interaction of organisms with their physical and biological environment. Courses cover the breadth of ecoscience. Students interested in studying ecoscience with an emphasis on the physical environment would best fit this theme. Graduates from the theme in Ecoscience should be prepared to gain employment as environmental scientists or seek graduate education in Environmental Science.

- BISC 302 General Ecology

Any four of the following:

- BISC 321: Environmental Biology  
 BISC 495: Evolution  
 CHEM 683/MAST 683: Environmental Chemistry  
 ENWC 419: Biological Control  
 ENWC 444/BISC 440: Conservation of Tropical Biodiversity  
 ENWC 456: Conservation Biology  
 ENWC 814: Landscape Ecology  
 GEOG 342: Bioclimatology  
 GEOG 431: Watershed Hydro-Ecology  
 MAST 427/627: Marine Biology  
 MAST 629: Topics in Marine Ecology  
 PLSC 201/102: Botany II with laboratory  
 PLSC 419: Soil Microbiology

**Theme in Water Science** provides an opportunity for Environmental Science majors to study the movement, distribution, quantity, and quality of water on Earth. Students pursuing this concentration will have the opportunity to study aspects of hydrology that range from the atmosphere to the Earth's subsurface, and from biogeochemical processes to policy and water management. Eight courses in water science are offered from four Departments (Geological Sciences, Geography, and Civil and Environmental Engineering), of which three are required. Many aspects of hydrology are quantitative in nature, requiring knowledge of basic calculus and in some cases more advanced calculus and/or statistics; thus MATH 243 is required, along with one additional course in differential equations, linear algebra, or statistics.

- MATH243 Analytical Geometry and Calculus C

- One of the following:  
 MATH 302 Ordinary Differential Equations  
 MATH 351 Engineering Math I (Ordinary Differential Equations/Linear Algebra)

Fundamental water courses

- One of the following:  
 CIEG 305 Fluid Mechanics  
 GEOG 432 Environmental Hydrology

Applied water courses

- GEOL 428 Hydrogeology OR CIEG 498 Groundwater flow and contaminant transport

And

- GEOG 320 Water and Society OR UAPP 411 Regional Watershed

-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

Management

One of the following:

- GEOL411/611 Fluvial Geomorphology
- GEOG 431 Watershed Hydro-Ecology
- GEOG 456 Hydroclimatology
- PLSC 421 Nonpoint Source Pollution
- PLSC 442 Storm Water Management
- PLSC467/667 Watershed Hydrochemistry
- CIEG 430 Water Quality Monitoring

**Theme in Marine Science** allows students to study and better understand the environment of the ocean, the seabed, and the coastal zone. Building on the foundation of MAST 482 Introduction to Ocean Sciences in the ENSC core, students choose coursework in the physical ocean or in the marine ecosystem. Students must complete 5 courses that assist students in gaining a depth of understanding of the Marine Environment.

-MAST 492 Seminar: Marine Environmental Case Studies

Four of the following:

- BISC 302 General Ecology
- BISC 637 Population Ecology
- ENWC/MAST 314 Comparative Terrestrial and Marine Ecology
- MAST 402/902 Introduction to Physical Ocean Science
- MAST/GEOG 408 Radiative Transfer in Ocean & Atmosphere
- MAST 421/621 Coastal Field Biology
- MAST 427/627 Marine Biology
- MAST 437/637 Geological Oceanography
- MAST 441 Algal Ecological Physiology
- MAST 442 Coral Reef Ecology
- MAST 451/651 Marine Invertebrate Diversity
- MAST 628 Offshore Wind Power: Science, Engineering and Policy
- MAST 630 Ichthyology
- MAST 646 Chemical Oceanography
- GEOG/GEOL/MAST 341 Climate and Climate Change
- GEOG 357 Paleoclimatology
- GEOG 420 Atmospheric Physics
- GEOL 414/614 Quaternary Geology and Geochronology
- GEOL 434/634 Geology of Coasts

**Theme in the Critical Zone** The "Critical Zone" is Earth's near-surface environment. It includes the land surface and its vegetation, rivers, lakes, and shallow seas, and it extends through the underlying soils, rocks and groundwater. Interactions at this dynamic zone are governed by complex linkages and feedbacks among a vast range of physical, chemical and biological processes and they determine the availability of nearly every life- sustaining resource. A better understanding of the Critical Zone is necessary to assess the impact of human activities on Earth's surface and to adapt to their consequences.

The Critical Zone theme of study requires 15 credits as follows:

- GEOL203 Surficial Processes
- GEOG/GEOL/MAST 341 Climate and Climate Change

One of the following:

- PLSC419 – Soil Microbiology
- PLSC438 – Fate/Transport Soil Contaminants
- PLSC603 – Soil Physics



-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  
CHEG468 Research (3 cr)

-One course from the following list:

GEOG622 Resources, Development & Environment  
GEOG236 Conservation: Global Issues  
MAST675 Economics of Natural Resources  
MAST628 Offshore Wind Power: Science, Engineering, and Policy  
GEOG617 Seminar in Climate Change\*

PLSC608 – Environmental Soil Chemistry

A minimum of 4-5 credits from the following (NOTE: PLSC course completed from above list) may not be used to satisfy this requirement:

GEOG 432 Environmental Hydrology  
GEOG 456 Hydroclimatology  
GEOG/GEOL 485 Geomorphology  
GEOL 202 Earth Materials  
GEOL304 Sedimentology and Stratigraphy  
GEOL/GEOG411 Fluvial Geomorphology  
GEOL414 Quaternary Geology and Geochronology  
GEOL428 Hydrogeology OR CIEG498 - Groundwater Flow and Contaminant Transport  
GEOL434 Geology of Coasts  
PLSC419 Soil Microbiology  
PLSC438 Fate/Transport Soil Contaminants  
PLSC603 Soil Physics  
PLSC608 Environmental Soil Chemistry  
PLSC421 Nonpoint Source Pollution  
PLSC467/667 – Watershed Hydrochemistry

**Theme in Energy and Environment** Discovering new energy sources that have minimal environmental impact is one of the greatest challenges of our society. The term “sustainable” is used when talking about energy that meet our current needs without endangering future generations from being able to meet their future needs. Topical areas that students in this theme explore include the science and policy aspects of renewable energy sources like wind energy, biofuels, solar energy and fuel cells as well as assessing the economic, local and global environmental impact of alternative energy sources.

Two from the following:

APEC 324 Natural Resource Economics  
ECON 320 Energy Economics  
ENEP 425 Energy Policy and Administration  
ENEP 426 Climate Change: Science, Policies, & Political Economy  
ENEP 427 Sustainable Energy Policy & Planning  
GEOG/GEOL/MAST 341 Climate and Climate Change  
GEOG 422 Resources, Development, & the Environment  
MAST 408 Radiative Transfer in Ocean and Atmosphere  
MAST 622 Conservation and Renewable Energy Policy

Three (9 credits or more of the following [\*not including any required prerequisites]. Please note: some of these courses have multiple prereqs):

CHEG 667 Environment and Energy  
ELEG 415 Electric Power and Renewable Energy Systems  
ELEG 437 Energy Systems\*  
ELEG 628 Solar Energy Technology and Application  
MAST 467014 Seminar: Electric Vehicles and the Grid  
MAST 467015 Seminar: Wind Power Meteorology  
MAST 628 Offshore Wind Power: Science, Engineering, & Policy  
MEEG 435 Wind Power Engineering\*  
MSEG 470 Solar Energy\*

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 Harvey A. Gredusky Date 20 Feb 2014  
Dean of College Mary M. Korynt Date 20 Feb 2014  
Chairperson, College Curriculum Committee Duff Date 17 Feb 14  
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

Letter of Support by Dr. Shirley Vincent, NCSE  
[program evaluator; see Appendix A]

&

Approvals from Departments and Programs  
Affected by Programmatic Revisions



# National Council for Science and the Environment

*Improving the scientific basis for environmental decision-making*

1101 17 Street, NW • Suite 250 • Washington, DC 20036-4722 • TEL 202/530-5810 • FAX 202/628-4311 • [www.NCSEonline.org](http://www.NCSEonline.org)

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James Gustave Speth, Esq.

February 4, 2014

University of Delaware Faculty Senate

Dear Members of the Senate,

Delphis Levia, the Director of the Environmental Science and Environmental Studies (ESS) programs, asked me to comment on the proposed changes to the degrees and their concentrations. The changes are informed by the recommendations made in my 2011 strategic and comparative assessment, which compares the ESS programs to their peers nationally and draws upon the extensive research conducted by the National Council for Science and the Environment on trends and best practices for interdisciplinary environmental programs. The recommendations were also based upon interviews with the programs' students, faculty and administrators.

I strongly support the four key changes to the ESS programs as described in the proposals. These changes build upon the programs' existing strengths while enhancing their ability to prepare students for environmental careers and will position the ESS programs more competitively in the national interdisciplinary environmental education landscape. The key changes include: 1) redesigning the concentrations to represent interdisciplinary themes that align with environmental career paths and include the key knowledge and professional skills required for interdisciplinary environmental professionals; 2) adding an additional core course in Earth Systems: Science and Policy for both majors to develop knowledge and skills in systems understanding and approaches for complex environmental/sustainability problem-solving; 3) requiring a series of three shared core courses that bring the environmental science and studies student cohorts together at the beginning, middle and end of their studies in a shared problem-solving capstone course; and 4) restructuring the administration of the programs to reflect the students' desire that their home college be the College of Earth, Ocean and Environment which will facilitate their sense of belonging, allow more interaction with other environmental science and studies students, and provide consistency in their advising and program requirements.

I believe these changes will be of great benefit to the ESS students, will further enhance the reputation and competitiveness of the ESS programs, and will position the programs for additional growth and development.

I would be pleased to answer any questions the Senate may have and can be reached by phone at 918-629-5143 or by email at [svincent@NCSEonline.org](mailto:svincent@NCSEonline.org).

Sincerely,

Shirley Vincent, PhD

Director of Education Research

National Council for Science and the Environment



February 4, 2014

MEMORANDUM

TO: Dr. Del Levia, Professor and Faculty Director  
ENSC and ENVR Programs

FROM: Dr. Nancy M. Targett  
Dean

SUBJECT: Support for changes proposed for the Environmental Science program

I write to formalize my support for the proposed revisions to the Environmental Science program that has been submitted for review.

These curricular and administrative changes are a result of recommendations from a program review conducted by an external nationally recognized expert with the specifics developed by the UD multi-college faculty committee that advises you as faculty director of the program.

The changes reflect best practices in the environmental field and bring the degree programs in line with current practices and processes at UD. Additionally and more importantly, the changes help eliminate confusion for students and are in their best interests from a cohort, curricular and preparation standpoint. The thematic areas give students more ability to explore current and future environmental issues such as water resources, renewable energy and earth system and societal connections in a cross and multidisciplinary way.

The Department of Geography and the College of Earth, Ocean, and Environment stand ready to implement these proposed changes. We are committed to serve our students while working closely with our colleagues throughout the university's many colleges and disciplines.

If you have questions or require additional information, please feel free to contact me.



Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

3 messages

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Delphis Levia <dlevia@udel.edu>

Thu, Feb 6, 2014 at 6:35 PM

Dear Colleague,

I write to you regarding programmatic revisions to the Environmental Science and Environmental Studies degree programs (see attached) which I intend to submit to the Faculty Senate for approval by February 15, 2014. These revisions are the culmination of a year long discussion by the Environmental Council composed of faculty from your College or Department. [Faculty members that served on the Council were: Delphis Levia, Tracy Deliberty, Paul Imhoff, Janet Johnson, Jerry Kaufman, John Madsen, and Steven Hastings. Tom Sims and Murray Johnston participated in initial discussions.]

As Director, I respectfully request an email confirmation or approval from you, on behalf of your College or Department, that you are okay with the Program's continued listing and use of your courses. Many of you have approved use of your courses in the current version of the majors. With a few of exceptions, the reconfigured majors are largely the same so the course demand should remain the same. The big change was a reduction in the number of concentrations to a lower number of more cross-cutting themes that mirror the interdisciplinary core of the majors.

The big course additions are:

PLSC 204/205 for environmental science majors

GEOG 372 or APEC 480 added to core of both majors

ENSC/ENVR 300 for both majors

ECON 151 or APEC 150 for environmental science majors [APEC100 no longer required for environmental science]

Broaden list of theme classes in environmental studies, for example, in UAPP and POSC

Again, I would very much having an email approval from you on or before February 14th.

I thank you for your support of these two important undergraduate interdisciplinary environmental programs.

Kind regards,  
Del Levia

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Delphis F. Levia, Ph.D.  
Professor of Ecohydrology  
Director, Environmental Science & Environmental Studies  
University of Delaware, Newark, DE 19716-2541, USA  
Series Editor, Springer-Verlag, Ecological Studies Series  
Skype: del.levia; Tel: (302) 831-3218; Fax: (302) 831-6654

**2 attachments**

 **FINAL\_BS\_ENSC\_ProgRev\_6Feb14.pdf**  
79K

 **FINAL\_BA\_ENVR\_ProgRev\_6Feb14.pdf**  
41K

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**Blake Meyers** <meyers@dbi.udel.edu>  
To: Delphis Levia <dlevia@udel.edu>

Thu, Feb 6, 2014 at 11:04 PM

Dear Del,  
I approve the use of our classes in the Environmental Science and Environmental Studies degree programs.

best,  
Blake

-----  
Blake C. Meyers, Ph.D.  
Edward F. and Elizabeth Goodman Rosenberg Professor  
and Department Chair  
Department of Plant and Soil Sciences  
University of Delaware

E-mail: [meyers@dbi.udel.edu](mailto:meyers@dbi.udel.edu)  
Phone: [302-831-3418](tel:302-831-3418)

---

**From:** "Delphis Levia" <dlevia@udel.edu>  
**To:** "Delphis Levia" <dlevia@udel.edu>  
**Sent:** Thursday, February 6, 2014 6:35:40 PM  
**Subject:** Email approval requested for proposed program revisions by Feb 14th, please

[Quoted text hidden]

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**Delphis Levia** <dlevia@udel.edu>  
To: Blake Meyers <meyers@dbi.udel.edu>

Fri, Feb 7, 2014 at 10:07 AM

Dear Blake,

Thank you for your support.

Take care,  
Del

[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

---

**John A. Pelesko** <pelesko@math.udel.edu>

Fri, Feb 7, 2014 at 10:42 AM

To: Delphis Levia <dlevia@udel.edu>

Dear Delphis,

The Department of Mathematical Sciences is happy to continue to support your program and your revisions.

Best,

John A. Pelesko

[Quoted text hidden]

[Quoted text hidden]

--

John A. Pelesko

Professor and Chair

Department of Mathematical Sciences

University of Delaware





Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

---

mckay jenkins <mckay@udel.edu>

Sat, Feb 8, 2014 at 3:41 PM

To: F JR Levia <dlevia@udel.edu>

Dear Professor Levia,

As a co-director of the Environmental Humanities minor, I approve of these revisions to your programs. Especially given the growing variety of environmental programs on campus, I think fewer concentrations with more interdisciplinary opportunities for our students is a fine idea indeed.

Best of luck with the proposal,

mckay jenkins

-----

mckay jenkins  
tilghman professor of english  
journalism and environmental humanities  
university of delaware  
[www.mckayjenkins.com](http://www.mckayjenkins.com)

[Quoted text hidden]

[Quoted text hidden]

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Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

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Duncan, Randall Lyle <rlduncan@udel.edu>

Sun, Feb 9, 2014 at 3:58 PM

To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Dear Dr. Levia,

The proposed changes to your major requirements in Environmental Science and Environmental Studies are consistent with our teaching mission. The Department of Biological Sciences supports these changes.

Best regards,

Randy

Randall L. Duncan, Ph.D.

Professor and Chair

Dept. of Biological Sciences

University of Delaware

***"Never...never...never...never give up!!"***

***Winston Churchill***

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]

**Sent:** Thursday, February 06, 2014 6:36 PM

**To:** Levia, Delphis F, JR

**Subject:** Email approval requested for proposed program revisions by Feb 14th, please

Dear Colleague,

[Quoted text hidden]

[Quoted text hidden]

[Quoted text hidden]

[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

---

## Email approval requested for proposed program revisions by Feb 14th, please

---

Murray Johnston <mvj@udel.edu>

Sun, Feb 9, 2014 at 7:32 PM

To: Delphis Levia <dlevia@udel.edu>

Dear Del,

On behalf of the Chemistry and Biochemistry Department, I confirm that we approve of these program revisions.

Thank you for shepherding this program so well.

Best,

Murray

Murray V. Johnston  
Professor and Chair  
Department of Chemistry and Biochemistry  
University of Delaware  
Newark, DE 19716

Office: Brown Laboratory, Room 102C  
Phone: [302.831.1247](tel:302.831.1247)  
Fax: [302.831.6335](tel:302.831.6335)  
Email: [mvj@udel.edu](mailto:mvj@udel.edu)  
Internet: [www.udel.edu/chem/johnston/](http://www.udel.edu/chem/johnston/)

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[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

---

**Butkiewicz, James L** <jimb@udel.edu>  
To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Tue, Feb 11, 2014 at 3:28 PM

Dear Del,

I approve of the continued listing of Economics courses for your programs.

Jim Butkiewicz

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]  
**Sent:** Thursday, February 06, 2014 6:36 PM  
**To:** Levia, Delphis F, JR  
**Subject:** Email approval requested for proposed program revisions by Feb 14th, please

Dear Colleague,

[Quoted text hidden]

[Quoted text hidden]

[Quoted text hidden]

[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

---

## Support for ENSC and ENVR programs

1 message

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**Moline, Mark Alan** <mmoline@udel.edu>  
To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Wed, Feb 12, 2014 at 10:58 AM

Dear Dr. Levia,

I would like to document the support of the School of Marine Science and Policy for the programmatic revisions of both the ENSC and ENVR programs. Both programs draw significantly from a broad set of courses offered in the School and uniquely integrate courses from other University units to offer students a strong curriculum in these growing interdisciplinary areas. Courses from SMSP that these two programs draw on include the following:

MAST 200 The Oceans

MAST 673 International Law (LEST 673, POSC 604)

MAST 663 Decision Tools for Policy Analysis

MAST 692 Environmental Values, Movements And  
Policy

MAST 620/POSC/UAPP 424/624 Energy Policy And  
Administration

MAST 670 United States Ocean And Coastal Policy

MAST 671 Coastal Processes And Management

MAST 462 Climate Change: Policy, Equity, and Mitigation

MAST 628 Offshore Wind Power: Science, Engineering & Policy

MAST 622 Conservation and Renewable Energy Policy

MAST 660 International and National Ocean Policies

MAST 482 Introduction to Ocean Science

MAST/GEOG 408 Radiative Transfer in Ocean & Atmosphere

MAST/GEOG 409 The Ocean and Climate Variation

MAST 427/627: Marine Biology

MAST 629: Topics in Marine Ecology

MAST 402/902 Introduction to Physical Ocean Science

MAST/GEOG 408 Radiative Transfer in Ocean & Atmosphere

MAST 421/621 Coastal Field Biology

MAST 427/627 Marine Biology

MAST 437/637 Geological Oceanography

MAST 441 Algal Ecological Physiology

MAST 442 Coral Reef Ecology

MAST 451/651 Marine Invertebrate Diversity

MAST 630 Ichthyology

MAST 646 Chemical Oceanography

Representing the faculty of the School, we are fully supportive of formalizing these programs and look forward to continued interaction with these students.

Regards,

Mark

Mark A. Moline, Director

School of Marine Science and Policy

College of Earth, Ocean, and Environment

University of Delaware

700 Pilottown Road

Lewes, DE 19958

(302) 645-4263

[mmoline@udel.edu](mailto:mmoline@udel.edu)



Delphis Levia <dlevia@udel.edu>

---

## Email approval requested for proposed program revisions by Feb 14th, please

---

**Watson, George H.** <ghw@art-sci.udel.edu>

Thu, Feb 13, 2014 at 5:34 PM

To: Delphis Levia <dlevia@udel.edu>

Cc: "'Ardis, Ann' (aardis@UDeL.Edu)" <aardis@udel.edu>, "Wilson, David C." <dcwilson@art-sci.udel.edu>, "Doren, Douglas J." <doren@art-sci.udel.edu>, "Shenkle, Cynthia W." <cshenkle@art-sci.udel.edu>

This looks fine to us, Del.

George Watson

Dean, College of Arts & Sciences

**From:** Delphis Levia [mailto:dlevia@udel.edu]

**Sent:** Thursday, February 06, 2014 6:36 PM

**To:** Delphis Levia

**Subject:** Email approval requested for proposed program revisions by Feb 14th, please

Dear Colleague,

[Quoted text hidden]

[Quoted text hidden]

[Quoted text hidden]

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### 2 attachments



**FINAL\_BS\_ENSC\_ProgRev\_6Feb14.pdf**

79K



**FINAL\_BA\_ENVR\_ProgRev\_6Feb14.pdf**

41K



Delphis Levia <dlevia@udel.edu>

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## Approval for ENSC and ENVR program revisions

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**Aristigueta, Maria P** <mariaa@udel.edu>  
To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Fri, Feb 14, 2014 at 5:04 PM

Delphis, I approve the courses from our School with one change. UAPP 604 Leadership should be UAPP 697 Leading Organizations in Public and Nonprofit Sectors. The other changes are all fine.

Thanks and best wishes, Maria

Maria P. Aristigueta

Director, School of Public Policy and Administration

Charles P. Messick Professor of Public Administration

Vice President, American Society for Public Administration

[\(302\) 831-4570](tel:(302)831-4570)

[www.sppa.udel.edu](http://www.sppa.udel.edu)

<http://www.ipa.udel.edu/directory/homepages/aristigueta.html>

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]  
**Sent:** Friday, February 14, 2014 4:57 PM  
**To:** Aristigueta, Maria P  
**Subject:** Re: Approval for ENSC and ENVR program revisions

[Quoted text hidden]





Delphis Levia <dlevia@udel.edu>

---

## Email approval requested for proposed program revisions by Feb 14th, please

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**Advani, Suresh G** <advani@udel.edu>

Sun, Feb 16, 2014 at 6:45 AM

To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Cc: "Keefe, Michael" <keefe@udel.edu>

It won't have an impact on ME so I approve

Sent from my iPhone

[Quoted text hidden]

| <FINAL\_BS\_ENSC\_ProgRev\_15Feb14.pdf>

| <FINAL\_BA\_ENVR\_ProgRev\_15Feb14.pdf>



Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

---

**Barner, Kenneth E.** <barner@udel.edu>

Sun, Feb 16, 2014 at 9:24 PM

To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Cc: "Shenton, Tripp" <shenton@udel.edu>, "Boncelet, Charles, JR" <boncelet@udel.edu>, "Goossen, Keith W" <goossen@udel.edu>

Levia:

ECE approves the inclusion of the ECE courses listed below.

One minor point should be addressed, however. In the PDF attachments, reference is made to ELEG 467/667 Low Power Electronics and Lighting. We have not developed that course to date and do not expect to offer it in the foreseeable future.

Ken

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]

**Sent:** Saturday, February 15, 2014 1:54 PM

**To:** Shenton, Tripp; Barner, Kenneth E.; Advani, Suresh G; Lenhoff, Abraham M; Martin, David C.

**Cc:** Ogunnaike, Babatunde A.; Imhoff, Paul T.

**Subject:** Re: FW: Email approval requested for proposed program revisions by Feb 14th, please

[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

---

## Email approval requested for proposed program revisions by Feb 14th, please

---

Delphis Levia <dlevia@udel.edu>

Sun, Feb 16, 2014 at 9:33 PM

To: "Barner, Kenneth E." <barner@udel.edu>

Cc: "Shenton, Tripp" <shenton@udel.edu>, "Boncelet, Charles, JR" <boncelet@udel.edu>, "Goossen, Keith W" <goossen@udel.edu>

Thank you, Ken. I appreciate your affirmative and quick response. ELEG 467/667 is not listed in the proposed programmatic revision (on the right side) so we'll be all set. It is only listed on the left side and those courses would no longer be in effect once the revision is approved.

Thanks,  
Del Levia

---

Delphis F. Levia, Ph.D.

Professor of Ecohydrology

Director, Environmental Science & Environmental Studies

University of Delaware, Newark, DE 19716-2541, USA

Series Editor, Ecological Studies- Analysis and Synthesis (Springer-Verlag)

Skype: del.levia; Tel: (302) 831-3218; Fax: (302) 831-6654

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Delphis Levia &lt;dlevia@udel.edu&gt;

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**Email approval requested for proposed program revisions by Feb 14th, please**

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**Martin, David C.** <milty@udel.edu>

Mon, Feb 17, 2014 at 8:54 AM

To: "Levia, Delphis F, JR" &lt;dlevia@udel.edu&gt;

Cc: "Shenton, Tripp" &lt;shenton@udel.edu&gt;, "Barner, Kenneth E." &lt;barner@udel.edu&gt;, "Advani, Suresh G"

&lt;advani@udel.edu&gt;, "Lenhoff, Abraham M" &lt;lenhoff@udel.edu&gt;, "Ogunnaike, Babatunde A." &lt;ogunnaik@udel.edu&gt;,

"Imhoff, Paul T." &lt;imhoff@udel.edu&gt;

This is fine with me...

David C. Martin, Ph.D.  
Karl W. and Renate Böer Professor and Chair  
Materials Science and Engineering  
Professor of Biomedical Engineering  
The University of Delaware  
201C DuPont Hall  
Newark, DE 19716  
(302) 831-2062 Office  
(734) 276-0409 Mobile  
(508) 256-8352 FAX  
miltydcm Skype  
Google Scholar: <http://tinyurl.com/98geuvt>  
<http://www.mseg.udel.edu>  
<http://cubic.mseg.udel.edu>  
<http://udel.edu/~milty>  
[milty@udel.edu](mailto:milty@udel.edu)

On Feb 15, 2014, at 1:53 PM, Delphis Levia &lt;dlevia@udel.edu&gt; wrote:

[Quoted text hidden]

&lt;FINAL\_BS\_ENSC\_ProgRev\_15Feb14.pdf&gt;&lt;FINAL\_BA\_ENVR\_ProgRev\_15Feb14.pdf&gt;



Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

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**Shenton, Tripp** <shenton@udel.edu>

Mon, Feb 17, 2014 at 9:31 AM

To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Cc: "Ogunnaike, Babatunde A." <ogunnaik@udel.edu>, "Imhoff, Paul T." <imhoff@udel.edu>, "Barner, Kenneth E." <barner@udel.edu>, "Advani, Suresh G" <advani@udel.edu>, "Lenhoff, Abraham M" <lenhoff@udel.edu>, "Martin, David C." <milty@udel.edu>

Approved

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](mailto:shenton@udel.edu)

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]

**Sent:** Saturday, February 15, 2014 1:54 PM

**To:** Shenton, Tripp; Barner, Kenneth E.; Advani, Suresh G; Lenhoff, Abraham M; Martin, David C.

**Cc:** Ogunnaike, Babatunde A.; Imhoff, Paul T.

**Subject:** Re: FW: Email approval requested for proposed program revisions by Feb 14th, please

[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

---

## Email approval requested for proposed program revisions by Feb 14th, please

---

**A. M. Lenhoff** <lenhoff@udel.edu>

Mon, Feb 17, 2014 at 9:40 AM

To: Delphis Levia <dlevia@udel.edu>

Dear Dr. Levia,

CHEG has a relatively small footprint in the proposed program, via a few courses listed as electives (CHEG 616, 625, 667). I should note that the 667 course listed will be up for receiving a permanent course number this year and so the designation will change at that point. I will also add, as noted in your documents, that some of the courses have prerequisites that may raise the bar somewhat for interested students. Beyond this, however, these are elective courses that can in general accommodate small numbers of additional students. (CHEG 625 has been quite crowded in recent years, and there have been occasions where we have had to limit enrollment.)

Given this context, we have no objections to your listing the courses as appropriate electives.

Regards,  
Bramie Lenhoff  
[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

---

## Email approval requested for proposed program revisions by Feb 14th, please

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**Ogunnaike, Babatunde A.** <ogunnaik@udel.edu>

Mon, Feb 17, 2014 at 4:33 PM

To: "Levia, Delphis F, JR" <dlevia@udel.edu>

You have my approval.

Babatunde A. Ogunnaike

William L. Friend Chaired Professor of Chemical Engineering

Dean, College of Engineering

University of Delaware,

Newark, DE 19716

302-831-8017

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]

**Sent:** Monday, February 17, 2014 3:55 PM

**To:** Ogunnaike, Babatunde A.

**Subject:** Re: Email approval requested for proposed program revisions by Feb 14th, please

Dear Dean Ogunnaike,

All of the COE departmental chairs [CIEG, ELEG, MEEG, MSEG, CHEG] have now given support for the proposed environmental science and studies programmatic revisions. Thank you. If it is possible, and you wish to send an email approval as well, it would also be greatly appreciated. Thank you.

Kind regards,

Del Levia

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Delphis F. Levia, Ph.D.

Professor of Ecohydrology

Director, Environmental Science & Environmental Studies

University of Delaware, Newark, DE 19716-2541, USA

Series Editor, Ecological Studies- Analysis and Synthesis (Springer-Verlag)

Skype: del.levia; Tel: (302) 831-3218; Fax: (302) 831-6654

On Mon, Feb 17, 2014 at 9:40 AM, A. M. Lenhoff <[lenhoff@udel.edu](mailto:lenhoff@udel.edu)> wrote:



Delphis Levia <dlevia@udel.edu>

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## Email approval requested for proposed program revisions by Feb 14th, please

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**Bauer, Gretchen M** <gbauer@udel.edu>  
To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Tue, Feb 18, 2014 at 9:26 AM

Dear Del, the department of political science and international relations is pleased to support and participate in the Environmental Science and Environmental Studies degree programs, including the revisions that you have proposed.

Gretchen Bauer

Professor and Chair

Political Science and IR

University of Delaware

302 831 2357

[www.udel.edu/poscir](http://www.udel.edu/poscir)

**From:** Delphis Levia [mailto:[dlevia@udel.edu](mailto:dlevia@udel.edu)]

**Sent:** Thursday, February 06, 2014 6:36 PM

**To:** Levia, Delphis F, JR

**Subject:** Email approval requested for proposed program revisions by Feb 14th, please

[Quoted text hidden]





Delphis Levia <dlevia@udel.edu>

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## Geological Sciences supports the revised ENSC and ENVR program

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James Pizzuto <pizzuto@udel.edu>

Tue, Feb 18, 2014 at 5:18 PM

To: Delphis Levia <dlevia@udel.edu>, James Pizzuto <pizzuto@udel.edu>

I am happy to report that our faculty voted today to approve the proposed revisions to the ENSC and ENVR programs. We look forward to working with you to successfully implement the new program.

Best,

--

Jim Pizzuto  
Professor and Interim Chair  
Dept. of Geological Sciences  
101 Penny Hall  
255 Academy Street  
University of Delaware  
Newark, DE 19716  
[302-831-2710](tel:302-831-2710)  
[pizzuto@udel.edu](mailto:pizzuto@udel.edu)



Delphis Levia <dlevia@udel.edu>

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## Changes to Environmental Studies Major

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**Awokuse, Titus O** <kuse@udel.edu>

Tue, Feb 18, 2014 at 7:39 PM

To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Yes; I also support the use of APEC courses listed in the BS in environmental science degree.

Thanks.

Titus Awokuse

Professor and Chair  
Dept. of Applied Economics & Statistics  
213 Townsend Hall  
University of Delaware  
Newark, DE 19716  
Phone: 302-831-1323

----- Original message -----

From: Delphis Levia

Date: 02/18/2014 7:36 PM (GMT-05:00)

To: "Awokuse, Titus O"

[Quoted text hidden]



Delphis Levia <dlevia@udel.edu>

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## Request for email approval for use of a few ENEP classes in program revisions

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John Byrne <jbbyrne@udel.edu>

Wed, Feb 19, 2014 at 6:24 PM

To: Delphis Levia <dlevia@udel.edu>, Syed Shah <ismat@udel.edu>

Cc: Lisa Schulz <lschulz@udel.edu>

Dear Del,

I give my email approval for the programmatic changes in both environmental science (with the theme name change stated) and environmental studies.

Regards,  
JB

---

John Byrne, Director and  
Distinguished Professor of  
Energy and Climate Policy                      Phone: (302) 831-8405  
Center for Energy &                                      FAX: (302) 831-3098  
Environmental Policy  
University of Delaware                              Website: <http://ceep.udel.edu/>  
Newark, DE 19716-7301 USA                      Biosketch: <http://ceep.udel.edu/Bios/Byrne.pdf>

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On Wed, Feb 19, 2014 at 3:45 PM, Delphis Levia <dlevia@udel.edu> wrote:

Dear JB (and Lisa),

I am happy to report that the Council supports the name change of the theme from "Sustainable Energy" to "Energy and Environment". I know that you liked this renaming as well, JB, based on our telephone conversation. I agree that this will lead to less confusion among students.

JB, I now ask for a quick email approval for the programmatic changes in both environmental science (with the theme name change as stated above) and environmental studies. I am thrilled we were able to resolve this to everyone's satisfaction so quickly.

Cheers,  
Del

---

Delphis F. Levia, Ph.D.  
Professor of Ecohydrology  
Director, Environmental Science & Environmental Studies  
University of Delaware, Newark, DE 19716-2541, USA  
Series Editor, Ecological Studies- Analysis and Synthesis (Springer-Verlag)  
Skype: del.levia; Tel: (302) 831-3218; Fax: (302) 831-6654

On Wed, Feb 19, 2014 at 8:17 AM, Delphis Levia <dlevia@udel.edu> wrote:

Thanks.

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## Department of Geography

COLLEGE OF EARTH, OCEAN AND  
ENVIRONMENT

University of Delaware  
Newark, Delaware 19716-2541  
*Ph:* 302/831-2294/2295  
*Fax:* 302/831-6654

20 February 2014

MEMO TO: Del Levia  
Director of Environmental Science & Studies Program

MEMO FROM: Tracy DeLiberty  
Chair of Geography

On behalf of Geography Department, we are pleased to support the revisions to the Environmental Science and Studies Programs. Changes in the core provide students with additional breadth and the themes are more appropriately aligned with fields of employment. Moreover, the changes are in line with the external program review.

Our Department will support the revisions in a number of ways. Our faculty will continue to serve as advisors and mentors, and we will offer the geography core and concentration courses as needed given our faculty resources.



Delphis Levia <dlevia@udel.edu>

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## Mtg request

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**Bowman, Jacob L** <jlbowman@udel.edu>  
To: "Levia, Delphis F, JR" <dlevia@udel.edu>

Thu, Feb 20, 2014 at 1:58 PM

Del,

You have my full approve.

Take care,  
Jake

Sent from my iPhone

On Feb 20, 2014, at 1:40 PM, "Delphis Levia" <dlevia@udel.edu> wrote:

Jake,

Given the below, I would like your full approval now so I can finish this paperwork.

I am okay with the change of the theme description. Good catch. I changed one word. Now reads: "**Theme in Ecoscience** focuses on studying the nature of ecosystems as well as the interaction of organisms with their physical and biological environment. Courses cover the breadth of ecoscience. Students interested in studying ecoscience with an emphasis on the physical environment would best fit this theme. Graduates from the theme in Ecoscience should be prepared to gain employment as environmental scientists or seek graduate education in Environmental Science."

*With regard to your final point, there will still be an Environmental Council. It is the intent to have faculty from all participating colleges on the Council. This is a plus and benefits students.*

Thanks for all your help,  
Del

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Delphis F. Levia, Ph.D.  
Professor of Ecohydrology  
Director, Environmental Science & Environmental Studies  
University of Delaware, Newark, DE 19716-2541, USA  
Series Editor, Ecological Studies- Analysis and Synthesis (Springer-Verlag)  
Skype: del.levia; Tel: (302) 831-3218; Fax: (302) 831-6654

On Thu, Feb 20, 2014 at 12:16 PM, Bowman, Jacob L <jlbowman@udel.edu> wrote:

Del,

My department approves of the Ecoscience theme under the Environmental Science degree. We also approve of the courses listed for the major and theme. The number for landscape ecology is ENWC820. We also approve of listing ENWC413 under the Environmental Studies degree.

## Appendix A

### Strategic Programmatic Assessment

Prepared by

Dr. Shirely Vincent, National Council of Science and the  
Environment (NSCE)

Expert on interdisciplinary environmental education

Appendix A is included as a separate file  
since it is a secured document.