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: Steven Dentel phone number x-8120

Department: Civil & Environmental Engineering email address dentel@udel.edu

Action: Add a Minor in Environmental Sustainability
(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 13F
(use format 04F, 05W)

Current degree n/a
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

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

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

Revising or Deleting:

Undergraduate major / Concentration:
(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")

Two new courses are required for the proposed minor:

1) CIEG 445/645 Industrial Ecology: The Science of Environmental Sustainability (previously taught as experimental; is in the course inventory approval process to make permanent).
2) CIEG 439 Public Health and Biosustainability (taught previously as experimental; is in the course inventory approval process to make permanent).

These are two of the three "core" courses within the minor, encompassing its central themes. They have both been previously taught, and are incorporated into plans for faculty teaching loads in CIEG.

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

The proposed Minor in Environmental Sustainability supports the following goals of undergraduate education:

1. Attain effective skills in oral and written communication, quantitative reasoning, and the use of information technology.

The important contribution to this goal is in integrating the skills of communication and quantitative reasoning, in order to incorporate qualitative sustainability goals into an engineering process.

2. Learn to think critically to solve problems.

Many of the problems posed in these courses will be "open ended" with no single solution, challenging students to consider environmental, social, and political implications of sustainable engineering development. For most students this will be a new, fundamentally different perspective from which to approach the problems facing the engineering profession.

4. Engage questions of ethics and recognize responsibilities to self, community, and society.

Responsibilities to community and society form the basis of sustainability, as the sustainability principles require engineers to consider the impact of development on the environment, community, and society – both in the present and in the future.

7. Develop the ability to integrate academic knowledge with experiences that extend the boundaries of the classroom.

Environmental sustainability requires "real-world" engineering that considers environmental and cultural impacts of technology. Particularly in developing world applications, case histories will be used to illustrate this.

10. Develop an international perspective in order to live and work effectively in an increasingly global society.

Two of the three core courses focus on international environmental issues, and student will take at least one of these. The core course CIEG465 is informally related to the Engineers Without Borders student organization and assists those students in formulating engineering solutions that they will then implement in the differing economic and cultural realms of the developing world. Several of the elective courses for this minor also address the economic, resource, and social needs of developing nations.

Identify other units affected by the proposed changes:

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

Mechanical Engineering, Energy and Environmental Policy, Bioresource Engineering, Marine Science and Policy, Geography, Business Administration, Sociology, Political Science, Economics, Applied Economics and Statistics

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

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

The objective of this minor is to provide basic knowledge and skills required in balancing technological development and environmental impacts, so that sustainability can be methodically defined and attained. Students will have the opportunity to:

- Assess sustainability using tools such as life cycle analysis, risk assessment, and the triple bottom line of economic, environmental, and societal effects;
- Recognize and specify engineering solutions to resource, pollution, and sanitation problems that are in harmony with local cultures;
- Relate environmental issues to local political, societal, and economic factors to provide a proper context for sustainable solutions; and
- Evaluate and compare "appropriate technologies" and other sustainable solutions across global boundaries.

The minor is available to all majors, although the courses that have been selected will require additional prerequisites for those in some majors. In practice, the minor should mainly appeal to undergraduates majoring in environmental, mechanical, chemical, and civil engineering. This estimate is based on current student enrollment in the Engineers Without Borders student organization and in CIEG 465. Availability of this minor, along with other sustainability minors, will further commit us to UD's Initiative for the Planet and its role as The Engaged University.

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.)

To receive a minor in Environmental Sustainability the student must complete a total of 15 credits in accordance with the requirements specified below. Before beginning these courses, the student must meet the required course prerequisites. A minimum grade of C- must be achieved in each course qualifying for the minor. The student must take:

Two (6 credits or more) of the following core courses:

- CIEG465 Engineers Without Borders
- CIEG445 Industrial Ecology (pending course approval)
- CIEG439 Public Health and Biosustainability (pending course approval)

One of the following pollution control technology courses

- CIEG433 Hazardous Waste Management
- CIEG436 Processing, Recycling, and Management of Solid Wastes
- CIEG438 Water and Wastewater Engineering
- BREG424 Water Supply and Water Treatment Systems

Two of the following sustainability-related breadth courses

- BUAD429 Selected Topics in Management: Sustainability and Green Business
- ECON311 Economics of Developing Countries
- ENEP410 Political Economy of Environment
- GEOG320 Water and Society
- GEOG422 Resources, Development, and the Environment
- PHIL448 Environmental Ethics
- POSC311 Politics of Developing Nations

- SOCI471 Disasters, Vulnerability, and the Environment
- MAST676 Environmental Economics
- POSC350 Politics and the Environment
- FREC343 Environmental Economics

Recommended prerequisites: To be accepted into the minor, the student is recommended to have completed an introductory course in mass and energy balances such as CHEG112, CIEG233, or MEEG331.

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

Department Chairperson _____ Date _____

Dean of College _____ Date _____

Chairperson, College Curriculum Committee _____ Date _____

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