THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM PROPOSAL

DIRECTIONS:

- Provide one form with original approval signatures in lines 1 - 4 for each proposed action. Keep this form to one page in length.
- Early consultation with the Office of the Associate Provost for Academic Planning & Programs is strongly recommended if there are questions or concerns, particularly with new programs.
- Please submit the signed form to Claudia Rector, Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.
- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.

DATE SUBMITTED: October 5, 2007

PCC LOG NO. 06036

COLLEGE/SCHOOL: College of Agriculture and Natural Resources

DEPARTMENT/PROGRAM: Department of Environmental Science and Technology

PROPOSED ACTION (*A separate form for each*) ADD__X___ DELETE_____ CHANGE_____

DESCRIPTION (*Provide a succinct account of the proposed action. Details should be provided in an attachment. Provide **old** and **new** sample programs for curriculum changes.*)

Establish a Bachelor of Science undergraduate program called Environmental Science and Technology, which will reside in the newly formed department of Environmental Science and Technology. The proposed Bachelor of Science program will consist of four concentrations: 1) Ecological Technology Design; 2) Environmental Health; 3) Soil and Watershed Science; and 4) Natural Resources Management.

JUSTIFICATION/REASONS/RESOURCES (*Briefly explain the reason for the proposed action. Identify the source of new resources that may be required. Details should be provided in an attachment.*)

The reason for this proposed action is the establishment of a new undergraduate program within the newly formed Department of Environmental Science and Technology. The source of new resources will be a combination of reallocation of resources from within the Department (Chair, ENST), the College (Dean, Agriculture and Natural Resources) and the College Park Campus (Provost, UMCP).

APPROVAL SIGNATURES - ***Please print name, sign, and date***

1. Department Committee Chair Andrew H. Baldwin Andrew H. Baldwin 10/5/2007
2. Department Chair FRANK J. COALE 10/05/07
3. College/School PCC Chair Mark A Varner 10/8/07
4. Dean 10-10-07
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC _____
7. Chair of Senate _____
8. Vice President for Academic Affairs & Provost _____

PROPOSAL FOR
NEW INSTRUCTIONAL PROGRAM
UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND

UNDERGRADUATE PROGRAM
IN
ENVIRONMENTAL SCIENCE AND TECHNOLOGY

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

DEAN: CHENG-I WEI

Award to Be Offered: B.S. Degree

Proposed initiation Date: Fall 2008

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PROPOSAL FOR
NEW UNDERGRADUATE PROGRAM
ENVIRONMENTAL SCIENCE AND TECHNOLOGY (ENST)

SUMMARY

In 2006 there was a major reorganization within the College of Agriculture and Natural Resources. Faculty from two former departments joined together to form a new entity, the Department of Environmental Science and Technology. Implementation of the undergraduate curriculum in Environmental Science and Technology described in this proposal is the logical next step resulting from this reorganization. Specifically, within this document we propose to create a new undergraduate program (i.e., major) called Environmental Science and Technology (ENST) with concentrations in: 1. Ecological Technology Design; 2. Environmental Health; 3. Soil and Watershed Science; and 4. Natural Resources Management. The ENST program will be the undergraduate program offered by the faculty of the Department of Environmental Science and Technology, who have interest and expertise in the areas related to these concentrations. The formation of the new department and implementation of this new ENST curriculum are consistent with the evolving mission of the College of Agriculture and Natural Resources to expand teaching, research, and extension programs in natural resources and the environment.

I. OVERVIEW AND RATIONALE

BACKGROUND

As the global population continues to rise and developing countries increase their industrial and economic status, the natural environment is in many ways moving from a boundless resource to be exploited toward a critical support system for human welfare and creativity. Furthermore, the crucial services provided by ecosystems, such as clean air and water, floodwater storage, and nutrient processing, have only recently become a major area of focus for environmental research. As human activities continue to alter the environment, increasingly the environment is likely to affect humans, not only in terms of food, materials, and energy shortages, but also via ecologically driven, socioeconomically catastrophic processes such as proliferation of disease vectors, soil desertification and salinization, food web transmission of toxins, and climate change. University graduates will increasingly be called upon to investigate environmental problems and to design solutions that manage, mitigate, or reverse ecological impacts.

The formation of the Department of Environmental Science and Technology at the University of Maryland presents a unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions. The bringing together of faculty with expertise in soil science, ecology, and biological engineering in this new department sets the stage for unique, relevant, and attractive courses and academic programs that not only train students to understand environmental systems and issues, but also gives them the multidisciplinary quantitative design and analytical tools to solve complex environmental problems.

PROPOSED STRUCTURE OF THE ENST PROGRAM

The ENST undergraduate program will consist of a single major (ENST) with four concentrations (Figure 1). Two of the concentrations do not exist in any form at University of Maryland: 1) Ecological Technology Design and 2) Environmental Health. The other two concentrations, Soil and Watershed Science and Natural Resources Management, exist already within the Department of Environmental Science & Technology (as the NRSC concentration in Conservation of Soil, Water and Environment and the NRMT program). These existing curricula will be modified slightly to complement the two entirely new concentrations (see Appendix A). All four concentrations will share the ENST numeric code (e.g., 9999) and be differentiated by subcodes (e.g., a, b, c, and d).

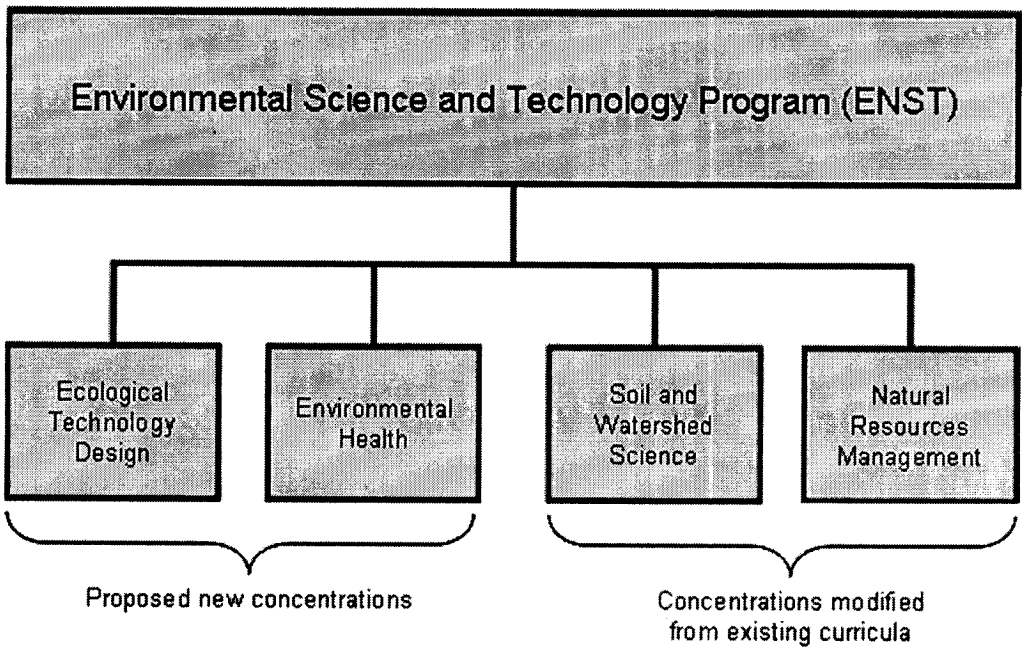

Fig. 1. Concentration areas in the proposed undergraduate program in Environmental Science and Technology (ENST). Two concentrations are entirely new (Environmental Health and Ecological Technology Design) and two are modifications of existing curricula (Soil and Watershed Science and Natural Resources Management).

STUDENT DEMAND FOR PROGRAMS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

A market survey was conducted to examine potential student demand for the new curriculum in ENST proposed here. Universities were identified that offered curricula in environmental science, environmental health, ecosystem health, ecological technology, ecological design, ecological engineering, and similar or related programs. Information on student enrollment was requested from each program, although not all programs responded. The

results from the market survey are presented in Appendix B. Curricula related to soil and watershed science and natural resources management were not specifically investigated in the survey because these programs are already established at the University of Maryland. Nonetheless, a number of universities identified in the survey also offer curricula in these areas.

The market survey indicates that demand for programs in environmental science and technology-related fields is high, and that respected institutions offer programs comparable to the ENST concentrations proposed here. These include University of California-Davis, Ohio State University, University of Florida, University of Vermont, Purdue University, and University of Washington (Appendix B). General undergraduate environmental sciences programs are common, and can attain high student enrollment. For example, University of California Davis offers an environmental science major that serves 600 undergraduate students. A subset of Universities offers only graduate programs in ecological technology design or environmental health (e.g., Johns Hopkins University, UC-Berkley, University of Georgia, University of Michigan), and several currently offer or are developing undergraduate programs in these areas (e.g., Ohio State University, University of Washington, University of Florida, University of Vermont, and Purdue University). Enrollments in these undergraduate programs are smaller than those for general environmental sciences programs, as might be expected. For example, the undergraduate Environmental Health major at University of Washington and the University of Florida undergraduate program in systems ecology and ecological engineering each have an enrollment of about 60 students.

Based on this survey, we anticipate that initially the ENST concentrations in Environmental Health and Ecological Technology Design together will attract about 30 new students, grow at a slower rate for the next 4-5 years, and level off at about 105 students. These students will join the approximately 35 students that are currently enrolled in other programs in the Department of Environmental Science and Technology (NRMT and NRSC), resulting in a total of 140 students in all departmental programs. The whole-department projections are the basis for the numbers of full-time students listed in the "Resources" table on p. 30.

In addition to students interested in environmental careers, the proposed ENST curriculum may be attractive to students interested in pursuing professional schools (e.g., medical school, dental school, veterinary school). The ENST program will provide an alternative to traditional programs in life sciences that support many pre-professional students, relieving the burden on these heavily enrolled programs, and offering students a comparatively unique environmental perspective that will serve them well in their professional careers.

JOB OPPORTUNITIES FOR GRADUATES

The positive projections of program growth given above are supported by ample job opportunities for students graduating from the new ENST concentrations. A list of occupations and employers for which program graduates will be well-qualified is included in Appendix C. These lists were generated from the market survey and based on past experience with our existing undergraduate programs. Private consulting firms, state and federal environmental agencies, manufacturing and petrochemical industries, research laboratories, and other employers are in need of qualified graduates with quantitative and qualitative skills in ecological, technological, and health areas. Positions are available for work in ecological restoration, energy analysis, soil science, stormwater management, sustainable agriculture, wetland science,

ecological risk assessment, environmental toxicology, industrial hygiene, public health management, and other occupations (see Appendix C).

RELATIONSHIP OF ENST TO ENSP

The Environmental Science and Policy program is currently and will remain a multi-college program, administratively housed within the Department of Environmental Science and Technology but functioning independently of other academic programs within the department. Specifically, ENSP has its own office in Symons Hall, separate from ENST facilities, staffed by a Director (Dr. Bruce James, an ENST faculty member), Associate Director, and Student Affairs Coordinator. Department faculty support ENSP by teaching ENST courses, and by advising students in three specialty areas of ENSP: Soil, Water, and Land Resources; Environmental Restoration and Management; and Wildlife Ecology and Management. The ENSP program will continue to serve the greater University of Maryland student community by offering academic programs advised in four separate colleges. A letter of support for the proposed ENST undergraduate program from the Director of ENSP is included in Appendix D.

The proposed undergraduate program in Environmental Science and Technology (ENST) differs from the existing ENSP program in many ways, including both curriculum content and structure, and program organization and management (Table 1).

Curriculum content and structure

In terms of curriculum content, the proposed ENST program contains four focused and complementary concentration areas that were selected to integrate management of natural ecosystems (Natural Resources Management), environmental quality of soils and watersheds (Soil and Watershed Science), human-environment interactions (Environmental Health), and designing ecosystem solutions to environmental problems to benefit human societies (Ecological Technology Design). In contrast, the ENSP concentrations vary widely, encompassing a broad array of science and socioeconomic disciplines including biology, geography, policy, geology, politics, government, agriculture, economics, and sociology. Two of the proposed ENST concentrations (Ecological Technology Design and Environmental Health) are not represented in the ENSP program. The ENSP concentrations in Soil, Water, & Land Resources and Wildlife Ecology & Management were developed and are advised by faculty in the Department of Environmental Science and Technology, and so not surprisingly share elements with the ENST concentrations Soil and Watershed Science and Natural Resources Management.

There is precedence for other departments to offer their own majors but also offer ENSP concentrations having similar or related content. For example: the Department of Agriculture and Resource Economics offers a concentration in "Environment and Resource Policy" as well as an ENSP concentration in "Environmental Economics"; the Government and Politics department offers a major of the same name, plus an ENSP concentration called "Politics and Policy"; the Biological Sciences program offers a "Biological Sciences" major as well as an ENSP concentration in "Biodiversity and Conservation Biology"; and the Sociology Department offers a "Sociology" major and an ENSP concentration in "Society and Environmental Issues".

The program core (courses that all students are required to take) of the two programs also differs strongly between the ENST and ENSP programs (Table 1). The ENST core is tightly focused around the four concentrations, and includes six ENST courses and seven basic science

and math courses. In contrast, the ENSP core only includes three ENSP courses (two introductory courses and a capstone), one calculus and one statistics course, and five courses selected from six groups. The ENST program core also requires more "hard" science than the ENSP core, which requires only one biology or chemistry course and no physics.

As well as obvious curricular differences, there are also more subtle differences in the philosophy, general content, and human dimensions of the two programs. The ENST program seeks to teach students how to apply science and technology to solve environmental problems using a systems approach, while the ENSP program uses a cross-disciplinary approach to understand environmental issues and their relationship to policy, politics, and economics. In relating to humans, the ENST program also deals primarily with the science and technology of interactions of humans with the environment, while the ENSP program emphasizes the environmental aspects of the social sciences.

Program organization and management

The curricular differences between ENSP and ENST outlined above can be attributed in part to differences in the organizational structure and management between the programs. The four concentrations of the ENST program will be entirely within the Department of Environmental Science and Technology, and all students will be advised within the department. In contrast, ENSP is a multi-college, multi-department program developed by 20 departments in four colleges. Students in the 12 ENSP concentration areas are advised by faculty from the various departments that developed the respective concentration areas.

More significantly for curriculum development, the ENSP program does not develop and teach courses other than introductory, environmental law, and capstone courses (Table 1). The substantive courses that comprise and differentiate the 12 ENSP concentration areas are all developed and taught by the faculty from the 20 participating departments. Therefore, ENSP concentrations cannot exist unless there is a department that has the faculty and desire to participate in or develop ENSP concentrations.

Also important for curriculum structure is that the ENST courses in the program core and more than 30 elective courses in the ENST program are all developed and taught by department faculty based on their expertise and interests. The ENSP program, in contrast, is based on traditional disciplines (e.g., economics, biology, geography, etc.) drawn from course offerings developed by the various departments of four colleges described above.

Table 1. Differences between the proposed ENST undergraduate program and the existing ENSP program.

Attribute	ENST	ENSP
Curriculum content and structure		
Concentrations offered	• Ecological Technology Design • Environmental Health • Soil and Watershed Science • Natural Resources Management	• Biodiversity & Conservation Biology • Marine and Coastal Management • Earth Surface Processes • Environment & Agriculture • Environmental Economics • Environmental Restoration and Management* • Global Environmental Change • Land Use • Politics & Policy • Society & Environmental Issues • Soil, Water & Land Resources* • Wildlife Ecology & Management*
Concentration focus	Four focused and integrated concentration areas (soils and watersheds, ecological technology design, natural resources management, and environmental health)	Broad array of 12 concentration areas (spanning biology, geography, policy, geology, politics, government, agriculture, economics, and sociology)
Program core (courses required of all students)	Focused core: • six ENST core courses • at least four additional ENST courses • seven required courses in BIOL, CHEM, PHYS, MATH, and BIOM • total = at least 17 courses	Broad core: • three ENSP courses • one calculus and one statistics course • one course from each of 5 out of 6 groups (biology, chemistry, earth science, economics, geography, or government and politics) • total = 10 courses
Unique topic areas	Energy, ecotechnology, environmental health, natural resources management, watershed processes	Environmental ethics, law, politics, and policy, environmental economics, society-environment issues

Attribute	ENST	ENSP
Program philosophy and content	• Solving environmental problems • Application of technology and science • Systems approach	• Understanding environmental problems • Relationship to policy and economics • Cross-disciplinary approach
Human dimensions	Human-environment interactions	Social sciences
Program organization and management		
Organizational structure	Single-department program	Multi-college, multi-department program
Student advising	Students are advised within the Department of Environmental Science & Technology	Students are advised by 20 departments in four colleges (AGNR, BSOS, CLFS, CMPS)
Course development	Program core courses, capstone, and more than 30 elective courses are developed and taught by department faculty	Courses are not developed and taught by the ENSP program, other than two introductory courses (ENSP 101 and 102), Environmental Law (ENSP 399), and Capstone (ENSP 499)
Course content	Based on departmental faculty strengths and interests	Based on traditional disciplines but from multiple departments across four colleges

*ENSP concentrations developed and advised by faculty in the Department of Environmental Science and Technology

Helping Students Choose Between ENST and ENSP

Because both the ENST and ENSP programs contain the term "Environmental Science," students need to be clearly informed about the differences between the two programs. This is particularly true for incoming freshmen. To ensure clear differentiation between the programs, a simplified version of Table 1 will be posted on the ENST and ENSP websites, and provided to students interested in environmental science programs during initial inquiries and advising. Additionally, this table and supplementary materials will be provided to the College academic programs office. As necessary, the undergraduate coordinator of ENST and the director of ENSP will meet together with College academic programs staff to coordinate recruiting and advising efforts. The overarching goal is to offer the highest quality of diverse academic programs possible to students interested in environmental science.

LETTERS OF SUPPORT

Letters of support for the program, from administrators, are included in Appendix D. Letters of support for inclusion of non-ENST courses in the proposed curricula, from program coordinators, are included in Appendix E.

II. PROPOSED CURRICULA

In this section we first present a catalog description of the proposed ENST major, describe courses common to the four proposed concentrations, and identify courses unique to each concentration. This is followed by a detailed description of the four concentrations, including catalog descriptions, required and elective courses, four year plans, and benchmarks for each.

CATALOG DESCRIPTION OF PROPOSED ENST UNDERGRADUATE MAJOR

The Environmental Science and Technology major prepares students for graduate study and careers focusing on understanding the natural and built environments and resolving environmental problems and concerns for the benefit of humans and ecosystems. Specifically, the program encompasses impacts of human society on the natural environment, the effects of environmental conditions on humans and ecosystems, science-based management of ecosystems, watershed and soil-related processes related to environmental quality, and designing solutions to sustainably improve environmental quality of air, water, soil, and biological communities. The ENST major is a science- and math-based curriculum leading to a B.S. degree in Environmental Science and Technology with concentration in Ecological Technology Design, Environmental Health, Soil and Watershed Science, or Natural Resources Management. These concentrations share a foundation in science and mathematics and offer specialization through restricted and free electives. The group of courses required for the concentrations are designed to provide students with a fundamental understanding of environmental systems and issues and the multidisciplinary quantitative design and analytical tools necessary to solve complex environmental problems.

REQUIREMENTS COMMON TO ALL CONCENTRATIONS

The concentrations within the ENST undergraduate program will share a common set of courses (Table 2).

Table 2. Courses required for all ENST concentrations (46 credits).

Course Title		
Departmental Core (total = 19 credits)	*Number*	*Credits*
Fundamentals of Soil Science	ENST 200	4
Introduction to Environmental Health (NEW COURSE)	ENST 2XA[1]	3
Ecosystem Ecology (NEW COURSE)	ENST 3XA	4
Internship in Environmental Sci. & Tech.	ENST 389	3

Seminar in Environmental Sci. & Tech.	ENST 398	1
Capstone Practicum in Env. Sci. & Tech (NEW COURSE)	ENST 4XC	4
At least 12 additional credits of upper level ENST courses (300 or 400 level) are required to fulfill requirements or electives specific to each new concentration.		
Additional Required Courses (total = 27 credits)		
Principles of Biology I	BSCI 105	4
Principles of Biology II	BSCI 106	4
Fund. General Chemistry & Lab	CHEM 131/132	4
Organic Chemistry I & Lab	CHEM 231/232	4
Calculus I	MATH 140 [2]	4
Fundamentals of Physics I	PHYS 121 [3]	4
Introduction to Biometrics	BIOM 301	3

[1] Potential University CORE in Interdisciplinary and Emerging Issues (IE) area
[2] Environmental Health, Soil and Watershed Science, and Natural Resources Management will accept MATH 220
[3] PHYS 117 may be substituted with advisor approval

COURSES UNIQUE TO EACH CONCENTRATION

While the concentrations share a common core of classes, they also differ considerably in their required courses (Appendix F). The number credits unique to each concentration ranges from 25 to 34.

CONCENTRATION IN ECOLOGICAL TECHNOLOGY DESIGN

Catalog Description:

The ENST concentration in Ecological Technology Design prepares students for integrating natural systems with the built environment to solve environmental problems while achieving economic, ecological and social sustainability. The science and applications of using natural systems, processes and organisms to address environmental issues has evolved during the last few decades to a mature level whereby there are strong employment opportunities for graduates that are cross-educated in ecology and technology. Examples of eco-technological applications include restoration of urban and rural streams, creation of wastewater treatment wetlands, design of raingardens and bioretention systems for low-impact stormwater management, design of eco-industrial parks, life cycle assessment of products for improved environmental performance, bioremediation and phytoremediation of contaminated groundwater, ecological systems for by-product recovery, and filtration of contaminated air with bioreactors. The curriculum consists of a broad set of background courses in environmental science, electives in applications of Ecological Technology Design, and upper-level courses that synthesize the major. Hands-on design experience is included in required internship and practicum courses.

Curriculum:

TOTAL CREDITS REQUIRED FOR THE B.S., including the CORE General Education Program = 120 credits, including: **71-72** required major credits; **12** Technology and Ecosystem elective credits; **6-7** free elective credits; and **30** credits for CORE (including Introduction to Writing (3), Professional Writing (3), Humanities and Arts (9), Social Sciences and History (9), and Human Cultural Diversity (3). CORE Sciences and Mathematics (9) are satisfied by major required courses. CORE Advanced Studies are satisfied by ENST 4XC Capstone Practicum (4) and a non-ENST 300- or 400-level course (3)).

Science and Math Fundamentals Required (50 credits):

ENST 200	Fundamentals of Soil Science	4 credits
ENST 2XA	Introduction to Environmental Health (NEW COURSE)	3 credits
ENST 3XA	Ecosystem Ecology (NEW COURSE)	4 credits
ENST 389	Internship in Environmental Science & Technology	3 credits
ENST 398	Seminar in Environmental Science & Technology	1 credit
ENST 4XC	Capstone Practicum in Environmental Science & Technology (NEW COURSE)	4 credits
BSCI 105	Principles of Biology I	4 credits
BSCI 106	Principles of Biology II	4 credits
CHEM 131/132	Fund. General Chemistry & Lab	4 credits
CHEM 231/232	Organic Chemistry I & Lab	4 credits
MATH 140	Calculus I	4 credits
MATH 141	Calculus II	4 credits
PHYS 121	Fundamentals of Physics I	4 credits
BIOM 301	Introduction to Biometrics	3 credits

Depth (9 credits):

ENST 405	Energy and Environment	3 credits
ENST 4XB	Ecological Design (NEW COURSE)	3 credits
ENST 4XE	Ecological Economics (NEW COURSE)	3 credits

Computational Techniques (1 course—3-4 credits):

Choose 1 course from the list below – 3-4 credits:		
ENBE 381	Creative Design with CAD	3 credits
ENST 415 ***or*** GEOG 373	GIS Applications in Soil Science ***or*** Geographic Information Systems	4-3 credits
ENST 4XA	Ecosystem Simulation Modeling (NEW COURSE)	3 credits

Assessment and Measurement (1 course—3 credits):

Choose 1 course from the list below – 3 credits:		
ENST 3XD	Environmental Instrumentation (NEW COURSE)	3 credits
ENST 451**	Water Quality: Field and Lab Methods	3 credits
ENBE 462	Nonpoint Source Pollution Assessment Techniques	3 credits

Applications (2 courses—6 credits):

Choose 2 courses from the list below – 6 credits:		
ENST 4XD	Wetland Creation and Restoration (NEW COURSE)	3 credits

ENST 4XF	Stormwater Management (NEW COURSE)	3 credits
ENST 4XG	Industrial Ecology (NEW COURSE)	3 credits
ENST 4XH	Stream Restoration (NEW COURSE)	3 credits

Technology and Ecosystem Electives
Students will take approximately 6 credits each of Technology and Ecosystem courses as electives to tailor their program to their specific interests (total = 12 credits). Example courses include:

Technology Electives (at least 6 credits[1]):

ARCH 450	Introduction to Urban Planning	3 credits
ENST 4XD	Wetland Creation and Restoration (NEW COURSE)	3 credits
ENST 4XF	Stormwater Management (NEW COURSE)	3 credits
ENST 4XG	Industrial Ecology (NEW COURSE)	3 credits
ENST 4XH	Stream Restoration (NEW COURSE)	3 credits
ENST 441	Sustainable Agriculture	3 credits
ENST 417	Soil Hydrology and Physics	3 credits
ENST 420	Soil Physical Properties Lab	1 credit
ENST 421	Soil Chemistry	4 credits
ENST 423	Soil-Water Pollution	3 credits
ENST 425	Terrestrial Bioremediation	3 credits
ENST 442** ***or*** GEOG 372	Remote Sensing of Agriculture and Natural Resources ***or*** Remote Sensing	3 credits
ENST 499	Special Topics in Environmental Science and Technology	1-4 credits
GEOL 451	Groundwater	3 credits
GEOL 452	Watershed and Wetland Hydrology	3 credits
LARC 451	Sustainable Communities	3 credits

Ecosystem Electives (at least 6 credits[1]):

BSCI 362	Ecology of Marsh and Dune Vegetation	2 credits
BSCI 363	The Biology of Conservation and Extinction	3 credits
BSCI 373	Natural History of the Chesapeake Bay	3 credits
BSCI 464	Microbial Ecology	3 credits
BSCI 460/461	Plant Ecology & Lab	5 credits
ENST 314**	Biology and Management of Finfish	4 credits
ENST 3XC	Environmental Toxicology (NEW COURSE)	3 credits
ENST 422	Soil Microbiology	3 credits
ENST 430**	Wetland Soils	3 credits
ENST 444**	Restoration Ecology	3 credits
ENST 450**	Wetland Ecology	3 credits
ENST 451**	Water Quality: Field and Lab Analysis Methods	3 credits
ENST 460**	Principles of Wildlife Management	3 credits
ENST 461**	Urban Wildlife Management	3 credits
ENST 462**	Field Techniques in Wildlife Management	2 credits
ENST 479**	Tropical Ecology and Resource Management	1-6 credits

ENST 499	Special Topics in Environmental Science and Technology	1-4 credits
ENST 4XD	Wetland Creation and Restoration (NEW COURSE)	3 credits
ENST 4XI	Fisheries Sustainability and Env. Health (NEW COURSE)	3 credits
GEOG 331	Introduction to Human Dimensions of Global Change	3 credits
LARC 450	Environmental Resources	3 credits
PLSC 400	Environmental Plant Physiology	3 credits
PLSC 471	Forest Ecology	3 credits

[1] Courses satisfying restricted elective requirements can NOT count for Technology or Ecosystem electives. Also, Technology electives cannot be double-counted as Ecosystem electives, and vice-versa.

**Reflects recent course prefix or number modification.

Four Year Plan:

A four-year plan for the Ecological Technology Design concentration in ENST is presented in Appendix G.

Benchmarks:

Benchmarks indicative of progress in the Ecological Technology Design curriculum are listed in Appendix H.

CONCENTRATION IN ENVIRONMENTAL HEALTH

Catalog Description:

Environmental health is a broad and increasingly important field with wide ranging applications in the environmental science and public health fields. The field encompasses environmental factors and ecosystem functions that affect human health and the effects of human activities on the ecosystem products and services we depend on. Example topics within the field include ecological risk analysis, environmental toxicology, environmental impact assessment, chemical fate and transport, human health risk assessment, industrial hygiene, air quality, environmental microbiology, food safety and security, biodiversity and human health, and children's environmental health. The Environmental Health concentration within the Department of Environmental Science and Technology offers a science-based curriculum that includes advanced studies in ecosystem health and environmental protection and the impacts of environmental degradation on human health.

Curriculum:

TOTAL CREDITS REQUIRED FOR THE B.S., including the CORE General Education Program = 120 credits, including: **68-69** required major credits; **12** Ecosystem Health and Human Health elective credits; **9-10** free elective credits; and **30** credits for CORE (including Introduction to Writing (3), Professional Writing (3), Humanities and Arts (9), Social Sciences and History (9), and Human Cultural Diversity (3). CORE Sciences and Mathematics (9) are

satisfied by major required courses. CORE Advanced Studies are satisfied by ENST 4XC Capstone Practicum (4) and a non-ENST 300- or 400-level course (3)).

Science and Math Fundamentals Required (56-57 credits):

ENST 200	Fundamentals of Soil Science	4 credits
ENST 2XA	Introduction to Environmental Health (NEW COURSE)	3 credits
ENST 3XA	Ecosystem Ecology (NEW COURSE)	4 credits
ENST 389	Internship in Environmental Science & Technology	3 credits
ENST 398	Seminar in Environmental Science & Technology	1 credit
ENST 4XC	Capstone Practicum in Environmental Science & Technology (NEW COURSE)	4 credits
BSCI 105	Principles of Biology I	4 credits
BSCI 106	Principles of Biology II	4 credits
BSCI 207	Principles of Biology III	3 credits
BSCI 223	General Microbiology	4 credits
CHEM 131/132	Fund. General Chemistry & Lab	4 credits
CHEM 231/232	Organic Chemistry I & Lab	4 credits
CHEM 241/242	Organic Chemistry II & Lab	4 credits
MATH 140 ***or*** MATH 220	Calculus I ***or*** Elementary Calculus I	3-4 credits
PHYS 121 ***or*** PHYS 117	Fundamentals of Physics I ***or*** Introduction to Physics	4 credits
BIOM 301	Introduction to Biometrics	3 credits

Concentration Depth (12 credits):

ENST 3XB	Ecosystem Health and Protection (NEW COURSE)	3 credits
ENST 3XC	Environmental Toxicology (NEW COURSE)	3 credits
ENST 4XJ	Environmental Contaminants: Sources and Fate (NEW COURSE)	3 credits
ENST 4XK ***or*** ENST 4XL	Ecological Risk Assessment (NEW COURSE) ***or*** Human Health Risk Assessment (NEW COURSE)	3 credits

Ecosystem Health and Human Health Electives

Students will take approximately 6 credits each of Ecosystem Health and Human Health electives to tailor their program to their specific interests (total = 12 credits). Ecosystem Health electives cannot be double-counted as Human Health Electives, and vice-versa.

Ecosystem Health Electives (at least 6 credits):

ANSC 252	Introduction to the Diseases of Wildlife	3 credits
AOSC 200/201	Weather and Climate & Lab	4 credits
AOSC 434	Air Pollution	3 credits
BSCI 222	Principles of Genetics	4 credits
BSCI 230	Cell Biology and Physiology	4 credits

BSCI 366	Biodiversity Issues in Conservation Management	3 credits
BSCI 375	Biological Oceanography	3 credits
BSCI 447	General Endocrinology	3 credits
BSCI 467	Freshwater Biology	4 credits
BSCI 473	Marine Ecology	3 credits
CHEM 271/272	General Chemistry and Energetics & Bioanalytical Lab	4 credits
ENBE 462	Non-point Source Pollution Assessment Techniques	3 credits
ENST 314**	Biology and Management of Finfish	4 credits
ENST 413	Soil and Water Conservation	3 credits
ENST 415 ***or*** GEOG 373	GIS Applications in Soil Science ***or*** Geographic Information Systems	4-3 credits
ENST 421	Soil Chemistry	4 credits
ENST 422	Soil Microbiology	3 credits
ENST 423	Soil-Water Pollution	3 credits
ENST 425	Terrestrial Bioremediation	3 credits
ENST 430**	Wetland Soils	3 credits
ENST 440	Crops, Soils and Civilization	3 credits
ENST 441	Sustainable Agriculture	3 credits
ENST 442** ***or*** GEOG 372	Remote Sensing of Agriculture and Natural Resources ***or*** Remote Sensing	3 credits
ENST 444**	Restoration Ecology	3 credits
ENST 450**	Wetland Ecology	3 credits
ENST 451**	Water Quality: Field and Lab Analysis Methods	3 credits
ENST 454	Environmental Issues in Plant and Soil Sciences	3 credits
ENST 460**	Principles of Wildlife Management	3 credits
ENST 479**	Tropical Ecology and Resource Management	1-6 credits
ENST 499	Special Topics in Environmental Science and Technology	1-4 credits
ENST 4XI	Fisheries Sustainability and Env. Health (NEW COURSE)	3 credits
ENST 4XM	Aquatic Toxicology (NEW COURSE)	3 credits
GEOL 452	Watershed and Wetland Hydrology	3 credits
LARC 450	Environmental Resources	3 credits

Human Health Electives (at least 6 credits):

ANTH 262	Culture and Environment	3 credits
ANTH 410	Culture, Health and Community Development	3 credits
BSCI 201	Human Anatomy and Physiology I	4 credits
BSCI 202	Human Anatomy and Physiology II	4 credits
BSCI 230	Cell Biology and Physiology	4 credits
BSCI 417	Microbial Pathogenesis	3 credits
BSCI 425	Epidemiology and Public Health	3 credits
BSCI 437	General Virology	3 credits
BSCI 440	Mammalian Physiology	4 credits
BSCI 464	Microbial Ecology	3 credits
ENST 499	Special Topics in Environmental Science and Technology	1-4 credits
ENST 4XL	Human Health Risk Assessment (NEW COURSE)	3 credits

ENST 4XN	Emerging Environmental Threats (NEW COURSE)	3 credits
GEOG 331	Introduction to Human Dimensions of Global Change	3 credits
GEOG 431	Culture and Natural Resource Management	3 credits
HLTH 140	Personal and Community Health	3 credits
HLTH 230	Introduction to Health Behavior	3 credits
HLTH 371	Communicating Safety and Health	3 credits
HLTH 430	Health Education in the Workplace	3 credits
NFSC 430/434	Food Microbiology & Lab	5 credits

** Reflects recent course prefix or number modification.

Four Year Plan:

A four-year plan for the Environmental Health concentration in ENST is presented in Appendix G.

Benchmarks:

Benchmarks indicative of progress in the Environmental Health curriculum are listed in Appendix H.

CONCENTRATION IN SOIL AND WATERSHED SCIENCE

Catalog Description:

The Soil and Watershed Science concentration enables students to understand the complex ways in which aquatic and terrestrial ecosystems are influenced by soil properties and processes and land management decisions. The soil performs such critical ecological functions as supplying and purifying water, recycling wastes, nurturing plants, modifying the atmosphere by emitting or sequestering gases and particulates, providing habitat for the most diverse biological communities on Earth, and serving as a medium for human engineering projects.

The concentration in Soil and Watershed Science in ENST provides students with one of the top soil science programs in the nation. The curriculum prepares graduates for work in variety of careers addressing natural resource and environmental issues and provides a rigorous science background for those planning to pursue post-graduate degrees in environmental sciences, soil science, watershed processes, and related fields. Students graduating from this program will make valuable contributions to society as they pursue challenging careers critical to the protection of the environment. In addition to pursuing advanced degrees, graduates may work in both the private and public sectors performing such services as soil mapping, wetland delineation, land conservation planning, forestry, waste management, farm advising, international development, and consulting in environmental, construction, and landscape architecture areas. Graduates from the Soil and Watershed Science concentration will be qualified to take the national exam to become a Certified Professional Soil Scientist (CPSS).

Curriculum:

TOTAL CREDITS REQUIRED FOR THE B.S., including the CORE General Education Program = 120 credits, including: **82-84** required major credits; **6-8** free elective credits; and **30** credits for CORE (including Introduction to Writing (3), Professional Writing (3), Humanities and Arts (9), Social Sciences and History (9), and Human Cultural Diversity (3). CORE Sciences and Mathematics (9) are satisfied by major required courses. CORE Advanced Studies are satisfied by ENST 4XC Capstone Practicum (4) and a non-ENST 300- or 400-level course (3)).

Science and Math Fundamentals Required (53-54 credits):

ENST 200	Fundamentals of Soil Science	4 credits
ENST 2XA	Introduction to Environmental Health (NEW COURSE)	3 credits
ENST 3XA	Ecosystem Ecology (NEW COURSE)	4 credits
ENST 389	Internship in Environmental Science & Technology	3 credits
ENST 398	Seminar in Environmental Science & Technology	1 credit
ENST 4XC	Capstone Practicum in Environmental Science & Technology (NEW COURSE)	4 credits
BSCI 105	Principles of Biology I	4 credits
BSCI 106	Principles of Biology II	4 credits
CHEM 131/132	Fund. General Chemistry & Lab	4 credits
CHEM 231/232	Organic Chemistry I & Lab	4 credits
MATH 140 ***or*** MATH 220	Calculus I ***or*** Elementary Calculus I	3-4 credits
PHYS 121 ***or*** PHYS 117	Fundamentals of Physics I ***or*** Introduction to Physics	4 credits
BIOM 301	Introduction to Biometrics	3 credits
PLSC 100 ***or*** PLSC 101	Introduction to Horticulture ***or*** Introductory Crop Science	4 credits
GEOL 100/110	Physical Geology and Lab	4 credits

Fundamental Soil Science Required (14 credits):

ENST 414	Soil Morphology, Genesis and Classification	4 credits
ENST 417	Soil Hydrology and Physics	3 credits
ENST 421	Soil Chemistry	4 credits
ENST 422	Soil Microbiology	3 credits

Technical Electives (3-4 courses—9 credits):

ENST 308	Field Soil Morphology	1 or 2 credits
ENST 411	Principles of Soil Fertility	3 credits
ENST 413	Soil and Water Conservation	3 credits
ENST 415	GIS Applications in Soil Science	3 credits
ENST 423	Soil-Water Pollution	3 credits
ENST 425	Terrestrial Bioremediation	3 credits
ENST 430**	Wetland Soils	3 credits
ENST 442**	Remote Sensing of Agriculture and Natural Resources	3 credits

Breadth Electives (2 courses—6-7 credits):

ENST 440	Crops, Soils and Civilization	3 credits
ENST 441	Sustainable Agriculture	3 credits
ENST 444**	Restoration Ecology	3 credits
ENST 450**	Wetland Ecology	3 credits
ENST 451**	Water Quality: Field and Lab Analysis Methods	3 credits
GEOL 451	Groundwater	3 credits
GEOL 452	Watershed and Wetland Hydrology	3 credits
GEOG 340 ***or*** GEOL 340	Geomorphology ***or*** Geomorphology	3 or 4 credits

**Reflects recent course prefix or number modification.

Four Year Plan:

A four-year plan for the Soil and Watershed Science concentration in ENST is presented in Appendix G.

Benchmarks:

Benchmarks indicative of progress in the Soil and Watershed Science curriculum are listed in Appendix H.

CONCENTRATION IN NATURAL RESOURCES MANAGEMENT

Catalog Description:

The goal of the Natural Resources Management Program is to teach students concepts of the environmentally sound use and management of natural resources. Ecosystems and human societies are linked in complex cycles and relationships between vegetation and wildlife, forests and cities, conservation and development. By learning to participate effectively within these cycles, we will help sustain a harmonious relationship between the environment and human activities. This concentration provides students with the knowledge and skills they need to work in such positions as wildlife biologists, environmental consultants, wetland scientists, forest managers, fisheries biologists, aquatic biologists, and nature interpreters.

Curriculum:

TOTAL CREDITS REQUIRED FOR THE B.S., including the CORE General Education Program = 120 credits, including: **69-71** required major credits; **12** Resource Management and Science elective credits; **7-9** free elective credits; and **30** credits for CORE (including Introduction to Writing (3), Professional Writing (3), Humanities and Arts (9), Social Sciences and History (9), and Human Cultural Diversity (3). CORE Sciences and Mathematics (9) are satisfied by major required courses. CORE Advanced Studies are satisfied by ENST 4XC Capstone Practicum (4) and a non-ENST 300- or 400-level course (3)).

Science and Math Fundamentals Required (56-58 credits):

ENST 200	Fundamentals of Soil Science	4 credits
ENST 2XA	Introduction to Environmental Health (NEW COURSE)	3 credits
ENST 3XA	Ecosystem Ecology (NEW COURSE)	4 credits
ENST 389	Internship in Environmental Science & Technology	3 credits
ENST 398	Seminar in Environmental Science & Technology	1 credit
ENST 4XC	Capstone Practicum in Environmental Science & Technology (NEW COURSE)	4 credits
BSCI 105	Principles of Biology I	4 credits
BSCI 106	Principles of Biology II	4 credits
BSCI 223	General Microbiology	4 credits
CHEM 131/132	Fund. General Chemistry & Lab	4 credits
CHEM 231/232	Organic Chemistry I & Lab	4 credits
MATH 140 ***or*** MATH 220	Calculus I ***or*** Elementary Calculus I	3-4 credits
PHYS 121 ***or*** PHYS 117	Fundamentals of Physics I ***or*** Introduction to Physics	4 credits
BIOM 301	Introduction to Biometrics	3 credits
GEOL 100/110 ***or*** GEOG 201/211	Physical Geology & Lab ***or*** Geography of Environmental Systems & Lab	4 credits
GEOG 340 ***or*** GEOL 340	Geomorphology ***or*** Geomorphology	3-4 credits

Resource Economics (7 credits):

AREC 240	Introduction to Economics and the Environment	4 credits
AREC 332 ***or*** ENST 4XE	Introduction to Natural Resources Policy ***or*** Ecological Economics (NEW COURSE)	3 credits

Government and Politics (3 credits):

GVPT 273	Introduction to Environmental Politics	3 credits

Sociology (3 credits):

SOCY 305	Scarcity and Modern Society	3 credits

Resource Management and Science Electives

Students will take approximately 6 credits each of Resource Management and Resource Science electives to tailor their program to their specific interests (total = 12 credits). Resource Management electives cannot be double-counted as Resource Science Electives, and vice-versa. This is not an exhaustive list of electives; other science and management courses can be substituted with advisor approval.

Resource Management Electives (6 credits):

ANSC 453	Animal Welfare and Bioethics	3 credits
ANTH 450	Theory and Practice of Environmental Anthropology	3 credits

AREC 365	World Hunger, Population, and Food Supplies	3 credits
AREC 445	Ag. Development, Population Growth and the Environment	3 credits
BSCI 363	The Biology of Conservation and Extinction	3 credits
BSCI 366	Biodiversity Issues in Conservation Management	3 credits
ECON 315	Economic Development of Underdeveloped Areas	3 credits
ENST 314**	Biology and Management of Finfish	3 credits
ENST 405	Energy and Environment	3 credits
ENST 413	Soil and Water Conservation	3 credits
ENST 415 ***or*** GEOG 373	GIS Applications in Soil Science ***or*** Geographic Information Systems	4-3 credits
ENST 425	Terrestrial Bioremediation	3 credits
ENST 434	Soil-Water Pollution	3 credits
ENST 440	Crops, Soils and Civilization	3 credits
ENST 441	Sustainable Agriculture	3 credits
ENST 442** ***or*** GEOG 372	Remote Sensing of Agriculture and Natural Resources ***or*** Remote Sensing	3 credits
ENST 444**	Restoration Ecology	3 credits
ENST 454	Environmental Issues in Plant and Soil Sciences	3 credits
ENST 460**	Principles of Wildlife Management	3 credits
ENST 461**	Urban Wildlife Management	3 credits
ENST 462**	Field Techniques in Wildlife Management	2 credits
ENST 479**	Tropical Ecology and Resource Management	3 credits
ENST 487**	Conservation of Natural Resources I	3 credits
ENST 497**	Conservation of Natural Resources II	3 credits
GEOG 472	Remote Sensing: Digital Processing and Analysis	3 credits
GEOG 473	Geographic Information Systems and Spatial Analysis	3 credits
GEOL 437	Global Climate Change: Past and Present	3 credits
LARC 450	Environmental Resources	3 credits
LARC 451***	Sustainable Communities	1-6 credits

Resource Science Electives (6 credits):

ANSC 252	Introduction to the Diseases of Wildlife	3 credits
ANSC 452	Avian Physiology	3 credits
BSCI 360	Principles of Animal Behavior	3 credits
BSCI 362	Ecology of Marsh and Dune Vegetation	2 credits
BSCI 373	Natural History of the Chesapeake Bay	3 credits
BSCI 374	Chesapeake Bay Laboratory	2 credits
BSCI 375	Biological Oceanography	3 credits
BSCI 440	Mammalian Physiology	4 credits
BSCI 441	Mammalian Physiology Laboratory	2 credits
BSCI 442	Plant Physiology	4 credits
BSCI 462	Population Ecology	3 credits
BSCI 463	Laboratory and Field Ecology	2 credits
BSCI 464	Microbial Ecology	3 credits
BSCI 467	Freshwater Biology	4 credits

BSCI 473	Marine Ecology	3 credits
BSCI 481	Insect Diversity and Classification	4 credits
BSCI 493	Medicinal and Poisonous Plants	3 credits
ENST 308	Field Soil Morphology	1-2 credits
ENST 414	Soil Morphology, Genesis and Classification	4 credits
ENST 421	Soil Chemistry	4 credits
ENST 422	Soil Microbiology	3 credits
ENST 430**	Wetland Soils	3 credits
ENST 450**	Wetland Ecology	3 credits
ENST 451**	Water Quality: Field and Lab Analysis Methods	3 credits
GEOG 345	Introduction to Climatology	3 credits
GEOG 440	Advanced Geomorphology	3 credits
GEOL 444	Low Temperature Geochemistry	4 credits
GEOL 451	Groundwater	3 credits
GEOL 452	Watershed and Wetland Hydrology	3 credits
PLSC 453	Weed Science	3 credits

**Reflects recent course prefix or number modification.
***Must take at least one other additional course, 6 credits of LARC 451 does not fulfill requirement.

Four Year Plan:

A four-year plan for the Natural Resources Management concentration in ENST is presented in Appendix G.

Benchmarks:

Benchmarks indicative of progress in the Natural Resources Management curriculum are listed in Appendix H.

CATALOG DESCRIPTIONS FOR PROPOSED NEW COURSES:

ENST 2XA Introduction to Environmental Health (3) The course will examine how humans are affected by the quality of air, water, and food as well as how humans affect these survival necessities. Students will learn how the evolution and prosperity of the human species has resulted in concerns about pollution, overpopulation, and other issues that are having a harmful effect on humans and our environment.

ENST 3XA Ecosystem Ecology (4) Prerequisites: BSCI 106 and MATH 113 or above. Two hours of lecture and four hours of laboratory per week. A survey of the structure and function of terrestrial and aquatic ecosystems. The laboratory emphasizes field methods with local ecosystems in order to demonstrate lecture topics.

ENST 3XB Ecosystem Health and Protection (3) Recommended: ENST 2XA. Discussion of the philosophies, principles, and practices for assessing ecosystem health with emphasis on

sustainability and degradation associated with human activities. Concepts will be clarified using case histories from the Chesapeake Bay watershed.

ENST 3XC Environmental Toxicology (3) Prerequisites: BSCI207 and CHEM131/132 or permission from department. Concepts and case histories in ecotoxicology. Emphasis on origin and variety of environmental pollutants, routes of biological exposure, modes of toxicological action, and effects on individuals and populations.

ENST 3XD Environmental Instrumentation (3) Prerequisite: BSCI 106 and (MATH 140 or MATH 220). Introduction to instruments used for measuring environmental attributes. Laboratory instruction with field applications.

ENST 4XA Ecosystem Simulation Modeling (3) Prerequisites: BSCI 106 and (MATH 140 or MATH 220). Fundamentals of conceptualizing, developing, calibrating, validating, and simulating mathematical models of ecosystems.

ENST 4XB Ecological Design (3) Prerequisite: BSCI 106. This is an advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.

ENST 4XC Capstone Practicum in Environmental Science and Technology (3) Students work in small groups on semester-long projects that involve analysis and design of real world problems and issues. For ENST majors only. Senior standing required.

ENST 4XD Wetland Creation and Restoration (3) Prerequisite: BSCI 106 and (MATH 140 or MATH 220). Recommended: ENST 450 or ENST 444 or BSCI361 or BSCI 460. Also offered as ENST 6XD. Credit will be granted for only one of the following: ENST 4XD or ENST 6XD. Principles, applications, and design of water treatment wetlands and wetlands that are created, restored, or enhanced for purposes of mitigation or ecosystem restoration. Practical aspects of planning and design, site selection, construction, hydrology, vegetation, geomorphology, ecosystem development, and monitoring will be emphasized.

ENST 4XE Ecological Economics (3) Prerequisite: BSCI 106. Economic techniques and concepts for evaluating ecosystems are introduced. Aspects of market based and non-market based approaches are covered. Emphasis is on decision-making applications.

ENST 4XF Stormwater Management (3) Prerequisite: BSCI 106. Ecological problems and solutions in suburban and urban settings are covered. Aspects of water resources, non-point source pollution and carrying capacity are covered.

ENST 4XG Industrial Ecology (3) Prerequisite: MATH 140 or MATH 220. Problems of waste management and recycling in human societies are covered. The industrial ecology approach to design is contrasted with analogous patterns and processes from natural ecosystems.

ENST 4XH Stream Restoration (3) Prerequisite: BSCI 106 and (MATH 140 or MATH 220). Recommended: ENST 451 or ENST 444 or BSCI 467 of GEOL 452. Application of hydrologic, geomorphic, and ecological principles to restoration of streams and riparian habitat within a watershed context. Emphasis will be placed on practical aspects of planning, design, channel engineering, sediment transport, physical structures, stream corridor enhancement, and ecosystem monitoring.

ENST 4XI Fisheries Sustainability and Environmental Health (3) Prerequisite: BSCI 106 and (MATH 140 or MATH 220). Recommended: ENST 314 or ENST 451 or ENBE 435. Exploration of ecological and socioeconomic dimensions of commercial and industrial fishing and aquaculture and their relationships to human and ecosystem health. Topics will include management and ecology of marine fisheries, freshwater and marine aquacultural practices, environmental contaminants, coral reef impacts and by-catch, socioeconomics of fishing communities, and trends and cycles in fish populations.

ENST 4XJ Environmental Contaminants: Sources and Fate (3) Prerequisites: ENST 3XB and BSCI361. Study of the release to the environment, transport through natural compartments, persistence and ultimate fate of various classes of contaminants produced as a result of human activities.

ENST 4XK Ecological Risk Assessment (3) Prerequisites: ENST 3XB and BSCI 361 and BIOM301. Assessment of ecological impacts of perturbations on natural systems. Course will describe quantitative methods for estimating environmental impacts by extrapolating from laboratory and field data. The role of regulatory agencies and implications of scientific uncertainty on risk management will be covered.

ENST 4XL Human Health Risk Assessment (3) Prerequisites: ENST 3XC and BIOM 301. Recommended: ENST 3XB and ENST 4XK. Biological, toxicological, medical, and statistical methods for assessment of risks posed by environmental contaminants in air, water, soil, manmade materials, or food on human health (including metals and other inorganics, pesticides, solvents, halogenated organics, nanoparticles, genetically engineered chemicals, pharmaceuticals, and metabolic byproducts). Topics will include probabilistic risk models, application of toxicity and exposure models to risk assessment, chemical mixtures, home and occupational chemical hazards, industrial hygiene, and approaches to risk communication and management.

ENST 4XM Aquatic Toxicology (3) Prerequisite: ENST 3XC . Discussion of the basic concepts and principles of aquatic toxicology. Examples from historic and on-going studies within the Chesapeake Bay watershed will be used to demonstrate the toxicological action of aquatic pollutants at all levels of biological organization from molecular to organismal to whole ecosystem.

ENST 4XN Emerging Environmental Threats (3) Prerequisite: ENST 3XB or permission from the department. Discussion of emergent areas of environmental concern including: global warming, exotic species, non-traditional pollutants, and other complex and potentially significant

environmental issues. By its nature, this course will evolve over time to reflect changes in scientific understanding and environmental research priorities.

III. Student Learning Outcomes and Assessment

To address this program's expected learning outcomes and explain how they will be measured, we have included a Learning Outcomes Assessment Plan and Rubrics in Appendix I of this document.

IV. Faculty and Organization

The ENST undergraduate program will be administered within the Department of Environmental Science and Technology. Members of the ENST faculty are:

Name	Rank
Adams, Lowell	Adjunct Associate Professor
Baldwin, Andrew	Associate Professor
Becker, Jennifer	Assistant Professor
Coale, Frank	Professor
Felton, Gary	Associate Professor
Fisher, Daniel	Senior Research Scientist
Harrell, Reginal	Professor
Hill, Robert	Professor
James, Bruce	Professor
Kangas, Patrick	Associate Professor
McGrath, Joshua	Assistant Professor
Miller, Ray	Professor
Momen, Bahram	Associate Professor
Needelman, Brian	Assistant Professor
Rabenhorst, Martin	Professor
Ross, David	Professor
Simpson, Thomas	Professor
Tilley, David	Associate Professor
Weil, Ray	Professor
Weismiller, Richard	Professor
Wheaton, Fredrick	Professor

V. Off Campus Programs

Not Applicable

VI. Other Issues

A. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program. ***NONE***
B. Will the program require or seek accreditation? ***NO.***
Is it intended to provide certification or licensure for its graduates? ***NO.***
Are there academic or administrative constraints as a consequence? ***NO.***

VII. Commitment to Diversity

The University of Maryland is located in a metropolitan region that has a diverse population. Students attracted to the program will be representative of this diverse population. We intend to increase communications with undergraduate programs at 1890 Land Grant Institutions and historically black colleges, both within and without USM and continue faculty involvement with International Programs in Agriculture and Natural Resources (IPAN), which will bring in students from all over the world.

VIII. New Required Physical Resources

Modest expenditures for renovation of existing office and laboratory space are expected in Years 1, 2 and 3 to accommodate new faculty.

IX. Resource Needs and Sources

The ENST faculty currently teach a range of courses (Table 3). The creation of the ENST undergraduate program requires the creation of new courses (Table 4). Resources and expenditures associated with creation of the ENST undergraduate program are presented in budget tables listed as "TABLE 1: RESOURCES" and "TABLE 2: EXPENDITURES" as required by the Academic Programs office. A budget narrative precedes these tables.

Table 3. Existing ENST undergraduate courses.

Number	Title	Credits	Responsible faculty
ENBE 234	Principles of Erosion and Water Control	1 credit	Various
ENBE 236	Design of Drainage Systems	1 credit	Various
ENBE 237	Design of Irrigation Systems	1 credit	Various
ENBE 381	Creative Design with CAD	3 credits	
ENBE 435	Aquacultural Engineering	3 credits	Wheaton
ENBE 462	Nonpoint Source Pollution Assessment Techniques	3 credits	Felton
ENBE 485	Capstone Design I	1 credit	Various
ENBE 486	Capstone Design II	2 credits	Various
ENBE 488	Special Topics in Biological Engineering	1-4 credits	Various
ENBE 489	Special Problems in Biological Engineering	1-3 credits	Various
ENST 100	International Crop Production-Issues and	3 credits	Tamboli

	Challenges in the 21st Century		
ENST 105	Soil and Environmental Quality	3 credits	Weil Weismiller
ENST 200	Fundamentals of Soil Science	4 credits	Weil
ENST 308	Field Soil Morphology	1-2 credits	Needelman Rabenhorst
ENST 314**	Biology and Management of Finfish	4 credits	
ENST 388**	Honors Thesis Research	3-6 credits	Various
ENST 389**	Internship	3 credits	Various
ENST 398	Seminar	1 credit	Coale
ENST 405	Energy and Environment	3 credits	Tilley
ENST 411	Principles of Soil Fertility	3 credits	Weil
ENST 413	Soil and Water Conservation	3 credits	Hill
ENST 414	Soil Morphology, Genesis and Classification	4 credits	Needelman
ENST 415	GIS Applications in Soil Science	4 credits	Needelman
ENST 417	Soil Hydrology and Physics	3 credits	Hill
ENST 420	Soil Physical Properties Lab	1 credit	Hill
ENST 421	Soil Chemistry	4 credits	James
ENST 422	Soil Microbiology	3 credits	
ENST 423	Soil-Water Pollution	3 credits	Steinhilber
ENST 424	Field Study in Soil Morphology	4 credits	Rabenhorst
ENST 425	Terrestrial Bioremediation	3 credits	
ENST 430**	Wetland Soils	3 credits	Rabenhorst
ENST 440	Crops, Soils, and Civilization	3 credits	James
ENST 441	Sustainable Agriculture	3 credits	Weil
ENST 442**	Remote Sensing of Agriculture and Natural Resources	3 credits	Weismiller
ENST 444**	Restoration Ecology	3 credits	Tilley
ENST 450**	Wetland Ecology	3 credits	Baldwin
ENST 451**	Water Quality: Field and Lab Analysis Methods	3 credits	Baldwin
ENST 454	Environmental Issues in Plant and Soil Sciences	3 credits	various
ENST 460**	Principles of Wildlife Management	3 credits	Adams
ENST 461**	Urban Wildlife Management	3 credits	Adams
ENST 462**	Field Techniques in Wildlife Management	2 credits	Adams
ENST 470**	Natural Resources Management	4 credits	Kangas
ENST 479**	Tropical Ecology and Resource Management	1-6 credits	Kangas
ENST 487**	Conservation of Natural Resources I	3 credits	Kangas
ENST 489**	Field Experience	1-4 credits	Various
ENST 497**	Conservation of Natural Resources II	3 credits	Kangas
ENST 499**	Special Topics in Environmental Science and Technology	1-4 credits	Various

**Reflects recent course prefix or number modification.

Table 4. New courses proposed for the ENST undergraduate program.

Number	Title	Responsible faculty	Credits	Required /elective
ENST 2XA	Introduction to Environmental Health	F. Coale	3	Required
ENST 3XA	Ecosystem Ecology	P. Kangas	4	Required
ENST 3XB	Ecosystem Health and Protection	D. Fisher	3	Required
ENST 3XC	Environmental Toxicology	D. Fisher	3	Required
ENST 3XD	Environmental Instrumentation		3	Required
ENST 4XA	Ecosystem Simulation Modeling	D. Tilley	3	Required
ENST 4XB	Ecological Design	P. Kangas	3	Required
ENST 4XC	Capstone Practicum in Environmental Science and Technology	P. Kangas	4	Required
ENST 4XD	Wetland Creation and Restoration	A. Baldwin	3	Required
ENST 4XE	Ecological Economics		3	Required
ENST 4XF	Stormwater Management		3	Required
ENST 4XG	Industrial Ecology		3	Required
ENST 4XH	Stream Restoration		3	Required
ENST 4XI	Fisheries Sustainability and Environmental Health	R. Harrell	3	Elective
ENST 4XJ	Environmental Contaminants: Sources and Fate		3	Required
ENST 4XK	Ecological Risk Assessment		3	Required
ENST 4XL	Human Health Risk Assessment		3	Required
ENST 4XM	Aquatic Toxicology		3	Elective
ENST 4XN	Emerging Environmental Threats		3	Elective

BUDGET NARRATIVE

TABLE 1: RESOURCES

Currently, ENST has 5.69 FTE instructional faculty positions. The Department will allocate internal resources to support 2.5 FTE Administrative Staff support and 1.0 FTE for an additional teaching assistantship to support the proposed program. The Dean's Office, College of Agriculture and Natural Resources, has agreed to provide ENST with one new permanent faculty position that will be available July 1, 2007 (Year 1), and a second new permanent faculty position that will be available July 1, 2008 (Year 2). Additionally, the College will provide resources for one additional teaching assistant beginning in Year 1. The Provost's Office, University of Maryland College Park, has agreed to provide ENST with one new permanent faculty position that will be available July 1, 2007 (Year 1), and a second new permanent faculty position that will be available July 1, 2008 (Year 2). Additionally, the campus will provide funds for one teaching assistant beginning in Year 2 and a second teaching assistant beginning in Year 3. Therefore, resources for Year 1 will include 7.69 FTE instructional faculty positions and resources for Year 2, and after, will include 9.69 FTE instructional faculty positions. By Year 3, funding for a total of four additional graduate teaching assistants will be available. Faculty positions were budgeted at an average of $73,750 annual salary. Resources for UMCP Libraries operations ($6,000/yr) provided by the Provost's Office (a library resource assessment follows budget tables).

Tuition revenue was calculated based on projected student numbers and the following assumptions regarding tuition sources: 70% in-state students, 30% out-of-state students, and 5% annual tuition increase beginning in Year 3. Currently, ENST undergraduate programs have an enrollment of approximately 35 students. We project that the proposed ENST undergraduate program will attract 30 new students in Year 1, an additional 15 new students in Year 2, and 20 new students in Years 3, 4 and 5, for a total of 140 students in the ENST program.

TABLE 2: EXPENDITURES

Currently, ENST has 5.69 FTE instructional faculty positions. As outlined above, two new permanent faculty positions will be made available in Year 1 and two additional faculty positions will be made available in Year 2. Initial new instructional faculty salaries were estimated to average $73,750 per position and benefits were calculated as 30% of salary. By Year 3, four new graduate teaching assistants will be funded. There are no changes proposed for administrative or support staff expenditures. Assessment of the proposed program's impact on Libraries operations was $6,000/yr. Modest expenditures for renovation of existing office and laboratory space are expected in Years 1, 2 and 3 to accommodate new faculty.

TABLE 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
	2007-08	2008-09	2009-10	2010-11	2011-12
1. Reallocated Funds (sum **a** through **i**, below)	$833,747	$1,073,747	$1,043,747	$943,747	$943,747
Department, Chair ENST					
a. Instructional Faculty Salary	$462,747	$462,747	$462,747	$462,747	$462,747
Instructional Faculty, FTEs	5.69	5.69	5.69	5.69	5.69
b. Administrative Staff Salary	$100,000	$100,000	$100,000	$100,000	$100,000
Administrative Staff, FTEs	2.5	2.5	2.5	2.5	2.5
c. Teaching Assistants Salary	$20,000	$20,000	$20,000	$20,000	$20,000
Teaching Assistants, FTEs	1.0	1.0	1.0	1.0	1.0
d. Operating (facilities renovation)	$80,000	$150,000	$100,000	$0	$0
College, Dean AGNR					
e. Instructional Faculty Salary	$80,000	$165,000	$165,000	$165,000	$165,000
Instructional Faculty, FTEs	1.0	2.0	2.0	2.0	2.0
f. Teaching Assistants Salary	$20,000	$20,000	$20,000	$20,000	$20,000
Teaching Assistants, FTEs	1.0	1.0	1.0	1.0	1.0
Campus, Provost UMCP					
g. Instructional Faculty Salary	$65,000	$130,000	$130,000	$130,000	$130,000
Instructional Faculty, FTEs	1.0	2.0	2.0	2.0	2.0
h. Teaching Assistants Salary	$0	$20,000	$40,000	$40,000	$40,000
Teaching Assistants, FTEs	0.0	1.0	2.0	2.0	2.0
i. Operating (library)	$6,000	$6,000	$6,000	$6,000	$6,000
2. Tuition / Fee Revenue (**h** + **m**, below)	$334,599	$506,117	$772,349	$1,057,457	$1,375,984
e. Additional New Full-Time Students	30	15	20	20	20
f. Additional Accumulated New Students	30	45	65	85	105
g. Annual Tuition Rate (assumes 70% in-state, 30% out-of-state, 5% tuition increase annually in year 3)	$10,598	$10,598	$11,128	$11,684	$12,268
h. Annual Full-Time Revenue (**f** x **g**)	$317,931	$476,897	$723,293	$993,137	$1,288,156
i. Additional New Part-Time Students	3	2	3	2	3
j. Additional Accumulate New Part-Time	3	5	8	10	13
k. Part-Time Credit Hour Rate (assumes 70% in-state, 30% out-of-state, 5% tuition increase annually in year 3)	$463	$487	$511	$536	$563
l. Annual Part-Time Credit Hours	12	12	12	12	12
m. Total Part-Time Revenue (**j** x **k** x **l**)	$16,668	$29,220	$49,056	$64,320	$87,828
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (add 1 + 2 + 3 + 4)	$1,168,346	$1,579,864	$1,816,096	$2,001,204	$2,319,731

TABLE 2: EXPENDITURES

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
	2007-08	2008-09	2009-10	2010-11	2011-12
1. Faculty Expenses (**b** + **c**, below)	$790,071	$985,071	$985,071	$985,071	$985,071
a. Instructional Faculty FTEs	7.69	9.69	9.69	9.69	9.69
b. Salary	$607,747	$757,747	$757,747	$757,747	$757,747
c. Benefits	$182,324	$227,324	$227,324	$227,324	$227,324
2. Graduate Teaching Assistants (**e** + **f**, below)	$25,600	$76,800	$102,400	$102,400	$102,400
d. Teaching Assistants FTEs	1.0	3.0	4.0	4.0	4.0
e. Salary	$20,000	$60,000	$80,000	$80,000	$80,000
f. Benefits	$5,600	$16,800	$22,400	$22,400	$22,400
3. Administrative Staff Expenses (**d** + **e**, below)	$130,000	$130,000	$130,000	$130,000	$130,000
g. Administrative Staff FTEs	2.5	2.5	2.5	2.5	2.5
h. Salary	$100,000	$100,000	$100,000	$100,000	$100,000
i. Total Administrative Staff Benefits	$30,000	$30,000	$30,000	$30,000	$30,000
4. Support Staff Expenses (**h** + **i**, below)	$0	$0	$0	$0	$0
j. Support Staff FTEs	0.0	0.0	0.0	0.0	0.0
k. Salary	$0	$0	$0	$0	$0
l. Benefits	$0	$0	$0	$0	$0
5. Equipment	$0	$0	$0	$0	$0
6. Library	$6,000	$6,000	$6,000	$6,000	$6,000
7. New or Renovated Space	$100,000	$150,000	$100,000	$0	$0
8. Other Expenses	$0	$0	$0	$0	$0
TOTAL (sum 1 through 8)	$1,051,671	$1,347,871	$1,323,471	$1,223,471	$1,223,471

DATE: March 1, 2007

TO: Cheng-I Wei
Dean, College of Agriculture and Natural Resources

FROM: Damon Austin
Agricultural Sciences Librarian, McKeldin Library

Dr. Desider Vikor
Director, Collection Management and Special Collections

RE: Library Resources to Support Environmental Sciences and Technology Undergraduate Program

The University of Maryland Library resources are very rich in the broad subject area of agriculture and related life sciences. Support for a burgeoning undergraduate program in the College of Agriculture and Natural Resources such as the Environmental Science and Technology would be well supported by the UM Libraries. The collection currently supports numerous graduate programs within the College of Agriculture and Natural Resources, as well as other graduate programs in Biology and Architecture. A short list of related programs includes: Agricultural Resource Economics, Animal Science, Biotechnology Resource Engineering, Food Science, Natural Resource Sciences, and Sustainable Development and Conservation Biology.

The Collection: Monographs and Serials

The McKeldin Library houses a collection of approximately 36,000 items including books and serials in the subject areas of agriculture and related topics including, ecology, and environmental toxicology, restoration, and sustainable agriculture. This collection is complemented by materials found in other University Libraries' locations including the Engineering and Physical Sciences Library, Government Documents and Maps, the Architecture Library and the Marylandia Collection of the Hornbake Library.

Because Agriculture (Environmental Science and Technology) is largely an interdisciplinary subject field that draws from such disciplines as botany/plant sciences, environmental protection, horticulture, forestry, ecology, and urban studies and planning, it is difficult to provide precise figures on the number of library materials that support this program. A random sampling of our online catalog using terms from the proposed list of new courses showed that the UM Libraries compares well to similar undergraduate programs at public universities nationwide (mentioned in Appendix B of the program proposal).

As a result of this comparative study to check our collections regarding proposed new course content and due to the related undergraduate and graduate programs that the UM Libraries already support, we conclude that the current monograph and serials collections and acquisitions practices are significant; they are sufficient to support the proposed ENST undergraduate program.

The Collection: Government Documents

As a Land Grant University and as a regional depository library for U.S. Government publications, the University of Maryland Libraries has a comprehensive collection and acquisitions of all agricultural related subjects and studies. Federal agencies that publish relevant documents include the U.S. Geological Survey, United States Department of Agriculture, National Center for Environmental Economics, National Park Service, USDA Forest Service, and the Bureau of Land Management. The Libraries' collection of government publications will provide a wealth of resources for ENST undergraduate research.

Furthermore, a significant portion of Government Documents is found in the Map Collection, which is comprised of approximately 350,000 items, primarily from U.S. Government sources. Coverage includes all U.S. states, most U.S. territories and possessions, and some areas outside the U.S.

The Libraries have two GIS (Geographic Information System) workstations and a collection of digital spatial data from government sources available as well.

The Collection: Marylandia

Most current Maryland government information will be available on Maryland State Agency Web sites. The UM Libraries' Marylandia Collection acquires and maintains significant Maryland State documents in print including, but not limited to: Maryland laws, regulations, court cases, budget and fiscal reports; *Maryland Statistical Abstract*; planning documents from such agencies as the Maryland-National Capital Park and Planning Commission and the Metropolitan Washington Council of Governments; environmental statements from the Maryland State Highway Administration; and task force reports on various topics of current interest from the Maryland General Assembly.

On a local level, the Marylandia Collection includes publications from regional planning agencies including the Baltimore Metropolitan Council, the Maryland-National Capital Park and Planning Commission, and the Metropolitan Washington Council of Governments.

The Collection: Electronic Resources

UM Libraries subscribes to the following important databases that could support an undergraduate program in Environmental Science and Technology: *AGRICOLA*; *Web of Science*; and *Compendex*. The Libraries also already subscribe to numerous specialized databases that provide information related to publications in the environment and technology. These include:

- Aquatic Sciences and Fisheries Abstracts
- Aquatic Pollution and Environmental Quality Agricultural and Environmental Biotechnology Abstracts
- Agricultural and Environmental Biotechnology Abstracts
- Ecology Abstracts
- Human Population & Natural Resource Management
- Sustainability Science Abstracts

In spite of this rich collection of online resources, there are additional electronic products on the market that, if added to the Libraries collections, would be important for ENST students:

> *Environment Complete* contains the full text of articles from over 400 journals, the full text of more than 100 books as well as citations to over 1 million articles from 1,500 domestic and international titles going back to the 1950s. The resource "is designed to provide deep coverage in applicable areas of agriculture, ecosystem ecology, energy, natural resources, marine and freshwater science, geography, pollution and waste management, environmental technology, environmental law, public policy, social impacts, urban planning, and more" and would therefore be a core resource for ENST.
>
> *BuildingGreen Suite* offers critical information on green design. It features comprehensive information on a wide range of topics related to sustainable building and the rebuilding of areas devastated by natural disaster. A few major themes are energy efficiency, land-use planning, and indoor air quality.

Both of these databases are available by site license to institutional subscribers.

Staff Resources

All staff in the Libraries' departments and service sites provides support to the curricular and research needs of academic departments at the University of Maryland. Direct support to the Environmental Science and Technology program will be provided by the Life Sciences/Chemistry Team. The team also liaisons to all programs within the College of

Agriculture and Natural Resources; Special Collections, staff serving the users of the Marylandia Collections, and Government Documents with a GIS librarian.

Funding

In order to acquire the additional electronic resources to support the proposed program the Libraries' require an increase in ongoing funds. Annual database subscription costs for the two resources named above are $6,000.

APPENDIX A
MODIFICATIONS OF EXISTING CURRICULA

Appendix A-1. Comparison of current structure of the concentration in Conservation of Soil, Water, and Environment and proposed structure of the concentration in Soil and Watershed Processes in the ENST program. An explanation for modifications necessary to integrate the existing program into the ENST program is presented in the last column.

Existing curriculum Concentration in Conservation of Soil, Water, and Environment				**Proposed curriculum** Concentration in Soil and Watershed Science				**Changes made**
Number	Title	Cr		Number	Title	Cr		
Required Courses:				**Required Courses:**				
CHEM 131/132	Chemistry I - Fundamentals of General Chemistry & Lab	4		CHEM 131/132	Fund. General Chemistry & Lab	4		
MATH 113 or MATH 115	College Algebra with Applications or Pre-calculus	3						Required in ENST program as pre-requisite to MATH 140 or MATH 220
ENST 200	Fundamentals of Soil Science	4		ENST 200	Fundamentals of Soil Science	4		
ENST 398	Seminar	1		ENST 398	Seminar in Environmental Science & Technology	1		
PLSC 100 or PLSC 101	Introduction to Horticulture or Introductory Crop Science	4		PLSC 100 or PLSC 101	Introduction to Horticulture or Introductory Crop Science	4		
CHEM 271/272	General Chemistry and Energetics & Bioanalytical Lab	4						Not included in new ENST concentration due to changes in chemistry program prerequisites
CHEM 104 or CHEM 231/232	Fundamentals of Organic and Biochemistry or Organic Chemistry I & Lab	4		CHEM 231/232	Organic Chemistry I & Lab	4		Chemistry department may be discontinuing CHEM 104 lab
COMM 100 or COMM 107	Foundations of Oral Communication or Oral Communication: Principles and Practices	3						ENST capstone and seminar courses will satisfy communications experience
GEOL 100/110	Physical Geology & Lab	4		GEOL 100/110	Physical Geology and Lab	4		
MATH 140 or MATH 220	Calculus I or Elementary Calculus I	3-4		MATH 140 or MATH 220	Calculus I or Elementary Calculus I	3-4		
PHYS 117	Introduction to Physics	4		PHYS 121 or 117	Fundamentals of Physics I or Introduction to Physics	4		Allowed choice of PHYS course to make consistent with other ENST concentrations

APPENDIX A – Modifications of Existing Curricula

Existing curriculum Concentration in Conservation of Soil, Water, and Environment				**Proposed curriculum** Concentration in Soil and Watershed Science				**Changes made**
Number	Title	Cr		Number	Title	Cr		
				BIOM 301	Introduction to Biometrics	3		Required in all proposed ENST concentrations; is an elective in existing concentration (see below under existing curriculum)
				ENST 2XA	Introduction to Environmental Health (NEW COURSE)	3		Required in all proposed ENST concentrations
				ENST 3XA	Ecosystem Ecology (NEW COURSE)	4		Required in all proposed ENST concentrations
				ENST 389	Internship in Environmental Science & Technology	3		Required in all proposed ENST concentrations; is an elective in existing concentration (see below under existing curriculum)
				ENST 4XC	Capstone Practicum in Environmental Science & Technology (NEW COURSE)	4		Required in all proposed ENST concentrations
				BSCI 105	Principles of Biology I	4		Required in all proposed ENST concentrations
				BSCI 106	Principles of Biology II	4		Required in all proposed ENST concentrations
Restricted electives (at least 26 credits from 4 groups of courses)				**Restricted electives (at least 29 credits from 3 groups of courses)**				
AREC 332	Introduction to Natural Resources Policy	3						Course removed from restricted elective list
BIOM 301	Introduction to Biometrics	3						Required in all proposed ENST concentrations
ENBE 234/235/236	Principles of Erosion and Water Control/ Design of Drainage Systems/ Design of Irrigation Systems	3						Removed to allow for new ENST core courses
ENST 308	Field Soil Morphology	1-2		ENST 308	Field Soil Morphology	1-2		

Existing curriculum Concentration in Conservation of Soil, Water, and Environment				**Proposed curriculum** Concentration in Soil and Watershed Science				**Changes made**
Number	Title	Cr		Number	Title	Cr		
ENST 389	Internship	3						Required in all proposed ENST concentrations
ENST 411	Principles of Soil Fertility	3		ENST 411	Principles of Soil Fertility	3		
ENST 413	Soil and Water Conservation	3		ENST 413	Soil and Water Conservation	3		
ENST 414	Soil Morphology, Genesis and Classification	4		ENST 414	Soil Morphology, Genesis and Classification	4		
ENST 415	GIS Application in Soil Science	3		ENST 415	GIS Application in Soil Science	3		
ENST 417	Soil Hydrology and Physics	3		ENST 417	Soil Hydrology and Physics	3		
ENST 421	Soil Chemistry	4		ENST 421	Soil Chemistry	4		
ENST 422	Soil Microbiology	3		ENST 422	Soil Microbiology	3		
ENST 423	Soil-Water Pollution	3		ENST 423	Soil-Water Pollution	3		
				ENST 425	Terrestrial Bioremediation	3		Recently-developed ENST course available as restricted elective
ENST 430	Wetland Soils	3		ENST 430	Wetland Soils	3		
ENST 440	Crops, Soils and Civilization	3		ENST 440	Crops, Soils and Civilization	3		
ENST 441	Sustainable Agriculture	3		ENST 441	Sustainable Agriculture	3		
ENST 442	Remote Sensing of Agriculture and Natural Resources	3		ENST 442	Remote Sensing of Agriculture and Natural Resources	3		
				ENST 444	Restoration Ecology	3		Recently-developed ENST course available as restricted elective
				ENST 450	Wetland Ecology	3		Existing ENST course added as restricted elective
ENST 451	Water Quality: Field and Lab Analysis Methods	3		ENST 451	Water Quality: Field and Lab Analysis Methods	3		
ENST 454	Environmental Issues in Plant and Soil Sciences	3						Course no longer being offered
GEOG 340 or GEOL 340	Geomorphology or Geomorphology	3		GEOG 340 or GEOL 340	Geomorphology or Geomorphology	3		
GEOL 451	Groundwater	3		GEOL 451	Groundwater	3		

Existing curriculum Concentration in Conservation of Soil, Water, and Environment				**Proposed curriculum** Concentration in Soil and Watershed Science				**Changes made**
Number	Title	Cr		Number	Title	Cr		
GEOL 452	Watershed and Wetland Hydrology	3		GEOL 452	Watershed and Wetland Hydrology	3		
PLSC 406	Forage Crops	3						Course removed from restricted elective list
PLSC 407	Cereal and Oil Crops	3						Course removed from restricted elective list

Appendix A-2. Comparison of current structure of the Natural Resources Management Program and proposed structure of the concentration in Natural Resources Management in the ENST program. An explanation for modifications necessary to integrate the existing program into the ENST program is presented in the last column.

Current structure			Proposed structure			Changes made
Number	Title	Cr	Number	Title	Cr	
AREC 240	Introduction to Economics and the Environment	4	AREC 240	Introduction to Economics and the Environment	4	
AREC 332	Introduction to Natural Resources Policy	3	AREC 332 or ENST 4XE	Introduction to Natural Resources Policy or Ecological Economics (NEW COURSE)	3	Addition of ENST course option
BSCI 105	Principles of Biology I	4	BSCI 105	Principles of Biology I	4	
BSCI 106	Principles of Biology II	4	BSCI 106	Principles of Biology II	4	
CHEM 131/132	Chemistry I - Fundamentals of General Chemistry & Lab	4	CHEM 131/132	Fund. General Chemistry & Lab	4	
CHEM 231/232 or CHEM 104	Organic Chemistry I & Lab- or Fundamentals of Organic and Biochemistry	4	CHEM 231/232	Organic Chemistry I & Lab	4	
PHYS 117 or PHYS 121	Introduction to Physics or Fundamentals of Physics I	4	PHYS 117 or PHYS 121	Introduction to Physics or Fundamentals of Physics I	4	
GEOL 100/110 or GEOG 201/211	Physical Geology & Lab or Geography of Environmental Systems & Lab	4	GEOL 100/110 or GEOG 201/211	Physical Geology & Lab or Geography of Environmental Systems & Lab	4	
BSCI 223	General Microbiology	4	BSCI 223	General Microbiology	4	
MATH 140 or MATH 220	Calculus I or Elementary Calculus I	3-4	MATH 140 or MATH 220	Calculus I or Elementary Calculus I	3-4	
ENST 200	Fundamentals of Soil Science	4	ENST 200	Fundamentals of Soil Science	4	
BIOM 301	Introduction to Biometrics	3	BIOM 301	Introduction to Biometrics	3	
BSCI 460/461 or BSCI 361	Plant Ecology & Lab or Principles of Ecology	4-5	ENST 3XA	Ecosystem Ecology (NEW COURSE)	4	Substitution of new ENST course for existing requirement
GEOG 340 or GEOL 340	Geomorphology or Geomorphology	3-4	GEOG 340 or GEOL 340	Geomorphology or Geomorphology	3-4	

APPENDIX A – Modifications of Existing Curricula

Current structure			Proposed structure			Changes made
Number	Title	Cr	Number	Title	Cr	
GVPT 273 or GVPT 306	Introduction to Environmental Politics or Global Ecopolitics	3	GVPT 273	Introduction to Environmental Politics	3	Removed GVPT 306 to avoid requiring prerequisite of GVPT 200
SOCY 305	Scarcity and Modern Society	3	SOCY 305	Scarcity and Modern Society	3	
ENST 389	Internship	3	ENST 389	Internship in Environmental Science & Technology	3	Change of course name
ENST 470	Natural Resources Management (Capstone)	4	ENST 4XC	Capstone Practicum in Environmental Science & Technology (NEW COURSE)	4	Change of course name
CMSC 102	Introduction to Information Technology	3				Intro computer course deleted because not necessary for incoming students
			ENST 2XA	Introduction to Environmental Health (NEW COURSE)	3	New course required by ENST program core--necessary to integrate NRMT curriculum into the ENST program
			ENST 398	Seminar in Environmental Science & Technology	1	New course required by ENST program core--necessary to integrate NRMT curriculum into the ENST program
20 technical electives (10 Science, 10 Management)				12 technical electives (6 Science, 6 Management)		

APPENDIX B
MARKET SURVEY

THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM PROPOSAL

ORIGINAL

DIRECTIONS:

- Provide one form with original approval signatures in lines 1 - 4 for **each** proposed action. Keep this form to one page in length.
- Early consultation with the Office of the Associate Provost for Academic Planning & Programs is strongly recommended if there are questions or concerns, particularly with new programs.
- Please submit the signed form to Claudia Rector, Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.
- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.

DATE SUBMITTED: December 6, 2006

PCC LOG NO. 07-33

COLLEGE/SCHOOL: College of Agriculture and Natural Resources

DEPARTMENT/PROGRAM: Department of Environmental Science and Technology

PROPOSED ACTION (*A separate form for each*) ADD X DELETE_____ CHANGE_____

DESCRIPTION (*Provide a succinct account of the proposed action. Details should be provided in an attachment. Provide **old** and **new** sample programs for curriculum changes.*)

Establish Master of Science graduate program, Environmental Science and Technology, which will reside in the newly formed department of Environmental Science and Technology. The proposed Master of Science program will consist of three specializations: 1) Soil and Watershed Sciences; 2) Ecological Technology Design; or 3) Wetland Science.

JUSTIFICATION/REASONS/RESOURCES (*Briefly explain the reason for the proposed action. Identify the source of new resources that may be required. Details should be provided in an attachment.*)

The reason for this proposed action is the reorganization, consolidation and defining of the current M.S. program that is managed by ENST faculty. There are no new resources requested.

APPROVAL SIGNATURES - ***Please print name, sign, and date***

1. Department Committee Chair _____ Dr. Andrew Baldwin
2. Department Chair _____ Dr. Frank J. Coale
3. College/School PCC Chair _____ 11/25/07 Dr. Mark Varner
4. Dean _____ Dr. Leon Slaughter
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC _____ 11/16/07
7. Chair of Senate _____
8. Vice President for Academic Affairs & Provost _____

VPAAP 8-05

PROPOSAL FOR
NEW INSTRUCTIONAL PROGRAM
UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND

M.S. GRADUATE PROGRAM IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

DEAN: CHENG-I WEI

AWARD TO BE OFFERED: M.S. IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

PROPOSED INITIATION DATE: FALL 2008

I. OVERVIEW and RATIONALE

A. Briefly describe the nature of the proposed program and explain why the institution should offer it. [You may want to refer to student demand, market demand for graduates, institutional strengths, disciplinary trends, synergy with existing programs, and/or institutional strategic priorities.]

The Department of Environmental Science and Technology (ENST) was formed July, 2006, bringing together faculty from two departments in the College of Agriculture and Natural Resources: the soil science faculty from the former Department of Natural Resource Sciences and Landscape Architecture (NRSL), and most of the faculty from the former Department of Biological Resources Engineering (BRE). Simultaneous with the formation of ENST, the soil science option of the NRSC M.S. graduate program was transferred to the new ENST department.

Following the philosophy that underpinned the establishment of the new Department of Environmental Science and Technology, we acknowledge that numerous departments and units on the campus and in the system are engaged in various aspects of the environmental enterprise. As our graduate program grows, it will complement, and thus strengthen, existing efforts in the environmental arena. We will be intentional in our collaboration, cooperation and support of these programs.

As described above, we anticipate collaborations with a great many units on the campus and within the system. In particular, we recognize the valuable contributions of, and expect close collaborations with, programs in the following units with whom we have already had serious conversations: Architecture, Planning, and Preservation; Chemical and Life Sciences (BEES, CONS); Civil and Environmental Engineering; Geography (geospatial analysis, land use and global change); Geology; Marine Environmental and Estuarine Studies; Plant Science and Landscape Architecture. We anticipate and hope that there will be many others.

As a newly organized department, ENST proposes to offer a graduate program leading to the Master of Science degree[1] (including thesis and non-thesis options). Candidates for the M.S. degree will work within one of three specializations: 1) Soil and Watershed Sciences; 2) Ecological Technology Design; or 3) Wetland Science. While this proposal creates a new M.S. program for ENST, nearly all of the courses are already established and being taught by current ENST faculty. However, we do propose the creation of two new courses that will contribute to the ENST core (one of which has been taught before), and three new courses to support offerings in the Wetland Science and Ecological Technology Design specializations.

The specialization in Soil and Watershed Sciences is essentially identical to the Soil Science option of the Natural Resource Sciences (NRSC) program that was administered within the former Dept of NRSL and transferred to the ENST Dept. during the recent reorganization. (After the Soil and Watershed Sciences specialization is approved as part of the new ENST Ph.D. graduate program, the Soil Science option of the NRSC Ph.D. graduate program will be phased out.) This graduate program will continue to prepare students to address challenging environmental issues that involve the soil resource at field, landscape and watershed scales. Soils are the most complex and ecologically significant biogeochemical systems on Earth. Soil processes and the soil resource are critical to all terrestrial ecosystems from prairies to the Alaskan tundra, to wetlands, to our

[1] We propose that students admitted to the Soils option of the NRSC M.S. program after July 1, 2006 be permitted the opportunity of transferring into the ENST M.S. program, should they wish to do so.

cities, to forests to biofuel farms. Soil Science is at the center of the study of what the National Science Foundation terms the Critical Zone - the confluence of atmosphere, lithosphere, hydrosphere and biosphere near the surface of the Earth. The quality of the Soil Science program and faculty is already recognized nationally and internationally; the program now housed in ENST represents one of the top three Soil Science programs in the northeast USA (along with Cornell University and The Pennsylvania State University).

The specialization in Ecological Technology Design will be a distinct program on a national scale that prepares students to integrate natural systems with the built environment to solve environmental problems while achieving economic, ecological and social sustainability. The science and application of using natural systems, processes and organisms to address environmental issues has evolved during the last few decades to a mature level whereby there are strong employment opportunities for graduates that are educated jointly in ecology and technology. Examples of eco-technological applications include: the restoration of urban and rural streams, the creation of wastewater treatment wetlands, the design of raingardens and bioretention systems for low-impact stormwater management, the design of eco-industrial parks, the life cycle assessment of products for improved environmental performance, the bioremediation and phytoremediation of contaminated land and groundwater, ecological systems for by-product recovery, and filtration of contaminated air with bioreactors. The creation of this new specialty will place the University of Maryland at the frontier among public universities in offering such a forward looking program. Programs similar to this exist at Ohio State Univ., the Univ. of Florida and UC Berkeley. At its core the Ecological Technology Design specialization will build upon the expertise of the faculty from the former Biological Resources Engineering Department, and advance with contributions from faculty from the former NRSL Department and campus faculty outside the ENST Department. [Note: The Ecological Technology Design specialization will be the focus for the ENST faculty formerly of the Biological Resources Engineering Department. These faculty have advised students in the ENBE M.S. graduate program which was transferred to the College of Engineering's Bioengineering Department upon the 2006 reorganization and will be phased out over the next few years after the ENST M.S. graduate program is approved.]

The specialization in Wetland Science is intended to address the keen awareness among the Environmental community that wetlands represent a critical and understudied component of many larger ecosystems. Wetlands have rapidly gained public attention over the last two decades as they have been brought into the limelight by state and federal regulations and through the attention given such large scale environmental issues as hurricane Katrina. Several faculty recently united within the newly formed Dept. of ENST have for years conducted research and taught courses in Wetland science. This new organization provides a critical mass, greater cooperation and synergism in Wetland Science research and education and a real opportunity to move forward. Currently, universities with well recognized Wetland Science programs include, The University of Florida, Duke University, The Ohio State University and Louisiana State University. Our goal is for the University of Maryland to become recognized as a national and international leader in the area of Wetland Science. What is true of Environmental Science in general, is also true of Wetland Science in particular – namely that there are many faculty in various units on this campus, and on other campuses in the system, that are involved in research and teaching in this area. In naming this as a specialization within the ENST M.S. graduate program we are not intending to claim exclusivity, but rather would vigorously work to raise the levels of collaboration and cooperation among faculty and among all interested units.

B. How big is the program expected to be? From what other programs serving current students, or from what new populations of potential students, onsite or offsite, are you expecting to draw?

The soils specialization of NRSC is currently housed in ENST, with a total of 18 graduate students (and this program has averaged 18 students over the last four years.), with about 60% of these being M.S. students. With the addition of two new specializations, over the next five years we expect this number to double, resulting in a total graduate enrollment of approximately 35 to 40 graduate students with approximately half of these students being enrolled in M.S. programs.

II. CURRICULUM

A. Provide a **full catalog description** of the proposed program, including educational objectives and any areas of concentration.

The Department of Environmental Science and Technology proposes to offer a program in graduate studies leading to the Master of Science degree (including thesis and non-thesis options). Candidates for the M.S. degree will work within one of three specializations: 1) Soil and Watershed Sciences; 2) Ecological Technology Design; or 3) Wetland Science.

B. List the courses (number, title, semester credit hours) that would constitute the requirements and other components of the proposed program. Provide a catalog description for any courses that will be newly developed or substantially modified for the program.

Requirements for Graduate Programs in ENST

Environmental science and technology is by nature a multidisciplinary enterprise. Therefore, the graduate program requirements have been designed to provide a necessary curricular foundation while preserving maximum flexibility for the student in selecting coursework to support their research and educational objectives.

1. Requirements for the Master of Science Degree (Thesis Option)
   a. Required Coursework - Students in the M.S. program will be expected to design a focused, coherent program of study that must be approved by the student's Advisor and Advisory Committee. This program requires a minimum of 30 semester hours beyond the B.S. degree, including six hours of thesis research credit (799). Of the 24 hours required in graduate courses, at least 12 must be earned in the major area. A minimum of 12 credit hours must be earned at the 600 level or above. All students in the M.S. program will be required to complete a core of courses that includes Research Principles and Methodology in Environmental Science and Technology (ENST 6XX) (3 credits), Communication and Professional Development in Environmental Science and Technology (ENST 7XX), one graduate level course in statistics (from among BIOM 601, 602, 603, 621 or equivalent) and two semesters of Graduate Seminar (ENST 798) (2 credits). Additional curriculum requirements are outlined below for each area of specialization. Details concerning course/credit requirements are also summarized in the appended summary table of requirements (Table 3).
      i. Students in the Soil and Watershed Sciences specialization are required to have a minimum of 12 credits of graduate level soil science courses that must be

earned in any four of the following five areas: soil chemistry, soil physics, pedology, soil biology, soil fertility.

ii. Students in the Ecological Technology Design specialization are required to complete six credits of graduate level coursework in ecology and six credits of graduate level coursework in ecological design or related engineering courses.

iii. Students in the Wetland Science specialization are required to complete eighteen (18) credits from a list of approved graduate level courses in Ecology, Soil Science and Hydrology, with a minimum of three credits from each of these three groups

earned in any four of the following five areas: soil chemistry, soil physics, pedology, soil biology, soil fertility.

ii. Students in the Ecological Technology Design specialization are required to complete six credits of graduate level coursework in ecology and six credits of graduate level coursework in ecological design or related engineering courses.

iii. Students in the Wetland Science specialization are required to complete eighteen (18) credits from a list of approved graduate level courses in Ecology, Soil Science and Hydrology, with a minimum of three credits from each of these three groups.

b. Thesis - In addition to successful completion of all coursework, students must complete and defend a research based thesis focused within their area of specialization.

2. Requirements for the Master of Science Degree (Non-Thesis Option)

a. Required Coursework - Students in the non-thesis M.S. program will be expected to design a focused, coherent program of study that must be approved by the student's Advisor and Advisory Committee. This program requires a minimum of 30 credit hours of course work beyond the B.S. degree. At least 18 credit hours must be at the 600 level or above. All students will be required to complete a core of courses that includes Research Principles and Methodology in Environmental Science and Technology (ENST 6XX) (3 credits), Communication and Professional Development in Environmental Science and Technology (ENST 7XX), one graduate level course in statistics (from among BIOM 601, 602, 603, 621 or equivalent) and two semesters of Graduate Seminar (ENST 798) (2 credits). Of the 30 hours required in graduate courses a minimum of 15 credit hours must be in the major area. Within the areas of specialization, identical course requirements apply for students in both non-thesis and thesis based M.S. program (see 1.a.i-iii above).

b. Scholarly Paper - Non-thesis M.S. students are required to write a scholarly paper in partial fulfillment of the degree requirements, and to present a seminar based on the content of the paper. The subject of the scholarly paper should be selected by the graduate student with the help of the Advisor and subject to approval by the student's Advisory Committee

c. Comprehensive Final Examination - Non-thesis M.S. students must pass a written comprehensive final examination on their knowledge of the discipline and an oral examination, at least part of which is devoted to the contents of the scholarly paper.

New courses:

ENST 6xa RESEARCH PRINCIPLES AND METHODOLOGY IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY (3 credits)
Fundamentals of research strategies useful and appropriate to Environmental Science and Technology, including a survey of current methodologies available for field and laboratory based projects that researchers are likely to utilize.

ENST 6xb CREATED AND RESTORED WETLANDS (3 credits)
Principles and practices of designing and constructing wastewater treatment wetlands and restoring and creating natural wetlands.

ENST 6xc ECOLOGICAL TECHNOLOGY DESIGN (3 credits)
Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.

ENST 6xd ECOSYSTEM SIMULATION MODELING (3 credits)
Fundamentals of conceptualizing, developing, calibrating, validating and simulating mathematical models of ecosystems.

ENST 7xx COMMUNICATION AND PROFESSIONAL DEVELOPMENT IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY (2 credits)
Training in communication and professional development to prepare students to succeed in careers within the fields of environmental science and technology. Topics will include communication with academic and non-academic audiences, manuscript and technical writing, multi-disciplinary collaboration, management, professionalism, mentoring, leadership, ethics, job search, and career opportunities. Course emphasizes practical training through facilitated discussions and critique practicums.

C. Describe any selective admissions policy or special criteria for students selecting this field of study.

Basic Admissions Requirements for Graduate Studies in ENST

To be admitted to pursue the M.S. degree students must have completed a B.S. Degree in a related field achieving a cumulative undergraduate GPA of 3.0 or higher and must have completed a minimum of one semester of Calculus and an additional 16 credits in some combination of Chemistry, Physics, or Mathematics (beyond Calculus I). They must also have completed the Graduate Record Examination (GRE).

III. STUDENT LEARNING OUTCOMES AND ASSESSMENT

A. List the program's learning outcomes and explain how they will be measured.

B. Include a general assessment plan for the learning outcomes. **(In lieu of a narrative for both IIIA and IIIB, you may attach the program's learning outcomes assessment forms.)**

Learning Outcomes for the Graduate Program in ENST

Students completing an M.S. Degree in ENST:
1. will read and synthesize pertinent information from the body of published scientific literature
2. will plan, design and conduct research following scientific protocols
3. will collect, analyze and interpret data from a research project
4. will effectively write research findings in a field specific format for a scientific audience
5. will orally communicate a technical summary of the research effort to a scientific audience

Students completing an M.S. Degree (non-thesis) in ENST:
1. will read and synthesize pertinent information from the body of published scientific literature
2. will effectively write a synthesis of a scientific literature review in a field specific format for a scientific audience
3. will orally communicate a summary and synthesis of a scientific literature review to a scientific audience

Outcomes Assessment Schedule

The following events are included as regular components of the normal graduate student program and provide opportunity for outcome assessment. The approximate timing at which these events occur within a student's program is also provided.

For M.S. Students
M.S. Entrance Seminar – within first year
M.S. Exit Seminar – at the end of the M.S. program
M.S. Thesis Defense or M.S. Scholarly Paper – at the end of the M.S. program
M.S. Qualifying Exam (non-thesis only) – at the end of the M.S. program

Graduate Program in ENST Assessment Rubric

Each member of the assembled faculty committee should complete one of these forms for the student in question following the conclusion of the faculty discussion, but before the student returns to the room (if applicable). Do not identify yourself or the student by name on this form. Add your form to the envelope held by the Chair of this committee.

This is a:
____ M.S. Entrance Seminar ____ M.S. Thesis Defense ____ M.S. Paper ____ M.S. Qualifying Exam
____ Ph.D. Entr. Seminar ____ Ph.D. Qualifying Exam ____ Ph.D. Dissertation Defense

Semester: _____

	Check one for each listed criterion			
Criteria for scientific components:	Professional	Novice	Unacceptable	Not Applicable
Statement of problem is clear and well-conceptualized.				
There is appropriate use and synthesis of published literature.				
Research methods are well-selected and well-executed.				
Conclusions are well-justified.				

	Check one for each listed criterion			
Criteria for communication components:	Professional	Novice	Unacceptable	Not Applicable
The student observed time limitations, spoke with clarity and sense of organization, and overall gave a compelling oral performance.				
The student answered the questions faculty asked.				
The student answered questions in ways that deepened the discussion.				
The project is well-written.				
The project is publishable.				

	Check one for each listed criterion			
Criteria for knowledge components:	Professional	Novice	Unacceptable	Not Applicable
Student demonstrates a general knowledge of the field of study				
Student demonstrates knowledge in their area of specialization				
Student demonstrates knowledge of recent developments				

Comments (optional):

IV. FACULTY AND ORGANIZATION

A. Who will provide academic direction and oversight for the program? [This might be a department, a departmental subgroup, a list of faculty members, or some other defined group.]

The ENST graduate program will be administered entirely within the Department of Environmental Science and Technology by the Departmental Graduate Committee. The Graduate committee will be overseen by the Director of Graduate Studies who will be appointed by the ENST department Chair. The ENST graduate committee will consist of the Director of Graduate Studies and four additional members, who must be associate or full members of the graduate faculty. These committee members will be elected by the ENST faculty and will serve for a period of four years with one committee member rotating off at the end of each year.

The ENST Departmental Graduate Committee will be responsible: 1) to periodically review and to propose to the ENST faculty any needed policy changes related to the Graduate Program; 2) to review and propose action to the graduate school on individuals making application to the ENST graduate program; 3) to evaluate, rank and make recommendations to the ENST chair regarding the merit of graduate applicants for consideration in awarding departmental assistantships.

Members of the ENST faculty who will advise graduate students within various specializations of the ENST graduate program include the following:

Name	Rank	Program Specializations		
		S&W Sci.	ETD	Wetl. Sci.
Adams, Lowell	Adj Assoc Prof		x	x
Baldwin, Andrew	Associate Prof		x	x
Becker, Jennifer	Assistant Prof		x	
Coale, Frank	Professor	x		
Felton, Gary	Associate Prof	x	x	
Hill, Robert	Professor	x		
James, Bruce	Professor	x		
Kangas, Patrick	Associate Prof		x	x
McGrath, Joshua	Assistant Prof	x		
Miller, Ray	Professor	x		
Meisinger, J.J.	Adj. Assoc. Prof	x		
Momen, Bahram	Associate Prof	x		x
Needelman, Brian	Assistant Prof	x		x
Rabenhorst, Marty	Professor	x		x
Ross, David	Professor		x	
Tilley, David	Assistant Prof		x	x
Weil, Ray	Professor	x		
Weismiller, Richard	Professor	x	x	
Wheaton, Fred	Professor		x	

B. If the program is not to be housed and administered within a single academic unit, provide details of its administrative structure. This should include at least the following:

Not Applicable

V. OFF CAMPUS PROGRAMS

Not Applicable

VI. OTHER ISSUES

A. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

Because many of the faculty within the Department of ENST historically have collaborated with faculty from other departments on the campus and other units in the system, we intend for this to continue. One of the principles that underpinned the establishment of the new Department of Environmental Science and Technology was the acknowledgement that numerous departments and units on the campus and in the system are engaged in particular aspects of environmental studies. Through continued informal cooperation, we intend for the graduate program in ENST to complement, and thus strengthen, environmental work on the campus and in the system.

B. Will the program require or seek accreditation? ***NO.*** Is it intended to provide certification or licensure for its graduates? ***NO.*** Are there academic or administrative constraints as a consequence? ***NO.***

VII. COMMITMENT TO DIVERSITY

Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

(1) Increase communications with undergraduate programs, and solicit applications from students enrolled, at 1890 Land Grant Institutions and historically black colleges, both within and without USM;
(2) Continue faculty involvement with International Programs in Agriculture and Natural Resources (IPAN), which will bring in students from all over the world.

VIII. REQUIRED PHYSICAL RESOURCES

A. Additional library and other information resources required to support the proposed program. You must include a formal evaluation by Library staff. NONE.

B. Additional facilities, facility modifications, and equipment that will be required. This is to include faculty and staff office space, laboratories, special classrooms, computers, etc. NONE.

C. Impact, if any, on the use of existing facilities and equipment. Examples are laboratories, computer labs, specially equipped classrooms, and access to computer servers. NONE.

IX. RESOURCE NEEDS and SOURCES

Describe the resources that are required to offer this program, and the source of these resources. Project this for five years. In particular:

A. List new courses to be taught, and needed additional sections of existing courses. Describe the anticipated advising and administrative loads. Indicate the personnel resources (faculty, staff, and teaching assistants) that will be needed to cover all these responsibilities.

Most of the ENST courses that will be utilized in the ENST graduate program are currently taught by ENST faculty. We are proposing the creation of five new courses (listed under section II.B.) for the graduate programs in ENST. These new courses will be partially supported by existing faculty and will also be partly supported by new faculty lines that have been requested in the ENST undergraduate proposal.

B. List new faculty, staff, and teaching assistants needed for the responsibilities in A, and indicate the source of the resources for hiring them.

There are new faculty lines that are being requested in the ENST undergraduate program proposal. These new faculty will partially support the new graduate courses as will also the current ENST faculty.

C. Some of these teaching, advising, and administrative duties may be covered by existing faculty and staff. Describe your expectations for this, and indicate how the current duties of these individuals will be covered, and the source of any needed resources.

This proposal creates an M.S. program within ENST, with specializations supported by courses that are, for the most part, already being taught through the existing faculty in ENST. Most of the teaching and advising for the new program will be covered by existing ENST faculty as they have been doing for the M.S. programs in NRSC and ENBE prior to the reorganization and subsequent creation of ENST. The new faculty hires described in the ENST undergraduate proposal will also partially support the teaching of the new proposed courses for the graduate program.

D. Identify the source to pay for the required physical resources identified in Section VIII. above. **N/A.**

E. List any other required resources and the anticipated source for them. NONE.

F. Provide the information requested in Table 1 and Table 2 (for Academic Affairs to include in the external proposal submitted to USM and MHEC). *Tables (which reflect projections for both the M.S. program and the Ph.D. program) are attached.*

BUDGET NARRATIVE

The proposals for new M.S. and Ph.D. instructional programs in Environmental Science and Technology (ENST) are inextricably linked with the concurrent proposal for a new ENST undergraduate (B.S.) program. For clarity and ease of presentation, all projected changes in total ENST instructional program resources, exclusive of graduate student tuition, are reflected in the undergraduate program proposal budget. In summary, the undergraduate program proposal budget accounts for four new instructional faculty positions, four new graduate teaching assistant positions, resources for library operations and resources for modest facilities renovation infused over a period of four years. These new program resources represent a reallocation of existing Department, College, and Campus funds. The new faculty, teaching assistant, library support and facilities renovation resources outlined in the undergraduate proposal will be combined with existing resources to deliver both graduate and undergraduate ENST programs.

TABLE 1: RESOURCES

Currently, ENST has 5.69 FTE instructional faculty positions. The Department will allocate internal resources to support 1.5 FTE Administrative Staff support for the proposed graduate programs (M.S. & Ph.D.). Tuition revenue was calculated based on projected student numbers and the following assumptions regarding tuition sources: 40% in-state students, 60% out-of-state students, and 5% annual tuition increase beginning in Year 3. Currently, ENST graduate programs have an enrollment of approximately 15 students. We project that the proposed ENST graduate programs will attract 5 new full-time students per year for a total of 40 graduate students (M.S. & Ph.D.) by Year 5.

TABLE 2: EXPENDITURES

Currently, ENST has 5.69 FTE instructional faculty positions. There are no changes proposed for faculty, administrative or support staff expenditures that are directly attributed to the graduate program proposals.

TABLE 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
	2007-08	2008-09	2009-10	2010-11	2011-12
1. Reallocated Funds (**a + b**, below)	$522,747	$522,747	$522,747	$522,747	$522,747
Department, Chair ENST					
a. Instructional Faculty Salary	$462,747	$462,747	$462,747	$462,747	$462,747
Instructional Faculty, FTEs	5.69	5.69	5.69	5.69	5.69
b. Administrative Staff Salary	$60,000	$60,000	$60,000	$60,000	$60,000
Administrative Staff, FTEs	1.5	1.5	1.5	1.5	1.5
2. Tuition / Fee Revenue (**f + k**, below)	$65,569	$131,138	$206,535	$289,164	$379,505
c. Additional New Full-Time Students	5	5	5	5	5
d. Additional Accumulated New Students	5	10	15	20	25
e. Annual Tuition Rate (assumes 40% in-state, 60% out-of-state, 5% tuition increase annually beginning in year 3)	$10,811	$10,811	$11,351	$11,919	$12,515
f. Annual Full-Time Revenue (**d x e**)	$54,055	$108,110	$170,265	$238,380	$312,875
g. Additional New Part-Time Students	1	1	1	1	1
h. Additional Accumulated New Part-Time	1	2	3	4	5
i. Part-Time Credit Hour Rate (assumes 90% in-state, 10% out-of-state, 5% tuition increase annually beginning in year 3)	$1,919	$1,919	$2,015	$2,116	$2,221
j. Annual Part-Time Credit Hours	6	6	6	6	6
k. Total Part-Time Revenue (**h x i x j**)	$11,514	$23,028	$36,270	$50,784	$66,630
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (add 1 + 2 + 3 + 4)	$588,316	$653,885	$729,282	$811,911	$902,252

TABLE 2: EXPENDITURES

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
	2007-08	2008-09	2009-10	2010-11	2011-12
1. Total Faculty Expenses (b+c, below)	$601,571	$601,571	$601,571	$601,571	$601,571
a. Instructional Faculty, FTEs	5.69	5.69	5.69	5.69	5.69
b. Total Faculty Salary	$462,747	$462,747	$462,747	$462,747	$462,747
c. Total Faculty Benefits	$138,824	$138,824	$138,824	$138,824	$138,824
2. Total Administrative Staff Expenses (d+e, below)	$78,000	$78,000	$78,000	$78,000	$78,000
d. Administrative Staff, FTEs	1.5	1.5	1.5	1.5	1.5
e. Total Administrative Staff Salary	$60,000	$60,000	$60,000	$60,000	$60,000
f. Total Administrative Staff Benefits	$18,000	$18,000	$18,000	$18,000	$18,000
3. Total Support Staff Expenses (h+i, below)	$120,900	$120,900	$120,900	$120,900	$120,900
g. Support Staff, FTEs	3.0	3.0	3.0	3.0	3.0
h. Total Support Staff Salary	$93,000	$93,000	$93,000	$93,000	$93,000
i. Total Support Staff Benefits	$27,900	$27,900	$27,900	$27,900	$27,900
4. Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$0	$0	$0	$0	$0
TOTAL (add 1+2+3+4+5+6+7)	$800,471	$800,471	$800,471	$800,471	$800,471

Table 3. ENST M.S. Graduate Program - Summary of Requirements			
Area of Specialization	**Soil and Watershed Sciences**	**Ecological Technology Design**	**Wetland Science**
M.S. Dept Admission	B.S. in related field; Undergraduate cumulative GPA of 3.0; GRE; Basic Science Requirement (a minimum of one semester of Calculus and 16 credits in Chemistry, Physics or Mathematics [beyond Calculus I]).		
Grad School Requirements	30 semester hours beyond the B.S. degree, including six hours of thesis research credit (799). Of the 24 hours required in graduate courses, at least 12 must be earned in a major area. A minimum of 12 credit hours must be earned at the 600 level or above		
ENST Core Requirements	ENST 6XX - Research Principles and Methodology in Environmental Science and Technology (3 credits) ENST 7XX - Communication and Professional Development in Environmental Science and Technology (2 credits) ENST 798 Graduate Seminar (2 semesters – 2 credits) One graduate level statistics course (from among, or equivalent to, those on approved list) [2];		
Specialization Requirements	Twelve credits of graduate level soil science courses. The 12 credits must be earned in any four of the following five areas: soil chemistry, soil physics, soil pedology, soil biology, soil fertility. All courses to be approved by the advisory	Six credits of graduate level courses in ecology and six credits of graduate level courses in ecological design or related engineering courses. All courses to be approved by the advisory committee.	Eighteen (18) credits from a list of approved graduate level courses[3] in Ecology, Soil Science and Hydrology, with a minimum of 3 credits from each of these three groups. All courses to be approved by the advisory committee.

[2] Approved Statistics Courses:

BIOM 601	Biostatistics I (4)
BIOM 602	Biostatistics II (4)
BIOM 603	Biostatistics III (4)
BIOM 621	Applied Multivariate Statistics (3)
GEOG606	Quantitative Spatial Analysis (3)

[3] Approved Courses for Wetland Science Specialization

Ecology

ENST 650	Wetland Ecology (3)	ENST 6xx	Created and Restored Wetlands (3)
ENST 460	Wildlife Management (3)	BSCI 464	Microbial Ecology (3)
BSCI 460	Plant Ecology (3)	MEES 610	Land Margin Interactions (4 credits)
PLSC 400	Environmental Plant Physiology	MEES 611	Estuarine Systems Ecology (3 credits)
MEES 645	Ecology and Management of Wetland and Submersed Aquatic Vegetation Systems (3)		

Soils

ENST 430**	Wetlands Soils (3)
ENST 421	Soil Chemistry (4)
ENST 721	Advanced Soil Chemistry (3)
ENST 414	Soil Morphology, Genesis, and Classification (4)

Hydrology

ENST 417	Soil Hydrology and Physics (3)
ENCE 431	Hydrologic Engineering (3)
ENCE 432	Ground Water Hydrology (3)
ENCE 630	Environmental and Water Resource Systems I (3)
GEOL 451	Groundwater Geology (3)
GEOL 452	Watershed and Wetland Hydrology (3)
GEOL 652	Advanced Watershed and Wetland Hydrology (3)

**As part of the continued reorganization of the ENST department, these courses are being reorganized and will also be offered at the 600 level

	committee.		

Table 4. Courses presently offered for graduate level credit by faculty in the Dept. of ENST

Acronym	Number	Title	Credits	Instructor
ENST	405**	Energy and Environment	3	Tilley
ENST	411**	Principles of Soil Fertility	3	Weil
ENST	413**	Soil and Water Conservation	3	Hill
ENST	414	Soil Morphology, Genesis and Classification	4	Needelman
ENST	415**	GIS Application in Soil Science	3	Needelman
ENST	417	Soil Hydrology and Physics	3	Hill
ENST	420	Soil Physical Properties Laboratory	1	Hill
ENST	421	Soil Chemistry	4	James
ENST	422	Soil Microbiology	3	
ENST	423**	Soil-Water Pollution	3	Steinhilber
ENST	424	Field Study in Soil Morphology	4	Rabenhorst
ENST	425**	Terrestrial Bioremediation	3	
ENST	430**	Wetland Soils	3	Rabenhorst
ENST	440**	Crops, Soils, and Civilization	3	James
ENST	441**	Sustainable Agriculture	3	Weil
ENST	442**	Remote Sensing of Agriculture and Natural Resources	3	Weismiller
ENST	444	Restoration Ecology	3	Tilley-Kangas
ENST	450**	Wetland Ecology	3	Baldwin
ENST	451	Water Quality: Field and Lab Analysis Methods	3	Baldwin
ENST	460	Principles of Wildlife Management	3	Adams
ENST	461	Urban Wildlife Management	3	Adams
ENST	462	Field Techniques in Wildlife Management	2	Adams
ENST	470	Natural Resources Management	4	Kangas
ENST	479	Tropical Ecology and Resource Management	3	Kangas
ENST	489	Field Experience	variable	Various
ENST	499	Special Topics in Natural Resource Sciences	variable	Various
ENST	608	Research Methods	variable	Various
ENST	689	Special Topics	variable	Various
ENST	689E	Soil Biochemistry and Microbial Ecology	3	James
ENST	689P	Scientific Communication and Profession Development	3	Needelman
ENST	711	Advanced Plant-Soil Relationships	2	Weil
ENST	722	Advanced Soil Chemistry	3	James
ENST	761	Methods in Pedological Investigations	4	Rabenhorst
ENST	789	Advances in Research	variable	Various
ENST	798	Graduate Seminar	1	Various
ENST	821	Advanced Methods of Soil Investigation	3	James
ENST	831	Soil Mineralogy	4	
ENST	832	Advanced Soil Physics	3	Hill
ENBE	462	Nonpoint Source Pollution Assessment Techniques	3	Felton
MEES	650	Wetland Ecology	3	Baldwin
MEES	698Z[4]	Special Topics in MEES: Energy and Environment	3	Tilley
ENBE	699D	Spec. Prob. in Biol. Engin: Ecological Decision Making	3	Tilley

**As part of the continued reorganization of the ENST department, these courses are being reorganized and will be offered at the 600 level

[4] This course is in the process of being changed to ENST605.

UNIVERSITY OF
MARYLAND
COLLEGE OF AGRICULTURE AND NATURAL RESOURCES
Department of Plant Science and Landscape Architecture

2102 Plant Sciences Building
College Park, Maryland 20742-4452
301.405.4356 TEL 301.314.9308 FAX

January 19, 2007

MEMORANDUM

TO: Frank J. Coale, Professor and Chair
Department of Environmental Science and Technology

FROM: William Kenworthy, Acting Chair
Department of Plant Science and Landscape Architecture
and
Jack Sullivan, Associate Professor and Coordinator
Landscape Architecture Program

RE: Support for Environmental Science and Technology

We are writing to express our support for the Department of Environmental Science and Technology Program/Curriculum Proposal. We appreciate the recent communication we have had regarding the proposed ENST concentrations and courses. We are especially grateful to have had clarification from your faculty in regard to the Ecological Technology and Design concentration, the content of this course of study, and the opportunities for future collaboration with the Department and the Landscape Architecture Program.

We look forward to working with you, the faculty, and the students in ENST. Our mutual interests and complementary programs will establish the University of Maryland as a national leader in environmental education, research, and application.

William Kenworthy

Jack Sullivan

MEES
MARINE ESTUARINE ENVIRONMENTAL SCIENCES GRADUATE PROGRAM

January 14, 2007

Dr. Frank Coale
Environmental Science and Technology
College of Agriculture
University of Maryland

Dr. Coale,

I am pleased to offer a letter of support for your proposed graduate program in environmental science and technology. Although the Marine, Estuarine, Environmental Sciences program will overlap a bit with your proposed program, as Director, I think the programs can be highly complimentary. We have long hoped to augment our involvement with the College of Agriculture but some Agriculture policies have been less than helpful in that regard. Your astute commitment to make sure that both ENST and MEES students advised by ENST faculty have equal opportunity for graduate support is a great step in the right direction to foster collaboration rather than competition.

Although I see little overlap with the proposed concentration in Ecological Design and Technology, there will likely be significant overlap with both Soil and Watershed Sciences and Wetland Science. We need to work to bring our respective groups together. Our watershed sciences faculty, including Claire Welty's group in the Center for Urban Environmental Research and Education (CUERE) at UMBC, will be highly relevant to your concentration. In addition, our wetland scientists, including faculty from the Horn Point Lab and College Park, will be interested in your Wetland Sciences concentration. It may behoove us to set up a seminar series in your department to have these faculty members come and speak to your faculty and students.

Please let me know if there is any thing I can do to help as you develop your graduate programs.

Sincerely,

Kennedy T. Paynter
Director

0105 Cole Student Activities Building, University of Maryland, College Park, MD 20742
301-405-6938 Fax: 301-314-4139 Email: mees@umd.edu www.mees.umd.edu

UNIVERSITY OF MARYLAND
COLLEGE OF CHEMICAL AND LIFE SCIENCES

Office of the Dean

Symons Hall
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www.chemlife.umd.edu

October 18, 2007

Dr. Frank J. Coale
Professor & Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA

Dear Frank:

Thank you for sharing the proposals for the new programs at the undergraduate and graduate levels in your department. We are glad to hear about the new programs and look forward to our collaboration and cooperation with them.

We clearly see a need for a number of your graduate initiatives. We also share the views of Dr. Paynter of MEES that there are substantial reasons for your program and MEES to collaborate and cooperate and that this will strengthen both programs. We certainly encourage these efforts, and see them as in the best interests of our colleges, graduate programs, and graduate students.

We also look forward to cooperation in undergraduate education. Our goal will be to ensure that the students added to our courses from your programs have places in our courses, but this may mean, as I discuss below, working through the University Planning Cycle to garner additional resources.

We do want to point out that while your newly proposed majors provide interesting new options to students, they do have some overlap with the ENSP-Biodiversity and Conservation and with the BSCI-Behavior, Ecology and Evolution concentration. It is worth noting that BOTH of these existing programs are small, so it is possible that your newly created programs may divide the existing population of students interested in these areas broadly. Thus, your new programs present the potential of creating three to four programs of very small enrollment as a result.

Your proposed new undergraduate programs have a significant number of course requirements and options in the College of Chemical and Life Sciences. All of your students will be required to take BSCI 105, 106, CHEM 131/132, and CHEM 231/232. Yet, all of these courses are currently under high enrollment pressure. The

Environmental Health concentration also requires BSCI 207, BSCI 223, and CHEM 241/242. The majority of these courses are lab courses. As a consequence, the projection of 30 new students/year from your program will have an impact on these high demand courses. Clearly, we will have to use the campus planning cycle process to try to add resources to accommodate these new demands.

Most upper level CLFS courses proposed for these majors are listed in large groups of electives. While some of these classes have enrollment capacity, others are filled currently by students in existing academic programs. Again, we will have to seek new resources for these courses if your programs reach the size you anticipate.

We certainly support your initiatives and we look forward to working with you to ensure that the students continue to have full access to our courses, while also ensuring that the additional students you bring in will also have sufficient access to meet their curricular requirements.

Sincerely,

Norma Allewell
Professor and Dean

UNIVERSITY OF MARYLAND
DEPARTMENT OF BIOLOGY
Behavior, Ecology, Evolution and Systematics Graduate Program

1210 Biology Psychology Building
College Park, Maryland 20742-4415
301.405.6887 TEL 301.314.9358 FAX

Dr. Frank J Coale, Chair
Department of Environmental Science and Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742

29 October 2007

Dear Frank,

I am writing in support of your newly restructured graduate programs in Environmental Science and Technology. At this time I do not see any great overlap or competition between our two graduate programs and view your initiative as very complementary to graduate training in the broad area of ecology at UMD. As director of the interdisciplinary graduate program in Behavior, Ecology, Evolution and Systematics (BEES) in the College of Chemical and Life Sciences, I hope that our two programs have opportunities to interact together on campus in the future. I wish you much success in this initiative.

Sincerely,

Michele R. Dudash

Dr. Michele R. Dudash
Director, BEES Graduate Program
Department of Biology
University of Maryland
College Park, MD 20742

UNIVERSITY OF
MARYLAND

College Park, Maryland 20742-1411
301.405.8000 TEL 301.314.9583 FAX
http://www.arch.umd.edu

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THE NATIONAL CENTER FOR SMART GROWTH RESEARCH AND EDUCATION

Office of the Dean

October 4, 2007

Frank J. Coale, Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742

Dear Frank:

I have reviewed the proposals for the new undergraduate and graduate programs in Environmental Science and Technology (ENST) and I thank you and members of the ENST faculty for meeting with me to discuss the proposals. As you know, faculty representatives from the School of Architecture, Planning and Preservation (ARCH) participated in our initial meeting and in subsequent collaborative discussions with ENST faculty. In summary, I believe that the proposed ESNT programs offer exciting opportunities for future collaboration with our own environmentally based proposal for a design and planning oriented undergraduate curriculum (to be titled ENDP) and I support the establishment of them all.

Working together, we can provide students with a broader exposure to environmental issues than either program could accomplish separately. For example, our existing ARCH course in Sustainability provides an immediate opportunity to commence collaboration by including ENST faculty as guest-lecturers on specific technological topics (e.g., ecosystem restoration or storm water management). Similarly, a proposed course, Ecological Design, may be cross-listed and/or co-taught by ARCH and ENST. This would provide students with exposure to both ARCH Environmental Design and ENST Ecological Design concepts and offerings. Many future collaborations exist for curricular connections between the programs.

Last, but not least, is concern over the use of the word "Design" in one of the proposed ENST areas of concentration. The word "Design" is an important aspect of our curriculum that we take very seriously. There are even current national trends to establish "Schools of Design" to supplant the more wordy string of disciplinary terms (like our own title). I realize that the label for an area of concentration within a major does not define the ENST program, but we must take care in the use of this term. I also understand that you have already changed the proposed name of this concentration once during this review process and you are willing to change it again to accommodate our needs. With the change of the name of your proposed concentration to Ecological Technology Design, we can offer our support for your proposed programs.

I look forward to continued conversations and future collaborations.

Best regards,

Garth Rockcastle, FAIA
Professor and Dean

UNIVERSITY OF MARYLAND

Graduate Program in Sustainable Development and Conservation Biology

3 November 2007

Dr. Frank J. Coale
Professor& Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA

Dear Frank,

I'm pleased to provide this letter of support for the proposed ENST graduate programs on behalf of the CONS (Sustainable Development and Conservation Biology) program. It is possible that the new ENST Ph.D. program would be of interest to some of the 15% of CONS graduates who go on to Ph.D. programs, and because the CONS students have broad interests and a lot of room for elective courses in their programs, some of the new ENST courses might also be of interest to them. We would also welcome ENST students in our CONS seminar (offered every semester), and there's the potential to offer this as a joint seminar (as we have previously with GEOG) if the topic for the semester is appropriate.

Sincerely,

Dr. David W. Inouye, Professor and Director
Sustainable Development and Conservation Biology
Department of Biology
University of Maryland
College Park, MD 20742
301-405-6946

THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM PROPOSAL

ORIGINAL

DIRECTIONS:

- Provide one form with original approval signatures in lines 1 - 4 for **each** proposed action. Keep this form to one page in length.
- Early consultation with the Office of the Associate Provost for Academic Planning & Programs is strongly recommended if there are questions or concerns, particularly with new programs.
- Please submit the signed form to Claudia Rector, Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.
- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.

DATE SUBMITTED: December 6, 2006

PCC LOG NO. 0606

COLLEGE/SCHOOL: College of Agriculture and Natural Resources

DEPARTMENT/PROGRAM: Department of Environmental Science and Technology

PROPOSED ACTION (*A separate form for each*) ADD X DELETE_____ CHANGE_____

DESCRIPTION (*Provide a succinct account of the proposed action. Details should be provided in an attachment. Provide **old** and **new** sample programs for curriculum changes.*)

Establish Doctor of Philosophy graduate program, Environmental Science and Technology, which will reside in the newly formed department of Environmental Science and Technology. The proposed Doctor of Philosophy program will consist of three specializations: 1) Soil and Watershed Sciences; 2) Ecological Technology Design; or 3) Wetland Science.

JUSTIFICATION/REASONS/RESOURCES (*Briefly explain the reason for the proposed action. Identify the source of new resources that may be required. Details should be provided in an attachment.*)

The reason for this proposed action is the reorganization, consolidation and defining of the current Ph.D. program that is managed by ENST faculty. There are no new resources requested.

APPROVAL SIGNATURES - ***Please print name, sign, and date***

1. Department Committee Chair _____ Dr. Andrew Baldwin
2. Department Chair _____ Dr. Frank J. Coale
3. College/School PCC Chair _____ 1/5/07 Dr. Mark Varner
4. Dean _____ Dr. Leon Slaughter
5. Dean of the Graduate School (if required) _____
6. Chair, Senate PCC _____ 11/16/07
7. Chair of Senate _____
8. Vice President for Academic Affairs & Provost _____

VPAAP 8-05

PROPOSAL FOR
NEW INSTRUCTIONAL PROGRAM
UNIVERSITY OF MARYLAND AT COLLEGE PARK, MARYLAND

Ph.D. GRADUATE PROGRAM IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

DEAN: CHENG-I WEI

AWARD TO BE OFFERED: PH.D. IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

PROPOSED INITIATION DATE: Fall 2008

I. OVERVIEW and RATIONALE

A. Briefly describe the nature of the proposed program and explain why the institution should offer it. [You may want to refer to student demand, market demand for graduates, institutional strengths, disciplinary trends, synergy with existing programs, and/or institutional strategic priorities.]

The Department of Environmental Science and Technology (ENST) was formed July, 2006, bringing together faculty from two departments in the College of Agriculture and Natural Resources: the soil science faculty from the former Department of Natural Resource Sciences and Landscape Architecture (NRSL), and most of the faculty from the former Department of Biological Resources Engineering (BRE). Simultaneous with the formation of ENST, the soil science option of the NRSC Ph.D. graduate program was transferred to the new ENST department.

Following the philosophy that underpinned the establishment of the new Department of Environmental Science and Technology, we acknowledge that numerous departments and units on the campus and in the system are engaged in various aspects of the environmental enterprise. As our graduate program grows, it will complement, and thus strengthen, existing efforts in the environmental arena. We will be intentional in our collaboration, cooperation and support of these programs.

As described above, we anticipate collaborations with a great many units on the campus and within the system. In particular, we recognize the valuable contributions of, and expect close collaborations with, programs in the following units with whom we have already had serious conversations: Architecture, Planning, and Preservation; Chemical and Life Sciences (BEES, CONS); Civil and Environmental Engineering; Geography (geospatial analysis, land use and global change); Geology; Marine Environmental and Estuarine Studies; Plant Science and Landscape Architecture. We anticipate and hope that there will be many others.

As a newly organized department, ENST proposes to offer a graduate program leading to the Doctor of Philosophy degree[1]. Candidates for the Ph.D. degree will work within one of three specializations: 1) Soil and Watershed Sciences; 2) Ecological Technology Design; or 3) Wetland Science. While this proposal creates new graduate programs for ENST, nearly all of the courses are already established and being taught by current ENST faculty. However, we do propose the creation of two new courses that will contribute to the ENST core (one of which has been taught before), and three new courses to support offerings in the Wetland Science and Ecological Technology Design specializations.

The specialization in Soil and Watershed Sciences is essentially identical to the Soil Science option of the Natural Resource Sciences (NRSC) program that was administered within the former Dept of NRSL and transferred to the ENST Dept. during the recent reorganization. (After the Soil and Watershed Sciences specialization is approved as part of the new ENST Ph.D. graduate program, the Soil Science option of the NRSC Ph.D. graduate program will be phased out.) This graduate program will continue to prepare students to address challenging environmental issues that involve the soil resource at field, landscape and watershed scales. Soils are the most complex and ecologically significant biogeochemical systems on Earth. Soil processes and the soil resource are critical to all terrestrial ecosystems from prairies to the Alaskan tundra, to wetlands, to our

[1] We propose that students admitted to the Soils option of the NRSC Ph.D. program after July 1, 2006 be permitted the opportunity of transferring into the ENST Ph.D. program, should they wish to do so.

cities, to forests to biofuel farms. Soil Science is at the center of the study of what the National Science Foundation terms the Critical Zone - the confluence of atmosphere, lithosphere, hydrosphere and biosphere near the surface of the Earth. The quality of the Soil Science program and faculty is already recognized nationally and internationally; the program now housed in ENST represents one of the top three Soil Science programs in the northeast USA (along with Cornell University and The Pennsylvania State University).

The specialization in Ecological Technology Design will be a distinct program on a national scale that prepares students to integrate natural systems with the built environment to solve environmental problems while achieving economic, ecological and social sustainability. The science and application of using natural systems, processes and organisms to address environmental issues has evolved during the last few decades to a mature level whereby there are strong employment opportunities for graduates that are educated jointly in ecology and technology. Examples of eco-technological applications include: the restoration of urban and rural streams, the creation of wastewater treatment wetlands, the design of raingardens and bioretention systems for low-impact stormwater management, the design of eco-industrial parks, the life cycle assessment of products for improved environmental performance, the bioremediation and phytoremediation of contaminated land and groundwater, ecological systems for by-product recovery, and filtration of contaminated air with bioreactors. The creation of this new specialty will place the University of Maryland at the frontier among public universities in offering such a forward looking program. Programs similar to this exist at Ohio State Univ., the Univ. of Florida and UC Berkeley. At its core the Ecological Technology Design program will build upon the expertise of the faculty from the former Biological Resources Engineering Department, and advance with contributions from faculty from the former NRSL Department and campus faculty outside the ENST Department. [Note: The Ecological Technology Design specialization will be the focus for the ENST faculty formerly of the Biological Resources Engineering Department. These faculty have advised students in the ENBE Ph.D. graduate program which was transferred to the College of Engineering's Bioengineering Department upon the 2006 reorganization and will be phased out over the next few years after the ENST Ph.D. graduate program is approved.]

The specialization in Wetland Science is intended to address the keen awareness among the Environmental community that wetlands represent a critical and understudied component of many larger ecosystems. Wetlands have rapidly gained public attention over the last two decades as they have been brought into the limelight by state and federal regulations and through the attention given such large scale environmental issues as hurricane Katrina. Several faculty recently united within the newly formed Dept. of ENST have for years conducted research and taught courses in Wetland science. This new organization provides a critical mass, greater cooperation and synergism in Wetland Science research and education and a real opportunity to move forward. Currently, universities with well recognized Wetland Science programs include, The University of Florida, Duke University, The Ohio State University and Louisiana State University. Our goal is for the University of Maryland to become recognized as a national and international leader in the area of Wetland Science, and for our Ph.D. graduate program to be sought as the destination of choice for the best students pursuing graduate studies in Wetland Science. What is true of Environmental Science in general, is also true of Wetland Science in particular – namely that there are many faculty in various units on this campus, and on other campuses in the system, that are involved in research and teaching in this area. In naming this as a specialization within the ENST Ph.D. graduate program we are not intending to claim exclusivity, but rather would vigorously work to raise the levels of collaboration and cooperation among faculty and among all interested units.

B. How big is the program expected to be? From what other programs serving current students, or from what new populations of potential students, onsite or offsite, are you expecting to draw?

The soils specialization of NRSC is currently housed in ENST, with a total of 18 graduate students (and this program has averaged 18 students over the last four years.), with about 40% of these being Ph.D. students. With the addition of two new specializations, over the next five years we expect this number to double, resulting in a total graduate enrollment of approximately 35 to 40 graduate students with approximately half of these students being enrolled in Ph.D. programs.

II. CURRICULUM

A. Provide a **full catalog description** of the proposed program, including educational objectives and any areas of concentration.

The Department of Environmental Science and Technology proposes to offer a program in graduate studies leading to the Doctor of Philosophy degree. Candidates for the Ph.D. degree will work within one of three specializations: 1) Soil and Watershed Sciences; 2) Ecological Technology Design; or 3) Wetland Science.

B. List the courses (number, title, semester credit hours) that would constitute the requirements and other components of the proposed program. Provide a catalog description for any courses that will be newly developed or substantially modified for the program.

Requirements for Graduate Programs in ENST

Environmental science and technology is by nature a multidisciplinary enterprise. Therefore, the graduate program requirements have been designed to provide a necessary curricular foundation while preserving maximum flexibility for the student in selecting coursework to support their research and educational objectives.

Requirements for the Doctor of Philosophy Degree

a. Required Coursework - Students in the Ph.D. program will be expected to design a focused, coherent program of study that must be approved by the student's Advisor and Advisory Committee and must provide the student with sufficient depth in the area of study to carry out the independent planned research. This program requires a minimum of 50 semester hours of coursework beyond the B.S. degree. All students in the Ph.D. program will be required to complete a core of courses that includes Research Principles and Methodology in Environmental Science and Technology (ENST 6XX) (3 credits), Communication and Professional Development in Environmental Science and Technology (ENST 7XX), two graduate level courses in statistics (from among BIOM 601, 602, 603, 621 or equivalent) and two semesters of Graduate Seminar (ENST 798) (2 credits). Students must have completed all coursework required for the M.S. degree in their area of specialization. In addition, students must complete 12 credits of dissertation research (ENST 898/899). Additional curriculum requirements are outlined below for each area of specialization. Details concerning requirements are also summarized in the appended summary table of requirements (Table 3).

i. Students in the Soil and Watershed Sciences specialization must complete one graduate level course in physical chemistry or biochemistry and at least one additional graduate level course in chemistry, biochemistry, physics, mathematics, engineering, or computer science.
ii. Students in the Ecological Technology Design specialization must have one graduate level course in ecosystem modeling and one additional graduate level course in ecology, ecological design or ecological engineering.
iii. Students in the Wetland Science specialization must have one graduate level course in modeling and two additional graduate level courses from within the areas of Ecology, Soil Science, or Hydrology.

b. Advancement to Candidacy - Students must pass a written and an oral comprehensive exam and prepare a written research proposal that must be approved by the student's Advisor and members of the Advisory Committee before the student will be advanced to candidacy.

c. Dissertation Defense – to earn the Ph.D. degree students must write and successfully defend a dissertation based upon original research.

New courses:

ENST 6xa RESEARCH PRINCIPLES AND METHODOLOGY IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY (3 credits)
Fundamentals of research strategies useful and appropriate to Environmental Science and Technology, including a survey of current methodologies available for field and laboratory based projects that researchers are likely to utilize.

ENST 6xb CREATED AND RESTORED WETLANDS (3 credits)
Principles and practices of designing and constructing wastewater treatment wetlands and restoring and creating natural wetlands.

ENST 6xc ECOLOGICAL TECHNOLOGY DESIGN (3 credits)
Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.

ENST 6xd ECOSYSTEM SIMULATION MODELING (3 credits)
Fundamentals of conceptualizing, developing, calibrating, validating and simulating mathematical models of ecosystems.

ENST 7xx COMMUNICATION AND PROFESSIONAL DEVELOPMENT IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY (2 credits)
Training in communication and professional development to prepare students to succeed in careers within the fields of environmental science and technology. Topics will include communication with academic and non-academic audiences, manuscript and technical writing, multi-disciplinary collaboration, management, professionalism, mentoring, leadership, ethics, job search, and career opportunities. Course emphasizes practical training through facilitated discussions and critique practicums.

C. Describe any selective admissions policy or special criteria for students selecting this field of study.

Basic Admissions Requirements for Graduate Studies in ENST

To be admitted to pursue the Ph.D. degree students must have completed an M.S. Degree in a closely related field[2] and must have fulfilled all admission requirements for the M.S. degree.

III. STUDENT LEARNING OUTCOMES AND ASSESSMENT

A. List the program's learning outcomes and explain how they will be measured.

B. Include a general assessment plan for the learning outcomes. **(In lieu of a narrative for both IIIA and IIIB, you may attach the program's learning outcomes assessment forms.)**

Learning Outcomes for the Graduate Program in ENST

Students completing a Ph.D. Degree in ENST:

1. will independently read and synthesize pertinent information from the body of published scientific literature
2. will independently plan, design and conduct original research following scientific protocols
3. will collect, analyze and interpret data from an original research project
4. will effectively and independently write original research findings for a scientific audience of a quality suitable for publication in an appropriate scientific journal
5. will orally communicate a technical summary of their original research effort to a scientific audience

Outcomes Assessment Schedule

The following events are included as regular components of the normal graduate student program and provide opportunity for outcome assessment. The approximate timing at which these events occur within a student's program is also provided.

For Ph.D. Students
Ph.D. Entrance Seminar – within first year
Ph.D. Qualifying Exam – normally during year three
Ph.D. Exit Seminar – at the end of the Ph.D. program
Ph.D. Dissertation – at the end of the Ph.D. program

[2] In special cases, exceptional students may be admitted to a Ph.D. program without first completing an M.S. degree. These students should have an exceptional academic record and test scores and should have demonstrated significant research experience during their B.S. program (such as completion of a research based honors thesis.)

Graduate Program in ENST Assessment Rubric

Each member of the assembled faculty committee should complete one of these forms for the student in question following the conclusion of the faculty discussion, but before the student returns to the room (if applicable). Do not identify yourself or the student by name on this form. Add your form to the envelope held by the Chair of this committee.

This is a:
____ M.S. Entrance Seminar ____ M.S. Thesis Defense ____ M.S. Paper ____ M.S. Qualifying Exam
____ Ph.D. Entr. Seminar ____ Ph.D. Qualifying Exam ____ Ph.D. Dissertation Defense

Semester: _____

	Check one for each listed criterion			
Criteria for scientific components:	Professional	Novice	Unacceptable	Not Applicable
Statement of problem is clear and well-conceptualized.				
There is appropriate use and synthesis of published literature.				
Research methods are well-selected and well-executed.				
Conclusions are well-justified.				

	Check one for each listed criterion			
Criteria for communication components:	Professional	Novice	Unacceptable	Not Applicable
The student observed time limitations, spoke with clarity and sense of organization, and overall gave a compelling oral performance.				
The student answered the questions faculty asked.				
The student answered questions in ways that deepened the discussion.				
The project is well-written.				
The project is publishable.				

	Check one for each listed criterion			
Criteria for knowledge components:	Professional	Novice	Unacceptable	Not Applicable
Student demonstrates a general knowledge of the field of study				
Student demonstrates knowledge in their area of specialization				
Student demonstrates knowledge of recent developments				

Comments (optional):

IV. FACULTY AND ORGANIZATION

A. Who will provide academic direction and oversight for the program? [This might be a department, a departmental subgroup, a list of faculty members, or some other defined group.]

The ENST graduate program will be administered entirely within the Department of Environmental Science and Technology by the Departmental Graduate Committee. The Graduate committee will be overseen by the Director of Graduate Studies who will be appointed by the ENST department Chair. The ENST graduate committee will consist of the Director of Graduate Studies and four additional members, who must be associate or full members of the graduate faculty. These committee members will be elected by the ENST faculty and will serve for a period of four years with one committee member rotating off at the end of each year.

The ENST Departmental Graduate Committee will be responsible: 1) to periodically review and to propose to the ENST faculty any needed policy changes related to the Graduate Program; 2) to review and propose action to the graduate school on individuals making application to the ENST graduate program; 3) to evaluate, rank and make recommendations to the ENST chair regarding the merit of graduate applicants for consideration in awarding departmental assistantships.

Members of the ENST faculty who will advise graduate students within various specializations of the ENST graduate program include the following:

Name	Rank	Program Specializations		
		S&W Sci.	ETD	Wetl. Sci.
Adams, Lowell	Adj Assoc Prof		x	x
Baldwin, Andrew	Associate Prof		x	x
Becker, Jennifer	Assistant Prof		x	
Coale, Frank	Professor	x		
Felton, Gary	Associate Prof	x	x	
Hill, Robert	Professor	x		
James, Bruce	Professor	x		
Kangas, Patrick	Associate Prof		x	x
McGrath, Joshua	Assistant Prof	x		
Miller, Ray	Professor	x		
Meisinger, J.J.	Adj. Assoc. Prof	x		
Momen, Bahram	Associate Prof	x		x
Needelman, Brian	Assistant Prof	x		x
Rabenhorst, Marty	Professor	x		x
Ross, David	Professor		x	
Tilley, David	Assistant Prof		x	x
Weil, Ray	Professor	x		
Weismiller, Richard	Professor	x	x	
Wheaton, Fred	Professor		x	

B. If the program is not to be housed and administered within a single academic unit, provide details of its administrative structure. This should include at least the following:

Not Applicable

V. OFF CAMPUS PROGRAMS

Not Applicable

VI. OTHER ISSUES

A. Describe any cooperative arrangements with other institutions or organizations that will be important for the success of this program.

Because many of the faculty within the Department of ENST historically have collaborated with faculty from other departments on the campus and other units in the system, we intend for this to continue. One of the principles that underpinned the establishment of the new Department of Environmental Science and Technology was the acknowledgement that numerous departments and units on the campus and in the system are engaged in particular aspects of environmental studies. Through continued informal cooperation, we intend for the graduate program in ENST to complement, and thus strengthen, environmental work on the campus and in the system.

In particular, we acknowledge and affirm the importance of the following programs and

Although not involving formally structured relationships, we anticipate that faculty and students within the ENST graduate program will especially collaborate and interact with faculty from these programs.

B. Will the program require or seek accreditation? **NO.** Is it intended to provide certification or licensure for its graduates? **NO..** Are there academic or administrative constraints as a consequence? **NO.**

VII. COMMITMENT TO DIVERSITY

Identify specific actions and strategies that will be utilized to recruit and retain a diverse student body.

(1) Increase communications with undergraduate programs, and solicit applications from students enrolled, at 1890 Land Grant Institutions and historically black colleges, both within and without USM;
(2) Continue faculty involvement with International Programs in Agriculture and Natural Resources (IPAN), which will bring in students from all over the world.

VIII. REQUIRED PHYSICAL RESOURCES

A. Additional library and other information resources required to support the proposed program. You must include a formal evaluation by Library staff. NONE.

B. Additional facilities, facility modifications, and equipment that will be required. This is to include faculty and staff office space, laboratories, special classrooms, computers, etc. NONE.

C. Impact, if any, on the use of existing facilities and equipment. Examples are laboratories, computer labs, specially equipped classrooms, and access to computer servers. NONE. We anticipate that students will be accommodated within the currently available office and laboratory space.

IX. RESOURCE NEEDS and SOURCES

Describe the resources that are required to offer this program, and the source of these resources. Project this for five years. In particular:

A. List new courses to be taught, and needed additional sections of existing courses. Describe the anticipated advising and administrative loads. Indicate the personnel resources (faculty, staff, and teaching assistants) that will be needed to cover all these responsibilities.

Most of the ENST courses that will be utilized in the ENST graduate program are currently taught by ENST faculty. We are proposing the creation of five new courses (listed under section II.B.) for the graduate programs in ENST. These new courses will be partially supported by existing faculty and will also be partly supported by new faculty lines that have been requested in the ENST undergraduate proposal.

B. List new faculty, staff, and teaching assistants needed for the responsibilities in A, and indicate the source of the resources for hiring them.

There are new faculty lines that are being requested in the ENST undergraduate program proposal. These new faculty will partially support the new graduate courses as will also the current ENST faculty.

C. Some of these teaching, advising, and administrative duties may be covered by existing faculty and staff. Describe your expectations for this, and indicate how the current duties of these individuals will be covered, and the source of any needed resources.

This proposal creates an Ph.D. program within ENST, with specializations supported by courses that are, for the most part, already being taught through the existing faculty in ENST. Most of the teaching and advising for the new program will be covered by existing ENST faculty as they have been doing for the Ph.D. programs in NRSC and ENBE prior to the reorganization and subsequent creation of ENST. The new faculty hires described in the ENST undergraduate proposal will also partially support the teaching of the new proposed courses for the graduate program.

D. Identify the source to pay for the required physical resources identified in Section VIII. above. **N/A.**

E. List any other required resources and the anticipated source for them. ***NONE.***

F. Provide the information requested in Table 1 and Table 2 (for Academic Affairs to include in the external proposal submitted to USM and MHEC). Tables (which reflect the projections for both the M.S. program and the Ph.D. program) are attached.

BUDGET NARRATIVE

The proposals for new M.S. and Ph.D. instructional programs in Environmental Science and Technology (ENST) are inextricably linked with the concurrent proposal for a new ENST undergraduate (B.S.) program. For clarity and ease of presentation, all projected changes in total ENST instructional program resources, exclusive of graduate student tuition, are reflected in the undergraduate program proposal budget. In summary, the undergraduate program proposal budget accounts for four new instructional faculty positions, four new graduate teaching assistant positions, resources for library operations and resources for modest facilities renovation infused over a period of four years. These new program resources represent a reallocation of existing Department, College, and Campus funds. The new faculty, teaching assistant, library support and facilities renovation resources outlined in the undergraduate proposal will be combined with existing resources to deliver both graduate and undergraduate ENST programs.

TABLE 1: RESOURCES

Currently, ENST has 5.69 FTE instructional faculty positions. The Department will allocate internal resources to support 1.5 FTE Administrative Staff support for the proposed graduate programs (M.S. & Ph.D.). Tuition revenue was calculated based on projected student numbers and the following assumptions regarding tuition sources: 40% in-state students, 60% out-of-state students, and 5% annual tuition increase beginning in Year 3. Currently, ENST graduate programs have an enrollment of approximately 15 students. We project that the proposed ENST graduate programs will attract 5 new full-time students per year for a total of 40 graduate students (M.S. & Ph.D.) by Year 5.

TABLE 2: EXPENDITURES

Currently, ENST has 5.69 FTE instructional faculty positions. There are no changes proposed for faculty, administrative or support staff expenditures that are directly attributed to the graduate program proposals.

TABLE 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
	2007-08	2008-09	2009-10	2010-11	2011-12
1. Reallocated Funds (**a + b**, below)	$522,747	$522,747	$522,747	$522,747	$522,747
Department, Chair ENST					
a. Instructional Faculty Salary	$462,747	$462,747	$462,747	$462,747	$462,747
Instructional Faculty, FTEs	5.69	5.69	5.69	5.69	5.69
b. Administrative Staff Salary	$60,000	$60,000	$60,000	$60,000	$60,000
Administrative Staff, FTEs	1.5	1.5	1.5	1.5	1.5
2. Tuition / Fee Revenue (**f + k**, below)	$65,569	$131,138	$206,535	$289,164	$379,505
c. Additional New Full-Time Students	5	5	5	5	5
d. Additional Accumulated New Students	5	10	15	20	25
e. Annual Tuition Rate (assumes 40% in-state, 60% out-of-state, 5% tuition increase annually beginning in year 3)	$10,811	$10,811	$11,351	$11,919	$12,515
f. Annual Full-Time Revenue (**d x e**)	$54,055	$108,110	$170,265	$238,380	$312,875
g. Additional New Part-Time Students	1	1	1	1	1
h. Additional Accumulated New Part-Time	1	2	3	4	5
i. Part-Time Credit Hour Rate (assumes 90% in-state, 10% out-of-state, 5% tuition increase annually beginning in year 3)	$1,919	$1,919	$2,015	$2,116	$2,221
j. Annual Part-Time Credit Hours	6	6	6	6	6
k. Total Part-Time Revenue (**h x i x j**)	$11,514	$23,028	$36,270	$50,784	$66,630
3. Grants, Contracts & Other External Sources	$0	$0	$0	$0	$0
4. Other Sources	$0	$0	$0	$0	$0
TOTAL (add 1 + 2 + 3 + 4)	$588,316	$653,885	$729,282	$811,911	$902,252

TABLE 2: EXPENDITURES

Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
	2007-08	2008-09	2009-10	2010-11	2011-12
1. Total Faculty Expenses (b+c, below)	$601,571	$601,571	$601,571	$601,571	$601,571
a. Instructional Faculty, FTEs	5.69	5.69	5.69	5.69	5.69
b. Total Faculty Salary	$462,747	$462,747	$462,747	$462,747	$462,747
c. Total Faculty Benefits	$138,824	$138,824	$138,824	$138,824	$138,824
2. Total Administrative Staff Expenses (d+e, below)	$78,000	$78,000	$78,000	$78,000	$78,000
d. Administrative Staff, FTEs	1.5	1.5	1.5	1.5	1.5
e. Total Administrative Staff Salary	$60,000	$60,000	$60,000	$60,000	$60,000
f. Total Administrative Staff Benefits	$18,000	$18,000	$18,000	$18,000	$18,000
3. Total Support Staff Expenses (h+i, below)	$120,900	$120,900	$120,900	$120,900	$120,900
g. Support Staff, FTEs	3.0	3.0	3.0	3.0	3.0
h. Total Support Staff Salary	$93,000	$93,000	$93,000	$93,000	$93,000
i. Total Support Staff Benefits	$27,900	$27,900	$27,900	$27,900	$27,900
4. Equipment	$0	$0	$0	$0	$0
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7. Other Expenses	$0	$0	$0	$0	$0
TOTAL (add 1+2+3+4+5+6+7)	$800,471	$800,471	$800,471	$800,471	$800,471

Table 3. ENST Ph.D. Graduate Program - Summary of Requirements			
Area of Specialization	**Soil and Watershed Sciences**	**Ecological Technology Design**	**Wetland Science**
Ph.D. Dept Admission	M.S. Degree in a closely related field[3]; All admission requirements for the M.S. degree (ie Basic Science Requirement, GRE, etc).		
Grad School Requirements	12 credits of dissertation research (899); A dissertation based on original research		
ENST Core Requirements	ENST 6XX - Research Principles and Methodology in Environmental Science and Technology (3 credits) ENST 7XX - Communication and Professional Development in Environmental Science and Technology (2 credits) ENST 798 Graduate Seminar (2 semesters – 2 credits) Two graduate level statistics courses (from among, or equivalent to, those on approved list)[4];		
Other ENST Requirements	Students are expected to complete a minimum of 50 credits beyond the B.S. degree (In addition to research credits 898 and 899)		
Specialization Requirements	Completion of M.S. specialization requirement plus one semester of graduate level physical chemistry or biochemistry and at least one additional graduate level course in chemistry, biochemistry, physics, mathematics, engineering, or computer science. All courses to be approved by the advisory committee.	Completion of M.S. specialization requirement plus one semester of graduate level systems modeling and one additional graduate level course in ecology, ecological design or ecological engineering. All courses to be approved by the advisory committee.	Completion of M.S. specialization requirement plus one graduate level course in modeling; two additional graduate level courses from within the areas of Ecology, Soil Science, or Hydrology. All courses to be approved by the advisory committee.

[3] In special cases, exceptional students may be admitted to a Ph.D. program without first completing an M.S. degree. These students should have an exceptional academic record and test scores and should have demonstrated significant research experience during their B.S. program (such as completion of a research based honors thesis.)

[4] Approved Statistics Courses:

BIOM 601	Biostatistics I (4)
BIOM 602	Biostatistics II (4)
BIOM 603	Biostatistics III (4)
BIOM 621	Applied Multivariate Statistics (3)
GEOG606	Quantitative Spatial Analysis (3)

Table 4. Courses presently offered for graduate level credit by faculty in the Dept. of ENST

Acronym	Number	Title	Credits	Instructor
ENST	405**	Energy and Environment	3	Tilley
ENST	411**	Principles of Soil Fertility	3	Weil
ENST	413**	Soil and Water Conservation	3	Hill
ENST	414	Soil Morphology, Genesis and Classification	4	Needelman
ENST	415**	GIS Application in Soil Science	3	Needelman
ENST	417	Soil Hydrology and Physics	3	Hill
ENST	420	Soil Physical Properties Laboratory	1	Hill
ENST	421	Soil Chemistry	4	James
ENST	422	Soil Microbiology	3	
ENST	423**	Soil-Water Pollution	3	Steinhilber
ENST	424	Field Study in Soil Morphology	4	Rabenhorst
ENST	425**	Terrestrial Bioremediation	3	
ENST	430**	Wetland Soils	3	Rabenhorst
ENST	440**	Crops, Soils, and Civilization	3	James
ENST	441**	Sustainable Agriculture	3	Weil
ENST	442**	Remote Sensing of Agriculture and Natural Resources	3	Weismiller
ENST	444	Restoration Ecology	3	Tilley-Kangas
ENST	450**	Wetland Ecology	3	Baldwin
ENST	451	Water Quality: Field and Lab Analysis Methods	3	Baldwin
ENST	460	Principles of Wildlife Management	3	Adams
ENST	461	Urban Wildlife Management	3	Adams
ENST	462	Field Techniques in Wildlife Management	2	Adams
ENST	470	Natural Resources Management	4	Kangas
ENST	479	Tropical Ecology and Resource Management	3	Kangas
ENST	489	Field Experience	variable	Various
ENST	499	Special Topics in Natural Resource Sciences	variable	Various
ENST	608	Research Methods	variable	Various
ENST	689	Special Topics	variable	Various
ENST	689E	Soil Biochemistry and Microbial Ecology	3	James
ENST	689P	Scientific Communication and Profession Development	3	Needelman
ENST	711	Advanced Plant-Soil Relationships	2	Weil
ENST	722	Advanced Soil Chemistry	3	James
ENST	761	Methods in Pedological Investigations	4	Rabenhorst
ENST	789	Advances in Research	variable	Various
ENST	798	Graduate Seminar	1	Various
ENST	821	Advanced Methods of Soil Investigation	3	James
ENST	831	Soil Mineralogy	4	
ENST	832	Advanced Soil Physics	3	Hill
ENBE	462	Nonpoint Source Pollution Assessment Techniques	3	Felton
MEES	650	Wetland Ecology	3	Baldwin
MEES	698Z[5]	Special Topics in MEES: Energy and Environment	3	Tilley
ENBE	699D	Spec. Prob. in Biol. Engin: Ecological Decision Making	3	Tilley

**As part of the continued reorganization of the ENST department, these courses are being reorganized and will also be offered at the 600 level

[4] This course is in the process of being changed to ENST605.

UNIVERSITY OF
MARYLAND
COLLEGE OF AGRICULTURE AND NATURAL RESOURCES
Department of Plant Science and Landscape Architecture

2102 Plant Sciences Building
College Park, Maryland 20742-4452
301.405.4356 TEL 301.314.9308 FAX

January 19, 2007

MEMORANDUM

TO: Frank J. Coale, Professor and Chair
Department of Environmental Science and Technology

FROM: William Kenworthy, Acting Chair
Department of Plant Science and Landscape Architecture
and
Jack Sullivan, Associate Professor and Coordinator
Landscape Architecture Program

RE: Support for Environmental Science and Technology

We are writing to express our support for the Department of Environmental Science and Technology Program/Curriculum Proposal. We appreciate the recent communication we have had regarding the proposed ENST concentrations and courses. We are especially grateful to have had clarification from your faculty in regard to the Ecological Technology and Design concentration, the content of this course of study, and the opportunities for future collaboration with the Department and the Landscape Architecture Program.

We look forward to working with you, the faculty, and the students in ENST. Our mutual interests and complementary programs will establish the University of Maryland as a national leader in environmental education, research, and application.

William Kenworthy

Jack Sullivan

MEES
MARINE ESTUARINE ENVIRONMENTAL SCIENCES GRADUATE PROGRAM

January 14, 2007

Dr. Frank Coale
Environmental Science and Technology
College of Agriculture
University of Maryland

Dr. Coale,

I am pleased to offer a letter of support for your proposed graduate program in environmental science and technology. Although the Marine, Estuarine, Environmental Sciences program will overlap a bit with your proposed program, as Director, I think the programs can be highly complimentary. We have long hoped to augment our involvement with the College of Agriculture but some Agriculture policies have been less than helpful in that regard. Your astute commitment to make sure that both ENST and MEES students advised by ENST faculty have equal opportunity for graduate support is a great step in the right direction to foster collaboration rather than competition.

Although I see little overlap with the proposed concentration in Ecological Design and Technology, there will likely be significant overlap with both Soil and Watershed Sciences and Wetland Science. We need to work to bring our respective groups together. Our watershed sciences faculty, including Claire Welty's group in the Center for Urban Environmental Research and Education (CUERE) at UMBC, will be highly relevant to your concentration. In addition, our wetland scientists, including faculty from the Horn Point Lab and College Park, will be interested in your Wetland Sciences concentration. It may behoove us to set up a seminar series in your department to have these faculty members come and speak to your faculty and students.

Please let me know if there is any thing I can do to help as you develop your graduate programs.

Sincerely,

Kennedy T. Paynter
Director

0105 Cole Student Activities Building, University of Maryland, College Park, MD 20742
301-405-6938 Fax: 301-314-4139 Email: mees@umd.edu www.mees.umd.edu

UNIVERSITY OF MARYLAND
COLLEGE OF CHEMICAL AND LIFE SCIENCES

Office of the Dean

Symons Hall
College Park, Maryland 20742
301.405.2071 TEL 301.314.9949 FAX
www.chemlife.umd.edu

October 18, 2007

Dr. Frank J. Coale
Professor & Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA

Dear Frank:

Thank you for sharing the proposals for the new programs at the undergraduate and graduate levels in your department. We are glad to hear about the new programs and look forward to our collaboration and cooperation with them.

We clearly see a need for a number of your graduate initiatives. We also share the views of Dr. Paynter of MEES that there are substantial reasons for your program and MEES to collaborate and cooperate and that this will strengthen both programs. We certainly encourage these efforts, and see them as in the best interests of our colleges, graduate programs, and graduate students.

We also look forward to cooperation in undergraduate education. Our goal will be to ensure that the students added to our courses from your programs have places in our courses, but this may mean, as I discuss below, working through the University Planning Cycle to garner additional resources.

We do want to point out that while your newly proposed majors provide interesting new options to students, they do have some overlap with the ENSP-Biodiversity and Conservation and with the BSCI-Behavior, Ecology and Evolution concentration. It is worth noting that BOTH of these existing programs are small, so it is possible that your newly created programs may divide the existing population of students interested in these areas broadly. Thus, your new programs present the potential of creating three to four programs of very small enrollment as a result.

Your proposed new undergraduate programs have a significant number of course requirements and options in the College of Chemical and Life Sciences. All of your students will be required to take BSCI 105, 106, CHEM 131/132, and CHEM 231/232. Yet, all of these courses are currently under high enrollment pressure. The

Environmental Health concentration also requires BSCI 207, BSCI 223, and CHEM 241/242. The majority of these courses are lab courses. As a consequence, the projection of 30 new students/year from your program will have an impact on these high demand courses. Clearly, we will have to use the campus planning cycle process to try to add resources to accommodate these new demands.

Most upper level CLFS courses proposed for these majors are listed in large groups of electives. While some of these classes have enrollment capacity, others are filled currently by students in existing academic programs. Again, we will have to seek new resources for these courses if your programs reach the size you anticipate.

We certainly support your initiatives and we look forward to working with you to ensure that the students continue to have full access to our courses, while also ensuring that the additional students you bring in will also have sufficient access to meet their curricular requirements.

Sincerely,

Norma Allewell
Professor and Dean

UNIVERSITY OF MARYLAND
DEPARTMENT OF BIOLOGY
Behavior, Ecology, Evolution and Systematics Graduate Program

1210 Biology Psychology Building
College Park, Maryland 20742-4415
301.405.6887 TEL 301.314.9358 FAX

Dr. Frank J Coale, Chair
Department of Environmental Science and Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742

29 October 2007

Dear Frank,

I am writing in support of your newly restructured graduate programs in Environmental Science and Technology. At this time I do not see any great overlap or competition between our two graduate programs and view your initiative as very complementary to graduate training in the broad area of ecology at UMD. As director of the interdisciplinary graduate program in Behavior, Ecology, Evolution and Systematics (BEES) in the College of Chemical and Life Sciences, I hope that our two programs have opportunities to interact together on campus in the future. I wish you much success in this initiative.

Sincerely,

Michele R. Dudash

Dr. Michele R. Dudash
Director, BEES Graduate Program
Department of Biology
University of Maryland
College Park, MD 20742

UNIVERSITY OF
MARYLAND

College Park, Maryland 20742-1411
301.405.8000 TEL 301.314.9583 FAX
http://www.arch.umd.edu

SCHOOL OF ARCHITECTURE, PLANNING, AND PRESERVATION
ARCHITECTURE • URBAN STUDIES AND PLANNING • HISTORIC PRESERVATION
THE NATIONAL CENTER FOR SMART GROWTH RESEARCH AND EDUCATION

Office of the Dean

October 4, 2007

Frank J. Coale, Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742

Dear Frank:

I have reviewed the proposals for the new undergraduate and graduate programs in Environmental Science and Technology (ENST) and I thank you and members of the ENST faculty for meeting with me to discuss the proposals. As you know, faculty representatives from the School of Architecture, Planning and Preservation (ARCH) participated in our initial meeting and in subsequent collaborative discussions with ENST faculty. In summary, I believe that the proposed ESNT programs offer exciting opportunities for future collaboration with our own environmentally based proposal for a design and planning oriented undergraduate curriculum (to be titled ENDP) and I support the establishment of them all.

Working together, we can provide students with a broader exposure to environmental issues than either program could accomplish separately. For example, our existing ARCH course in Sustainability provides an immediate opportunity to commence collaboration by including ENST faculty as guest-lecturers on specific technological topics (e.g., ecosystem restoration or storm water management). Similarly, a proposed course, Ecological Design, may be cross-listed and/or co-taught by ARCH and ENST. This would provide students with exposure to both ARCH Environmental Design and ENST Ecological Design concepts and offerings. Many future collaborations exist for curricular connections between the programs.

Last, but not least, is concern over the use of the word "Design" in one of the proposed ENST areas of concentration. The word "Design" is an important aspect of our curriculum that we take very seriously. There are even current national trends to establish "Schools of Design" to supplant the more wordy string of disciplinary terms (like our own title). I realize that the label for an area of concentration within a major does not define the ENST program, but we must take care in the use of this term. I also understand that you have already changed the proposed name of this concentration once during this review process and you are willing to change it again to accommodate our needs. With the change of the name of your proposed concentration to Ecological Technology Design, we can offer our support for your proposed programs.

I look forward to continued conversations and future collaborations.

Best regards,

Garth Rockcastle, FAIA
Professor and Dean

UNIVERSITY OF
MARYLAND

Graduate Program in Sustainable Development and Conservation Biology

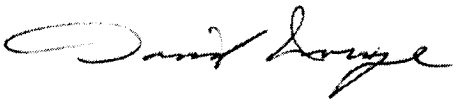
3 November 2007

Dr. Frank J. Coale
Professor& Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA

Dear Frank,

I'm pleased to provide this letter of support for the proposed ENST graduate programs on behalf of the CONS (Sustainable Development and Conservation Biology) program. It is possible that the new ENST Ph.D. program would be of interest to some of the 15% of CONS graduates who go on to Ph.D. programs, and because the CONS students have broad interests and a lot of room for elective courses in their programs, some of the new ENST courses might also be of interest to them. We would also welcome ENST students in our CONS seminar (offered every semester), and there's the potential to offer this as a joint seminar (as we have previously with GEOG) if the topic for the semester is appropriate.

Sincerely,



Dr. David W. Inouye, Professor and Director
Sustainable Development and Conservation Biology
Department of Biology
University of Maryland
College Park, MD 20742
301-405-6946

Appendix A. Results of market survey of Universities offering programs similar or related to the proposed ENST concentrations. When information was available, numbers of enrolled students are listed in parentheses.

Program and University	Programs Similar to Ecological Technology and Design	Programs Similar to Environmental Health
University:	University of California Berkeley	University of California Davis
Department or College:	Civil & Environmental Engineering	College of Agriculture and Natural Resources
Program or Specialty:	Ecological Engineering	Environmental Sciences
Operational or In Development:	Operational	Operational
Graduate or Undergraduate:	Graduate	Undergraduate (604)
University:	Ohio State University	University of Washington
Department or College:	Food, Agricultural and Biological Engineering	School of Public Health
Program or Specialty:	Biological & Ecological Engineering	Environmental Health
Operational or In Development:	Operational	Operational
Graduate or Undergraduate:	Both	Undergraduate (56)
University:	University of Florida	University of Washington
Department or College:	Environmental Engineering Sciences	Interdisciplinary Arts and Sciences
Program or Specialty:	Systems Ecology and Ecological Engineering	Environmental Science
Operational or In Development:	Operational	Operational
Graduate or Undergraduate:	Graduate (27) and Undergraduate (60)	Undergraduate (60 majors and 10 minors)
University:	University of Georgia	Rutgers University
Department or College:	Biological & Agricultural Engineering	School of Environmental and Biological Sciences
Program or Specialty:	Biological Engineering (Environmental/Ecological)	Environmental Sciences (includes environmental health and environmental science options)
Operational or In Development:	Operational	Operational
Graduate or Undergraduate:	Graduate	Undergraduate (400)

APPENDIX B – Market Survey

Program and University	Programs Similar to Ecological Technology and Design	Programs Similar to Environmental Health
University:	State University of New York-College of Environmental Science and Forestry (SUNY-ESF)	Duke University
Department or College:	Environmental Resources & Forest Engineering	Nicholas School of the Environment and Earth Sciences
Program or Specialty:	Ecological Engineering	Environmental Sciences
Operational or In Development:	In Development	Operational
Graduate or Undergraduate:	Graduate	Undergraduate (45-90 plus 20 more in Earth and Ocean Sciences)
University:	University of Vermont	University of Vermont
Department or College:	School of Environment and Natural Resources	School of Environment and Natural Resources
Program or Specialty:	Certificate in Ecological Design	Environmental Sciences and Environmental Studies
Operational or In Development:	In Development	Operational
Graduate or Undergraduate:	Both	Undergraduate (110 in Env. Sci. and 101 in Env. Studies)
University:	Oregon State University	University of Western Ontario
Department or College:	Biological & Ecological Engineering	School of Medicine and Dentistry
Program or Specialty:	Biological & Ecological Engineering	Ecosystem Health (27 credit hours required courses plus 4 electives)
Operational or In Development:	Graduate operation, undegraduate in development	Operational
Graduate or Undergraduate:	Graduate (8) and Undergraduate (in development)	All medical school students (135)
University:	Purdue University	Boston University
Department or College:	College of Engineering	Department of Environmental Health
Program or Specialty:	Division of Environmental & Ecological Engineering	Environmental Health
Operational or In Development:	In Development	Operational
Graduate or Undergraduate:	Both	Graduate

Program and University	Programs Similar to Ecological Technology and Design	Programs Similar to Environmental Health
University:		University of Cincinnati
Department or College:		Department of Environmental Health
Program or Specialty:		Environmental Health (4 option areas)
Operational or In Development:		Operational
Graduate or Undergraduate:		Graduate
University:		University of Michigan
Department or College:		Department of Environmental Health Sciences
Program or Specialty:		Environmental Health
Operational or In Development:		Operational
Graduate or Undergraduate:		Graduate
University:		Johns Hopkins University
Department or College:		Department of Environmental Health Sciences
Program or Specialty:		Environmental Health, Environmental Health Engineering, Occupational and Environmental Health
Operational or In Development:		Operational
Graduate or Undergraduate:		Graduate

APPENDIX C
JOB OPPORTUNITIES FOR ENST GRADUATES

Appendix C. Professional employment opportunities for graduates from ENST concentrations.

	Ecological Technology and Design	Environmental Health
Occupations	ecological scientist ecosystem restoration specialist energy analyst environmental analyst environmental consultant environmental manager environmental planner environmental regulatory compliance officer environmental scientist environmental site assessor environmental technician forest manager green technology design expert natural resource manager stream restoration ecologist sustainable agriculture specialist sustainable building designer water resource manager wetland engineer wetland scientist	air quality scientist ecological risk assessor environmental affairs manager environmental biologist environmental consultant environmental health professional environmental impact analyst environmental legal professional environmental scientist environmental toxicologist epidemiologist health officer industrial hygienist laboratory director manager of environmental affairs public health educator public health inspector risk manager
Employers	Private consulting firms; land development and construction corporations; industrial manufacturing corporations; federal, state and local government; international non-governmental organizations.	State and federal environmental agencies; the U.S. Military; private institutes; petrochemical industries; manufacturing industries; private and public law offices; research laboratories.

APPENDIX D
LETTERS OF SUPPORT FOR THE ENST PROGRAM

UNIVERSITY OF
MARYLAND

Environmental Science and Policy Program 0102 Symons Hall College Park, MD 20742 301-405-8573

MEMORANDUM

TO: Andrew Baldwin, Director of Undergraduate Programs
ENST

FROM: Bruce James, Director of Env. Sci. and Policy Program

RE: Support of new ENST major curricula

I am writing in support of the new major curricula being developed in the Department of Environmental Science and Technology. There will be many opportunities for synergy between ENSP and these new undergraduate programs in ENST, and I look forward to seeking ways that these programs can mutually support innovative, forward-looking courses for our undergraduates. ENSP is now administratively housed within ENST, but it maintains its multi-disciplinarity and independence as a Campus-wide program supported by AGNR, CLSC, CMPS, and BSOS.

Issues of course content overlap, scheduling conflicts, and enrollment management can be addressed as the need arises and in the planning stages for the new majors. Using ENSP 101, 102, 386, 399, and 400 in the new ENST major curricula can be considered as an efficient way to bring students and professors with diverse backgrounds together into the same classroom.

Bruce R James

cc. Frank
Bill)
Levine

UNIVERSITY OF MARYLAND
OFFICE OF THE PRESIDENT

Main Administration Building
College Park, Maryland 20742
301.405.5803 TEL 301.314.9560 FAX

April 4, 2007

RECEIVED
APR 12 2007
Dean's Office
College of Ag & Natural Resources

Chancellor William E. Kirwan
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783

Dear Chancellor Kirwan:

The College of Agriculture and Natural Resources has proposed to split and rename the the B.S. in Natural Resource Sciences. The degree is presently comprised of six concentrations. The reorganized degree would include five of the six concentrations (Horticulture and Crop Production, Landscape Management, Plant Science, Turf and Golf Course Management, and Urban Forestry) and would be known as the B.S. in Plant Sciences. Although the degree would remain essentially the same, the new name would more closely align with the Department of Plant Sciences established in last year's reorganization of the College of Agriculture and Natural Resources. The sixth concentration (Conservation of Soil, Water, and the Environment), would continue to be known as the B.S. in Natural Resource Sciences for a short time until it can be incorporated into a new degree in Environmental Science and Technology, for which a proposal is currently underway.

The proposal has been endorsed by the appropriate faculty and administrative committees concerned and was recommended for approval by the College Park Senate at its meeting on March 12, 2007.

I have accepted this recommendation and ask that you approve the splitting and renaming of this degree.

Yours sincerely,

C. D. Mote, Jr.
President

CWR/

Cc: William Destler, Senior Vice President for Academic Affairs and Provost
Cheng-I Wei, Dean, College of Agriculture & Natural Resources
Theresa Hollander, Associate Vice Chancellor for Academic Affairs

UNIVERSITY OF MARYLAND
COLLEGE OF AGRICULTURE AND NATURAL RESOURCES
Department of Plant Science and Landscape Architecture

2102 Plant Sciences Building
College Park, Maryland 20742-4452
301.405.4356 TEL 301.314.9308 FAX

January 19, 2007

MEMORANDUM

TO: Frank J. Coale, Professor and Chair
Department of Environmental Science and Technology

FROM: William Kenworthy, Acting Chair
Department of Plant Science and Landscape Architecture
and
Jack Sullivan, Associate Professor and Coordinator
Landscape Architecture Program

RE: Support for Environmental Science and Technology

We are writing to express our support for the Department of Environmental Science and Technology Program/Curriculum Proposal. We appreciate the recent communication we have had regarding the proposed ENST concentrations and courses. We are especially grateful to have had clarification from your faculty in regard to the Ecological Technology and Design concentration, the content of this course of study, and the opportunities for future collaboration with the Department and the Landscape Architecture Program.

We look forward to working with you, the faculty, and the students in ENST. Our mutual interests and complementary programs will establish the University of Maryland as a national leader in environmental education, research, and application.

William Kenworthy

Jack Sullivan

UNIVERSITY OF
MARYLAND
COLLEGE OF HEALTH AND HUMAN PERFORMANCE
Office of the Dean

College Park, Maryland 20742-2611
301.405.2438 TEL

January 19, 2007

MEMORANDUM

TO: Frank J. Coale
Chair, Department of Environmental Science & Technology

FROM: Robert S. Gold
Dean, College of Health and Human Performance

The College of Health and Human Performance supports your department's proposal for a new undergraduate program called Environmental Science and Technology (ENST). We understand that the proposed ENST undergraduate program will offer two areas of concentration: 1) Ecological Technology and Design; and 2) Environmental Health. We see this as an opportunity to build a pipeline of students likely to be very interested in, and competitive for spots in our Masters of Public Health Program in Environmental Health. As a result, I support its development.

We are enthusiastic about the potential for productive collaboration among the faculty and students of our two Colleges and we look forward to working together to grow our programs by sharing each others' expertise for the benefit of our campus' students.

UNIVERSITY OF
MARYLAND
COLLEGE OF BEHAVIORAL AND SOCIAL SCIENCES
Office of the Dean

2141 Tydings Hall
College Park, Maryland 20742
301.405.1679 TEL 301.314.9086 FAX
www.bsos.umd.edu

September 27, 2007

Dr. Frank J. Coale
Professor and Department Chair
Department of Environmental Sciences and Technology
1109 H.J. Patterson Hall
College Park, Maryland 20742

Dear Professor Coale:

I am writing to express my support for the proposed Environmental Science and Technology (ENST), Bachelor of Science degree at the University of Maryland. In endorsing this undergraduate degree, I support the four ENST concentrations of Ecological Technology Design, Environmental Health, Soil and Watershed Science, and Natural Resources Management.

My support is with the understanding that Environmental Science and Policy undergraduate major and the concentrations associated with that undergraduate degree will not be adversely impacted by the ENST Bachelors of Science degree.

Sincerely,

Edward Montgomery
Professor and Dean

UNIVERSITY OF
MARYLAND
COLLEGE OF CHEMICAL AND LIFE SCIENCES

Office of the Dean

Symons Hall
College Park, Maryland 20742
301.405.2071 TEL 301.314.9949 FAX
www.chemlife.umd.edu

October 18, 2007

Dr. Frank J. Coale
Professor & Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA

Dear Frank:

Thank you for sharing the proposals for the new programs at the undergraduate and graduate levels in your department. We are glad to hear about the new programs and look forward to our collaboration and cooperation with them.

We clearly see a need for a number of your graduate initiatives. We also share the views of Dr. Paynter of MEES that there are substantial reasons for your program and MEES to collaborate and cooperate and that this will strengthen both programs. We certainly encourage these efforts, and see them as in the best interests of our colleges, graduate programs, and graduate students.

We also look forward to cooperation in undergraduate education. Our goal will be to ensure that the students added to our courses from your programs have places in our courses, but this may mean, as I discuss below, working through the University Planning Cycle to garner additional resources.

We do want to point out that while your newly proposed majors provide interesting new options to students, they do have some overlap with the ENSP-Biodiversity and Conservation and with the BSCI-Behavior, Ecology and Evolution concentration. It is worth noting that BOTH of these existing programs are small, so it is possible that your newly created programs may divide the existing population of students interested in these areas broadly. Thus, your new programs present the potential of creating three to four programs of very small enrollment as a result.

Your proposed new undergraduate programs have a significant number of course requirements and options in the College of Chemical and Life Sciences. All of your students will be required to take BSCI 105, 106, CHEM 131/132, and CHEM 231/232. Yet, all of these courses are currently under high enrollment pressure. The

Environmental Health concentration also requires BSCI 207, BSCI 223, and CHEM 241/242. The majority of these courses are lab courses. As a consequence, the projection of 30 new students/year from your program will have an impact on these high demand courses. Clearly, we will have to use the campus planning cycle process to try to add resources to accommodate these new demands.

Most upper level CLFS courses proposed for these majors are listed in large groups of electives. While some of these classes have enrollment capacity, others are filled currently by students in existing academic programs. Again, we will have to seek new resources for these courses if your programs reach the size you anticipate.

We certainly support your initiatives and we look forward to working with you to ensure that the students continue to have full access to our courses, while also ensuring that the additional students you bring in will also have sufficient access to meet their curricular requirements.

Sincerely,

Norma Allewell
Professor and Dean

UNIVERSITY OF
MARYLAND

College Park, Maryland 20742-1411
301.405.8000 TEL 301.314.9583 FAX
http://www.arch.umd.edu

SCHOOL OF ARCHITECTURE, PLANNING, AND PRESERVATION
ARCHITECTURE • URBAN STUDIES AND PLANNING • HISTORIC PRESERVATION
THE NATIONAL CENTER FOR SMART GROWTH RESEARCH AND EDUCATION

Office of the Dean

October 4, 2007

Frank J. Coale, Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742

Dear Frank:

I have reviewed the proposals for the new undergraduate and graduate programs in Environmental Science and Technology (ENST) and I thank you and members of the ENST faculty for meeting with me to discuss the proposals. As you know, faculty representatives from the School of Architecture, Planning and Preservation (ARCH) participated in our initial meeting and in subsequent collaborative discussions with ENST faculty. In summary, I believe that the proposed ESNT programs offer exciting opportunities for future collaboration with our own environmentally based proposal for a design and planning oriented undergraduate curriculum (to be titled ENDP) and I support the establishment of them all.

Working together, we can provide students with a broader exposure to environmental issues than either program could accomplish separately. For example, our existing ARCH course in Sustainability provides an immediate opportunity to commence collaboration by including ENST faculty as guest-lecturers on specific technological topics (e.g., ecosystem restoration or storm water management). Similarly, a proposed course, Ecological Design, may be cross-listed and/or co-taught by ARCH and ENST. This would provide students with exposure to both ARCH Environmental Design and ENST Ecological Design concepts and offerings. Many future collaborations exist for curricular connections between the programs.

Last, but not least, is concern over the use of the word "Design" in one of the proposed ENST areas of concentration. The word "Design" is an important aspect of our curriculum that we take very seriously. There are even current national trends to establish "Schools of Design" to supplant the more wordy string of disciplinary terms (like our own title). I realize that the label for an area of concentration within a major does not define the ENST program, but we must take care in the use of this term. I also understand that you have already changed the proposed name of this concentration once during this review process and you are willing to change it again to accommodate our needs. With the change of the name of your proposed concentration to Ecological Technology Design, we can offer our support for your proposed programs.

I look forward to continued conversations and future collaborations.

Best regards,

Garth Rockcastle, FAIA
Professor and Dean

UNIVERSITY OF MARYLAND

Graduate Program in Sustainable Development and Conservation Biology

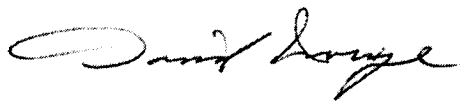
3 November 2007

Dr. Frank J. Coale
Professor& Department Chair
Department of Environmental Science & Technology
1109 H. J. Patterson Hall
University of Maryland
College Park, MD 20742 USA

Dear Frank,

I'm pleased to provide this letter of support for the proposed ENST graduate programs on behalf of the CONS (Sustainable Development and Conservation Biology) program. It is possible that the new ENST Ph.D. program would be of interest to some of the 15% of CONS graduates who go on to Ph.D. programs, and because the CONS students have broad interests and a lot of room for elective courses in their programs, some of the new ENST courses might also be of interest to them. We would also welcome ENST students in our CONS seminar (offered every semester), and there's the potential to offer this as a joint seminar (as we have previously with GEOG) if the topic for the semester is appropriate.

Sincerely,



Dr. David W. Inouye, Professor and Director
Sustainable Development and Conservation Biology
Department of Biology
University of Maryland
College Park, MD 20742
301-405-6946

APPENDIX E
LETTERS OF SUPPORT REGARDING USE OF NON-ENST COURSES

In this appendix we include first the letter sent from ENST to the program followed by the response received from that program

APPENDIX E – Letters of Support Regarding Use of Non-ENST Courses

Dr. Mark Varner
Undergraduate Program Coordinator
1415 Animal Sciences Building

September 10, 2007

Dear Dr. Varner,

As you are aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

Earlier this year we presented you with consideration of our proposed two new academic programs, *Ecological Design Technology* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. We have improved our proposal by adding concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Elective in Environmental Health Concentration:

ANSC 252	Introduction to the Diseases of Wildlife

Electives in Natural Resources Management Concentration:

ANSC 252	Introduction to the Diseases of Wildlife
ANSC 452	Avian Physiology
ANSC 453	Animal Welfare and Bioethics

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Use of ANSC Electives for ENST curricula
Date: Fri, 14 Sep 2007 12:38:44 -0400
From: Mark Varner <markv@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Tom E. Porter <teporter@umd.edu>, Libby Dufour <libbyd@umd.edu>, fjcoale@umd.edu

Hi Kim,

We are pleased to support your request to use the following ANSC courses as electives for the ENST curricula concentrations as listed below from your proposal.

We wish you and ENST the very best with these new curricula concentrations.

Mark Varner

Elective in Environmental Health Concentration:

ANSC 252	Introduction to the Diseases of Wildlife

Electives in Natural Resources Management Concentration:

ANSC 252	Introduction to the Diseases of Wildlife
ANSC 452	Avian Physiology
ANSC 453	Animal Welfare and Bioethics

--
Go Terps!

++
Mark Varner
Professor, Extension Dairy Scientist and ANSC Undergraduate Coordinator
Department of Animal & Avian Sciences
Rm. 1415 Animal Sciences Center
University of Maryland
College Park, MD 20742-2311
USA
1-301-405-1374 (voice)
1-240-838-4359 (mobile)
1-301-405-7980 (fax)
http://ansc.umd.edu/faculty/mvmain.htm
markv@umd.edu

Dr. Katherine Johnson
Director of Undergraduate Studies
1111 Woods Hall

September 10, 2007

Dear Dr. Johnson,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Design Technology* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Electives in Environmental Health Concentration:

ANTH 262	Culture and Environment
ANTH 410	Culture, Health and Community Development

Elective in Natural Resources Management Concentration:

ANTH 450	Theory and Practice of Environmental Anthropology

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: ENST Undergraduate Proposal/ ANTH Course Use Permission
Date: Mon, 10 Sep 2007 13:31:51 -0500
From: Paul Shackel <wayback87@verizon.net>
To: Kimberly Monahan <kmonahan@umd.edu>, <KJJOHNSON@anth.umd.edu>, <Kjohns11@umd.edu>

Kimberly,
We would be pleased if you used the three mentioned courses in your ENST Undergraduate Proposal.

Paul Shackel

Dr. Brian Kelly
Director, *School of Architecture, Planning, and Preservation*
1228 Architecture Building

September 17, 2007

Dear Dr. Kelly,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Elective in Ecological Technology Design:
ARCH 450 Introduction to Urban Planning

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

Ms. Monahan:

I don't think that there is any problem with including this course as an elective for your program. However, we haven't offered the course in some time, and I am not certain when it will be offered in the future.

Brian

*****

Brian Kelly, AIA
Associate Professor
Director, Architecture Program
School of Architecture Planning and Preservation
University of Maryland
College Park, Maryland 20742
301.405.4592
bkelly@umd.edu
www.arch.umd.edu
www.arch.umd.edu/BK

Dr. James Carton
Associate Chair for Academic Affairs
Department of Atmospheric and Oceanic Science

September 10, 2007

Dear Dr. Carton,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following way:

Electives in Environmental Health:

AOSC 200/201	Weather and Climate & Lab
AOSC 434	Air Pollution

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: Reply Needed by Thursday, 10/4: ENST Undergraduate Proposal/ AOSC Course Use Permission
Date: Wed, 03 Oct 2007 17:08:27 -0400
From: Jim Carton <carton@atmos.umd.edu>
Organization: University of Maryland
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Robert Hudson <hudson@atmos.umd.edu>, Russell Dickerson <russ@atmos.umd.edu>

Dear Kimberly,
we would be happy for you to use AOSC200/201 and 434 for your electives. Bear in minds that enrollments for 200 are currently heavy so you will want your students to sign up early. Sorry for the delay in getting back to you -- you are exactly right that it slipped my mind. The chair of our curriculum committee is Prof. Eugenia Kalnay (ekalnay@atmos.umd.edu). She can answer scheduling issues. I'm cc-ing the two instructors. -- Jim

Dr. Ted McConnell
Department Chair
2200 Symons Hall

September 10, 2007

Dear Dr. McConnell,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following way:

Electives in Natural Resources Management:

AREC 240	Introduction to Economics and the Environment
AREC 332	Introduction to Natural Resources Policy
AREC 365	World Hunger, Population, and Food Supplies
AREC 445	Ag. Development, Population Growth and the Environment

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject:RE: ENST Undergraduate Proposal/ AREC Course Use Permission
Date: Tue, 11 Sep 2007 10:33:52 -0400
From: Howard Leathers <hleathers@arec.umd.edu>
To:kmonahan@umd.edu <kmonahan@umd.edu>
CC: Liesl Koch <lkoch@arec.umd.edu>, Bruce Gardner <bgardner@arec.umd.edu>

I have consulted with the AREC chair, Prof. Bruce Gardner on this. We have no objection to inclusion of four AREC courses in the ENST curricula: AREC 240, 250, 332, and 445. We note that AREC 445 has ECON 200, ECON 201, MATH 220, and ECON 306 as prerequisites.

Thanks.

Howard Leathers
Associate Professor and Undergraduate Coordinator
Department of Agricultural and Resource Economics
2200 Symons Hall
University of Maryland
College Park, MD 20742-5535
301 405 1277
301 314 9091 (fax)
hleathers@arec.umd.edu

Dr. Tom Porter
Chair, Animal and Avian Sciences
1413 Animal Science Building

September 10, 2007

Dear Dr. Porter,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Requirement in each of the four concentrations:
BIOM 301 Introduction to Biometrics

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: ENST Undergraduate Proposal/ BIOM Course Use Permission
Date: Mon, 01 Oct 2007 15:00:20 -0400
From: Tom E. Porter <teporter@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Frank Coale <fjcoale@umd.edu>, Andrew Baldwin <baldwin@umd.edu>, Kim Montague-Smith <ksms@umd.edu>, "Mark Varner" <markv@umd.edu>, Libby Dufour <libbyd@umd.edu>

Dear Ms. Monahan,

I am writing in regard to two requests from you to include our courses in your curricula revisions. You have our permission to include our courses as listed below. Please be aware that BIOM301 has a large enrollment, and our resources are stretched thin. This course is currently offered Fall, Winter, and Spring terms and requires a large number of teaching assistants. The Animal & Avian Sciences Department supports your request to add BIOM301 to your requirements, as long as as the number of your students enrolled in BIOM301 does not exceed 10 students per semester in the future. If enrollment exceeds this level, then resources provided to the department to support BIOM 301 would have to be increased.

We wish you the best of luck with your new curricula.

Sincerely,

Best regards,

Tom Porter

Dr. Reid Compton
Associate Chair and Director of Undergraduate Studies
2227 Biology/Psychology Building

September 10, 2007

Dear Dr. Compton,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Required for each of the 4 concentrations:		
BSCI 105	Principles of Biology I	
BSCI 106	Principles of Biology II	
Additionally Required by Environmental Health:		
BSCI 207	Principles of Biology III	
BSCI 223	General Microbiology	
Additionally Required by Natural Resources Management:		
BSCI 223	General Microbiology	
Electives in Ecological Technology Design:		
BSCI 362	Ecology of Marsh and Dune Vegetation	
BSCI 363	The Biology of Conservation and Extinction	
BSCI 373	Natural History of the Chesapeake Bay	
BSCI 464	Microbial Ecology	
BSCI 460/461	Plant Ecology & Lab	
Electives in Environmental Health:		
BSCI 201	Human Anatomy and Physiology I	
BSCI 202	Human Anatomy and Physiology II	
BSCI 222	Principles of Genetics	
BSCI 230	Cell Biology and Physiology	
BSCI 366	Biodiversity Issues in Conservation Management	

BSCI 375	Biological Oceanography	
BSCI 417	Microbial Pathogenesis	
BSCI 425	Epidemiology and Public Health	
BSCI 437	General Virology	
BSCI 440	Mammalian Physiology	
BSCI 464	Microbial Ecology	
BSCI 447	General Endocrinology	
BSCI 467	Freshwater Biology	
BSCI 473	Marine Ecology	
Electives in Natural Resources Management:		
BSCI 224	Animal Diversity	
BSCI 360	Principles of Animal Behavior	
BSCI 362	Ecology of Marsh and Dune Vegetation	
BSCI 363	The Biology of Conservation and Extinction	
BSCI 366	Biodiversity Issues in Conservation Management	
BSCI 373	Natural History of the Chesapeake Bay	
BSCI 374	Chesapeake Bay Laboratory	
BSCI 375	Biological Oceanography	
BSCI 440	Mammalian Physiology	
BSCI 441	Mammalian Physiology Laboratory	
BSCI 442	Plant Physiology	
BSCI 462	Population Ecology	
BSCI 463	Laboratory and Field Ecology	
BSCI 464	Microbial Ecology	
BSCI 467	Freshwater Biology	
BSCI 473	Marine Ecology	
BSCI 481	Insect Diversity and Classification	
BSCI 493	Medicinal and Poisonous Plants	

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: ENST Undergraduate Proposal/ BSCI Course Use Permission
Date: Fri, 21 Sep 2007 16:09:49 -0400
From: Reid Compton <compton@umd.edu>
Reply-To: Reid Compton <compton@umd.edu>
Organization: University of Maryland
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Robert Infantino <infantino@umd.edu>, Joelle Presson <jpresson@umd.edu>

Dear Kimberly,

It looks we can certainly absorb students in the number that you project, but the Biology department does not control all of the courses on your list, so I have passed the course list to Bob Infatino and Joelle Presson, the Deans in the College Office primarily responsible for directing our academic programs for their opinions.

They can respond themselves to your specific request.

Reid

Dr. Reid S. Compton
Associate Chair
Director of Undergraduate Studies
Department of Biology
University of Maryland
College Park, MD 20742
Voice: 301/405-6916
Fax: 301/314-9358

-------- Original Message --------
Subject: Re: Reply Needed by Thursday, 10/4: ENST Undergraduate Proposal/ CHEM Course Use Permission
Date: Wed, 3 Oct 2007 16:24:54 -0400
From: Joelle Presson <jpresson@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Robert Infantino <infantino@umd.edu>

Sorry for the delay. We gave verbal agreement for the use of our courses by ENST majors and this is written confirmation.

Joelle Presson, Ph.D.
Assistant Dean
Undergraduate Academic Programs
College of Chemical and Life Sciences
College Park, MD 20742
301-405-6892

APPENDIX E – Letters of Support Regarding Use of Non-ENST Courses

Dr. Joelle Presson
Assistant Dean, Undergraduate Academic Programs
1322 Symons Hall

September 10, 2007

Dear Dr. Presson,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Required for each of the 4 concentrations:	
CHEM 131/132	Fund. General Chemistry & Lab
CHEM 231/232	Organic Chemistry I & Lab
Additionally required by Environmental Health:	
CHEM 241/2	Organic Chemistry II & Lab
Elective in Environmental Health:	
CHEM 271/272	General Chemistry and Energetics & Bioanalytical Lab

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: Reply Needed by Thursday, 10/4: ENST Undergraduate Proposal/ CHEM Course Use Permission
Date: Wed, 3 Oct 2007 16:24:54 -0400
From: Joelle Presson <jpresson@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Robert Infantino <infantino@umd.edu>

Sorry for the delay. We gave verbal agreement for the use of our courses by ENST majors and this is written confirmation.

Joelle Presson, Ph.D.
Assistant Dean
Undergraduate Academic Programs
College of Chemical and Life Sciences
College Park, MD 20742
301-405-6892

-------- Original Message --------
Subject: Re: Permission requested to add your courses to our (ENST) program curricula
Date: Wed, 17 Jan 2007 23:01:27 -0500
From: Michael Montague-Smith <mpms@umd.edu>
To:kmonahan@umd.edu

The Department of Chemistry and Biochemistry feels your move to require chemistry lecture and laboratory courses CHEM 131/132, CHEM 231/232 and CHEM 241/242 as part of your programs is a positive change, will strengthen your programs, and supports your inclusion of these requirements in your curriculum.

Michael P. Montague-Smith, Ph.D.
Director of Undergraduate Studies
Department of Chemistry and Biochemistry
Building 091
University of Maryland
College Park, MD 20742-2021

Voice: 301 405 1791
FAX: 301 314 9121

Dr. Cynthia Clement
Director of Undergraduate Studies
4115D Tydings Hall

September 10, 2007

Dear Dr. Clement,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management*. These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Elective in Natural Resources Management:
ECON 315 Economic Development of Underdeveloped Areas

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: Need Reply by Thursday 10/4: ENST Undergraduate Proposal/ ECON Course Use Permission
Date: Thu, 04 Oct 2007 08:11:27 -0400
From: Cindy Clement <Clement@econ.bsos.umd.edu>
To: <kmonahan@umd.edu>

Kimberly -

Sorry for the slow provision of documentation. On behalf of the Department of Economics, I can say that we are willing to have ECON315, Economic Development of Underdeveloped Areas, included as an elective in your new concentration on Natural Resources Management. As we discussed, the pre-requisites for enrollment in this course are usually ECON200 and ECON201, but we will accept AREC240 in lieu of ECON200.

Regards,

Cindy Clement, Ph.D.
Director of Undergraduate Studies, Economics Department
University of Maryland, College Park
301 405 3257
clement@econ.umd.edu

Dr. Adel Shirmohammadi
Undergraduate Programs Coordinator
1419 Animal Sciences Building

September 11, 2007

Dear Dr. Shirmohammadi,

As you are aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management*. These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Electives in Ecological Technology Design:

ENBE 381	Creative Design with CAD
ENBE 462	Nonpoint Source Pollution Assessment Techniques

Elective in Environmental Health:

ENBE 462	Nonpoint Source Pollution Assessment Techniques

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

UNIVERSITY OF MARYLAND
A. JAMES CLARK SCHOOL OF ENGINEERING
FISCHELL DEPARTMENT OF BIOENGINEERING

3234 Jeong H. Kim Engineering Building
College Park, MD 20742
301.405.0000 TEL 301.314.6868 FAX
www.bioe.umd.edu

September 26, 2007

Ms. Kimberly Monahan
Coordinator, Student Services
Department of Environmental Sciences and Technology
1419 Animal Science/Agricultural Engineering Building
University Of Maryland
College Park, MD 20742

Dear Ms. Monahan:

I am writing in response to your letter dated September 11, 2007 regarding your request to include two of the existing ENBE courses (ENBE 381 –Creative Design with CAD and ENBE 462 –Nonpoint Source Pollution Assessment Techniques) under your sub-program areas in ENST's Undergraduate Curriculum. As you are aware, the Biological Resources Engineering (ENBE) undergraduate program was transitioned to the Bioengineering (BIOE) program on July 1, 2006. However, we still are offering ENBE courses (both required and elective) until all of our ENBE undergraduate students complete their degree requirements and graduate. I anticipate that almost all of our ENBE students will graduate in May 2008 after which time the whole ENBE undergraduate program will be cancelled or dropped off the campus books. You are also aware that academic aspects of ENBE students have been mostly handled by the Fischell Department of Bioengineering with support from the Department of the Environmental Science and Technology. As a result, I posed your question to both our BIOE undergraduate curriculum committee and Dr. Bentley, the chairman of our department. We collectively came up with the following response and suggestions:

1) Your undergraduate program is welcomed to include these courses in its curriculum for as long as the ENBE program is in the books and has not been dropped yet.

2) We also suggest the that the best course of action would be to change the prefix in these two courses to ENST (e.g., ENST 381 and ENST 462) and include them in your course listing in the ENST undergraduate curriculum. This option may save you lots of time in future because it will be permanent in the books as ENST courses.

I should note that you can always teach a course one time without it being approved by the college or campus PCC, but for further teaching they have to be submitted for VPAC approval even if it is only a minor change in name or prefix!

I hope this helps out. Please do not hesitate to contact me if I can be of any further assistance in this regard. Thank you.

Sincerely,

Adel Shirmohammadi
Professor, Associate Chair & Director of Undergraduate program

CC: Dr. William Bentley

Dr. Joseph Cirrincione
Associate Chair and Undergraduate Coordinator
2181E LeFrak Hall

September 11, 2007

Dear Dr. Cirrincione,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Required by Natural Resources Management:	
GEOG 200/211	Geography and Environmental Systems and Lab (option to take GEOL 100/110 instead)
GEOG 340	Geomorphology (option to take GEOL 340 instead)
Electives in Ecological Technology Design:	
GEOG 331	Introduction to Human Dimensions of Global Change
GEOG 372	Remote Sensing
GEOG 373	Geographic Information Systems
Electives in Environmental Health:	
GEOG 331	Introduction to Human Dimensions of Global Change
GEOG 372	Remote Sensing
GEOG 373	Geographic Information Systems
GEOG 431	Culture and Natural Resource Management
Electives in Soil and Watershed Science:	
GEOG 340	Geomorphology
Electives in Natural Resources Management:	
GEOG 345	Introduction to Climatology
GEOG 440	Advanced Geomorphology
GEOG 372	Remote Sensing
GEOG 373	Geographic Information Systems

GEOG 472	Remote Sensing: Digital Processing and Analysis
GEOG 473	Geographic Information Systems and Spatial Analysis

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

APPENDIX E – Letters of Support Regarding Use of Non-ENST Courses

UNIVERSITY OF MARYLAND
DEPARTMENT OF GEOGRAPHY

2181 LeFrak Hall
College Park, Maryland 20742
301.405.4050 TEL 301.314.9299 FAX

September 21, 2007

Dr. Frank J Coale, Chair
Dr. Andrew H. Baldwin, Undergraduate Director
Dept. of Environmental Science & Technology:

The Geography Department has reviewed your proposal for an undergraduate degree program with concentrations in Natural Resource Management, Ecological Technology Design, Soil & Watershed Science, and Natural Resources Management and have no objections to this proposal going forward. We note that two of the concentrations are modifications of already existing ENST concentrations and that Ecological Technology Design and Environmental Health are new concentrations reflecting the emerging areas of interested in the new ENST Department. We also note that Environmental Studies Program will continue to operate as independent unit responsible for the current and future concentrations in ENSP.

The review of Geography courses listed as required and electives for the four concentrations do not pose a problem for our Department. Geog.201/211 should be a required or recommended course for the four concentrations as the upper level physical geography courses have Geog 201/211 as a prerequisite and it is a CORE Physical Science Lab course. Our technique courses have high demand but they are offered in both Winterterm and Summer School. I would further suggest you review the syllabus and course description for Geog 342- Biogeography as it would seem this course would also be a good fit for the concentrations. Finally, for those students interested in expanding their technique skills we recommend the Department review our GIS Minor.

Best of luck in moving your proposal forward and we look forward to working with you in the future.

Sincerely,

John Townshend
Chair

Joseph M. Cirrincione
Associate Chair

Dr. John Merck
Undergraduate Director
1218 Centreville Hall

September 11, 2007

Dear Dr. Merck,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Required by Soil and Watershed Science:	
GEOL 100/110	Physical Geology & Lab
Required by Natural Resources Management:	
GEOL 100/110	Physical Geology & Lab (option to take GEOG 200/211 instead)
GEOL 340	Geomorphology (option to take GEOG 340 instead)
Electives in Ecological Technology Design:	
GEOL 451	Groundwater
GEOL 452	Watershed and Wetland Hydrology
Elective in Environmental Health:	
GEOL 452	Watershed and Wetland Hydrology
Electives in Soil and Watershed Science:	
GEOL 340	Geomorphology
GEOL 451	Groundwater
GEOL 452	Watershed and Wetland Hydrology
Electives in Natural Resources Management:	
GEOL 436	Principles of Biogeochemistry
GEOL 437	Global Climate Change: Past and Present
GEOL 451	Groundwater

GEOL 452	Watershed and Wetland Hydrology

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: Need Reply by Thursday 10/4: Undergraduate Proposal/ GEOL Course Use Permission
Date: Wed, 03 Oct 2007 18:52:40 -0400
From: John/Merck <jmerck@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>

Dear Kimberly:

Sorry to delay. When I brought this up with Dr. Brown, he indicated that an agreement had been reached on these matters between him and your chair last summer. He advises that you consult your chair. I would have responded sooner, but I thought that he was going to respond straight to your chair and I assumed you would get the word. In any event, my understanding at this point is that you are duplicating efforts that were made by your department last summer. Sorry.

Best success.

Ciao,

John Merck

APPENDIX E – Letters of Support Regarding Use of Non-ENST Courses

UNIVERSITY OF
MARYLAND
DEPARTMENT OF GEOLOGY
Office of the Chair

Geology Building
University of Maryland
College Park, Maryland 20742-4211 USA
301.405.4082 TEL 301.314.7970 FAX
www.geol.umd.edu

May 3rd, 2007

Dr. Frank J. Coale
Professor and Department Chair
Department of Environmental Science and Technology
College of Agriculture and Natural Resources

Dear Frank:

Re: Undergraduate and Graduate Programs in Environmental Science and Technology

Further to our discussion a couple of weeks ago, I confirm that the inclusion of GEOL 100/110, GEOL 340, GEOL 451, GEOL 452 and GEOL 652 in your proposed Undergraduate and Graduate Programs in Environmental Science and Technology is acceptable to this Department on the basis of your projection that approximately a dozen additional students per year will be distributed across the upper-level undergraduate and graduate classes at steady state. I understand that you propose to submit these proposals through the College and Campus approval process next semester, and I wish you success with them.

With best regards,
Yours sincerely,

Michael Brown

Michael Brown
Professor of Geology
e-mail: mbrown@geol.umd.edu

cc. Dr. Steve Halperin, Dean, CMPS

Dr. Mark Lichbach
Professor and Chair
3140 Tydings Hall

September 11, 2007

Dear Dr. Lichbach,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Elective in Natural Resources Management:
GVPT 273 Introduction to Environmental Politics

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

Kimberly:
Thanks for the clarification. We should be fine with this. You should be aware that although we generally do offer these courses regularly, we cannot promise that we will do so in advance.

best regards,

Wayne

Wayne McIntosh
Department of Government & Politics
University of Maryland
College Park, MD 20742

Dr. David Hyde
Public and Community Health
2374 Health and Human Performance Building

September 11, 2007

Dear Dr. Hyde,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

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We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Electives in Environmental Health:	
HLTH 140	Personal and Community Health
HLTH 230	Introduction to Health Behavior
HLTH 371	Communicating Safety and Health
HLTH 430	Health Education in the Workplace

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: ENST Undergraduate Proposal/ HLTH Course Use Permission
Date: Wed, 26 Sep 2007 06:23:47 -0400
From: David H Hyde <dhyde1@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>

Hi Kimberly,
I remember your email and thought I had sent a reply, very sorry. At the time, I check with our chairperson, Dr. Glover, and he did not think we could officially accommodate your request. During the past three semesters our program has increased by nearly 100 students so our own majors are having a difficult time getting HLTH classes. However, many of our courses do not have a BPO or a prerequisite so any student can register for any of those courses and use them as an elective in a program.
Take care,
Dave Hyde

Dr. Jack Sullivan
Undergraduate Coordinator
2142 Plant Sciences Building

September 11, 2007

Dear Dr. Sullivan,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Electives in Ecological Technology Design:	
LARC 451	Sustainable Communities
LARC 450	Environmental Resources
Elective in Environmental Health:	
LARC 450	Environmental Resources
Electives in Natural Resources Management:	
LARC 450	Environmental Resources
LARC 451	Sustainable Communities

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

APPENDIX E – Letters of Support Regarding Use of Non-ENST Courses

UNIVERSITY OF MARYLAND

Department of Plant Science and Landscape Architecture
2102 Plant Sciences Building
University of Maryland
College Park, MD 20742-4452

October 3, 2007

MEMORANDUM

TO: Frank J. Coale, Professor and Chair
Department of Environmental Science and Technology

FROM: Jack Sullivan, FASLA, Associate Professor and Coordinator
Landscape Architecture Program

RE: ENST student access to LARC 450 and LARC 451

In support of the Department of Environmental Science and Technology and in the spirit of collaboration, the Landscape Architecture Program is pleased to make LARC 450, Environmental Resources, and LARC 451, Sustainable Communities, available to students in the following ENST programs: *Ecological Technology Design*; *Environmental Health;* and *Natural Resources Management.* We look forward to working with your faculty and your students through these and other courses and future projects.

Jack Sullivan

CC: Bill Kenworthy, Chair, PSLA

Dr. Mike Boyle
Professor and Associate Chair, Chair Undergraduate Studies
4413 Mathematics Building

September 11, 2007

Dear Dr. Boyle,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Required for each of the 4 concentrations:	
MATH 140	Calculus I (MATH 220 may be substituted in 3 of the 4 concentrations)
Additionally Required by Ecological Technology Design:	
MATH 141	Calculus II

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: ENST Undergraduate Proposal/ MATH Course Use Permission
Date: Tue, 11 Sep 2007 22:00:24 -0400 (EDT)
From:M. Michael Boyle <mmb@math.umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>
CC:M. Michael Boyle <mmb@math.umd.edu>, JAMES YORKE <yorke@umd.edu>, Denny Gulick <dng@math.umd.edu>, William R. Schildknecht <wrs@math.umd.edu>

Dear Kimberly,

Our department is very happy to give permission for the inclusion of the calculus courses in the course requirements in those four areas of concentration (those courses being a subset of MATH 140,141,220 depending on the area of concentration).

I would be grateful if you could send me a rough estimate of the increase in students enrolling in these calculus courses, as a consequence of the proposed change, and also the semesters in which we might begin to see such changes.

I appreciate an accurate estimate may not be feasible, but unless you have another proposal, perhaps you could email me some range estimates for numbers of students in the concentrations, with a list of the current math requirements for those populations.

Best wishes,
Mike Boyle
Chair of the Undergraduate Program
Department of Mathematics

Dr. Jianghong Meng
Nutrition and Food Science

September 14, 2007

Dear Dr. Meng,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Elective in Environmental Health:	
NFSC 430/434	Food Microbiology & Lab

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: ENST Undergraduate Proposal/ NFSC Course Use Permission
Date: Tue, 18 Sep 2007 21:04:46 -0400 (EDT)
From: Jianghong Meng <jmeng@umd.edu>
Reply-To:jmeng@umd.edu
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Mickey Parish <mparish@umd.edu>
Kim,

I would have no problem but I believe this needs to get approved from my Dept Chair, Dr. Mickey Parish. Also, NFSC430 and NFSC434 are two courses. The lab course (NFSC434) requires additional funding support for purchasing lab materials from the Dept. We normally offer it only to our food science major. Dr. Parish needs to approve it if students from other majors are interested in taking it.

Jianghong

Jianghong Meng, DVM, MPVM, PhD
Professor
Department of Nutrition & Food Science
Interim Director
Joint Institute for Food Safety and
Applied Nutrition (JIFSAN)
University of Maryland
College Park, MD 20742
Tel: (301) 405-8382
http://www.jifsan.umd.edu/

-------- Original Message --------
Subject:RE: ENST Undergraduate Proposal/ NFSC Course Use Permission
Date: Sun, 23 Sep 2007 16:00:59 -0400
From: Mickey Parish <mparish@umd.edu>
To:'Kimberly Monahan' <kmonahan@umd.edu>
CC:<jmeng@umd.edu>, "'Y. Martin Lo'" <ymlo@umd.edu>, "'Frank Coale'" <fjcoale@umd.edu>

Dear Kim

Since the food science undergraduate curriculum committee chair and the instructor of the courses in question (NFSC430 and NFSC434) have given their approvals, I have no objection to ENST listing those courses as electives for your degree programs. I made a slight change to the table on page 16 of your proposal to indicate that these are two separate courses of 3 credits each.

Let me know if you have any questions.

Regards,
M. Parish

Mickey E. Parish, Ph.D.
Professor and Chair, Department of Nutrition and Food Science
Acting Director, Center for Food Systems Security & Safety
University of Maryland
0112 Skinner Building
College Park, MD 20742 USA
Tel: 301-405-0773
Fax: 301-314-3313
mparish@umd.edu

Dr. Doug Roberts
Associate Chair, Undergraduate Education
4308 Physics Building

September 11, 2007

Dear Dr. Roberts,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Required for each of the 4 concentrations:	
PHYS 121	Fundamentals of Physics I (PHYS 117 may be substituted with advisor approval)

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Fwd: ENST Undergraduate Proposal/ PHYS Course Use Permission (fwd)
Date: Wed, 12 Sep 2007 09:50:16 -0400 (EDT)
From: Nick Hadley <hadley@physics.umd.edu>
To:kmonahan@umd.edu

Dear Kimberly,

You have Physics' permission to use this course in your program.
Do you have an estimate of how many new students this might bring into the class?

Sincerely,

Nick Hadley

APPENDIX E – Letters of Support Regarding Use of Non-ENST Courses

Dr. Chris Walsh
Undergraduate Coordinator
2136 Plant Sciences Building

September 11, 2007

Dear Dr. Walsh,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your courses will add strength to our programs! We request the permission to be able to include the following courses in the following ways:

Required by Soil and Watershed Science:	
PLSC 100 *or* PLSC 101	Introduction to Horticulture *or* Introductory Crop Science
Electives in Ecological Technology Design:	
PLSC 400	Environmental Plant Physiology
PLSC 471	Forest Ecology
Elective in Natural Resources Management:	
PLSC 453	Weed Science

Permission to include your courses will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: PLSC Courses/ENST Proposal
Date: Thu, 04 Oct 2007 09:15:48 -0400
From: Christopher Walsh <cswalsh@umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>
CC: Kathy Hunt <khunt@umd.edu>, Frank Coale <fjcoale@umd.edu>, Andrew Baldwin <baldwin@umd.edu>

October 4, 2007

Dear Kimberly,

Thanks for taking the time to discuss the ENST course requests at last week's undergraduate committee meeting. This email summarizes our discussion of your course requests for your department's proposed academic programs. After you left, concerns were voiced by a number of faculty members about the title and curriculum proposed as "Ecological Technology Design."

As I mentioned in that meeting, PSLA will have no trouble accomodating students in PSLC 100 (Introduction to Horticulture) and PLSC 101 (Introduction to Crop Science). These two CORE courses are designed to enroll a significant number of students from outside our department. We would welcome students from the proposed Soil and Watershed Science program to take this as a required course.

Scott Glenn, the instructor for PLSC 453 (Weed Science) also approved that course as an elective for the Natural Resource Management program. Scott stated that seats are currently available for your students.

We also discussed two other elective courses PLSC 400 (Environmental Plant Physiology) and PLSC 471 (Forest Ecology). We would be pleased to allow students from ENST to enroll in these courses. As we discussed at the meeting, we are contemplating changes to both courses. These revisions will be forwarded to the AGNR PCC during this semester. We plan to add a mandatory laboratory to PLSC 400 and offer an optional one-credit laboratory (PLSC 471A) to Forest Ecology. I do not know if these proposed changes would affect your curricula but wanted you to be aware of them as they could be approved by Fall, 2008.

Although faculty are willing to allow ENST students to enroll in these courses, I do need to mention that a number of us are not comfortable with the focus and proposed title for this new major, "Ecological Technology Design." That name, and the material to be taught in that major could prove to be confusing to students applying to the university. I also believe that the proposed major covers many elements taught in our existing PSLA curricula which could adversely affect the enrollment and viability of our undergraduate program.

Chris

Dr. Linda Moghadam
Undergraduate Director
2108 Art-Sociology Building

September 11, 2007

Dear Dr. Moghadam,

As you may be aware, two departments within the College of Agriculture and Natural Resources have merged and reorganized to form the department of Environmental Science and Technology. The formation of this department creates the unique opportunity to develop and implement cutting-edge, high profile curricula that will produce students with the knowledge and skills necessary to deal with increasingly severe environmental conditions.

We are proposing two new academic programs, *Ecological Technology Design* and *Environmental Health,* both of which are planned to exist under the major Environmental Science and Technology. Additionally, we propose to have concentrations in *Soil and Watershed Science* and *Natural Resources Management.* These additional concentrations are modifications to two current majors within our department.

We're writing because we feel your course will add strength to our programs! We request the permission to be able to include the following course in the following way:

Required by Natural Resources Management:	
SOCY 305	Scarcity and Modern Society

Permission to include your course will be an important asset to our programs and our proposal, while also building greater connections and collaborations between and among academic units.

We greatly appreciate your time and support. If you're willing to provide permission, please provide either an email or letter to me, Kimberly Monahan, at kmonahan@umd.edu or 1457 Animal Sciences Building. We will be submitting our materials just as soon as we hear back from everyone. If you need further information in considering our request, please do not hesitate to call (301-405-1193) or email.

Thank you!
Sincerely,

Kimberly Monahan
Coordinator, Student Services

-------- Original Message --------
Subject: Re: Need Reply by Thursday, 10/4: ENST Undergraduate Proposal/ SOCY Course Use Permission
Date: Wed, 03 Oct 2007 16:33:57 -0400
From: Linda Moghadam <LINDA@socy.umd.edu>
To: Kimberly Monahan <kmonahan@umd.edu>

Kimberly,

That shouldln't be a problem. Go ahead and include the course.

Linda Moghadam

Linda L. Moghadam
Director,
Sociology Undergraduate Program
2108 Art/Socy
University of Maryland College Park
College Park, MD 20742
301-405-7365

APPENDIX F
COURSES UNIQUE TO EACH ENST CONCENTRATION

Appendix F. List of ENST required courses illustrating the number of course credits unique to each concentration. ENST core courses (Table 2) not listed.

Course Title	Number	Eco Tech Design Credits	Environ Health Credits	Soil and Water Sci Credits	Natural Res Mgmt Credits
Calculus II	MATH 141	4			
Energy and Environment	ENST 405	3			
Ecological Design	ENST 4XB	3			
Ecological Economics	ENST 4XE	3			
One of the following: Creative Design with CAD GIS Applications in Soil Science *or* Geographic Information Systems Ecosystem Simulation Modeling	 ENBE 381 ENST 415 *or* GEOG 373 ENST 4XA	3-4			
One of the following: Environmental Instrumentation Water Quality: Field and Lab Methods Nonpoint Source Pollution Assessment Techniques	 ENST 3XD ENST 451 ENBE 462	3			
Two of the following: Wetland Creation and Restoration Stormwater Management Industrial Ecology Stream Restoration	 ENST 4XD ENST 4XF ENST 4XG ENST 4XH	6			
Principles of Biology III	BSCI 207		3		
General Microbiology	BSCI 223		4*		4*
Ecosystem Health and Protection	ENST 3XB		3		
Environmental Toxicology	ENST 3XC		3		
Environmental Contaminants: Sources and Fate	ENST 4XJ		3		
Ecological Risk Assessment *or* Human Health Risk Assessment	ENST 4XK *or* ENST 4XL		3		
Ecosystem Health and Human Health Electives			12		
Introduction to Horticulture *or* Introductory Crop Science	PLSC 100 *or* PLSC 101			4	
Physical Geology and Lab *or* Geography of Env Systems and Lab	GEOL 100/110 *or* GEOG 201/211			4*	4*
Soil Morphology, Genesis and Classification	ENST 414			4	
Soil Hydrology and Physics	ENST 417			3	
Soil Chemistry	ENST 421			4	
Soil Microbiology	ENST 422			3	
Three to Four of the following (9 credits): Field Soil Morphology Principles of Soil Fertility Soil and Water Conservation GIS Applications in Soil Science Soil-Water Pollution Terrestrial Bioremediation Wetland Soils	 ENST 308 ENST 411 ENST 413 ENST 415 ENST 423 ENST 425 ENST 430				

APPENDIX F– Courses Unique to Each ENST Concentration

Course Title	Number	Eco Tech Design Credits	Environ Health Credits	Soil and Water Sci Credits	Natural Res Mgmt Credits
Remote Sensing of Agriculture and Natural Resources	ENST 442			9	
Two of the following:					
Crops, Soils and Civilization	ENST 440				
Sustainable Agriculture	ENST 441				
Restoration Ecology	ENST 444				
Wetland Ecology	ENST 450				
Water Quality: Field and Lab Analysis Methods	ENST 451				
Groundwater	GEOL 451				
Watershed and Wetland Hydrology	GEOL 452				
Geomorphology *or* Geomorphology	GEOG 340 *or* GEOL 340			6-7	
Geomorphology *or* Geomorphology	GEOG 340 *or* GEOL 340				3-4
Intro to Economics and the Environment	AREC 240				4
Intro to Natural Resources Policy *or* Ecological Economics	AREC 332 *or* ENST 4XE				3
Intro to Environmental Politics	GVPT 273				3
Scarcity and Modern Society	SOCY 305				3
Resource Management and Science Electives					12
Number of credits unique to each concentration		**25-26**	**27**	**33-34**	**28-29**

*Overlapping courses excluded in total.

APPENDIX G
FOUR-YEAR PLANS FOR ENST CONCENTRATIONS

Environmental Science and Technology (ENST)
Ecological Technology Design
Curriculum in Example 4-Year Plan

Student _____ UID_____

Phone_____ E-mail_____ Matriculation Date_____

Freshman Year Fall Semester			Credits	**Freshman Year Spring Semester**			Credits
o ENGL*	101	Introduction to Writing	3	o CORE*	---	(HA)_____	3
o CORE*	---	(HL)_____	3	o CORE*	---	(HL/HA/HO)_____	3
o MATH*	140	Calculus I	4	o MATH*	141	Calculus II	4
o BSCI*	105	Principles of Biology I	4	o BSCI*	106	Principles of Biology II	4
		Total	*14*			*Total*	*14*
Sophomore Year Fall Semester			Credits	**Sophomore Year Spring Semester**			Credits
o CORE*	---	(SH)_____	3	o CORE*	---	(SB)_____	3
o PHYS*	121	Fundamentals of Physics I	4	o CORE*	---	(SB)_____	3
o ENST	2XA	Intro to Env. Health	3	o ENST*	200	Fundamentals of Soil Science	4
o CHEM*	131	Chemistry I	3	o CHEM	231	Organic Chemistry I	3
o CHEM*	132	Chemistry I Lab	1	o CHEM	232	Organic Chemistry I Lab	1
		Total	*14*			*Total*	*14*
Junior Year Fall Semester			Credits	**Junior Year Spring Semester**			Credits
o BIOM	301	Intro to Biometrics	3	o ENGL*	393	Professional Writing	3
o ENST	3XA	Ecosystem Ecology	4	o ENST	389	Internship	3
o Comp Tech	---	_____	3-4	o ENST	398	Seminar	1
o Free Elec	---	_____	3	o Assess/Meas	---	_____	3
o CORE*	---	(D)_____	3	o Tech Elec[1]	---	_____	3
				o Eco Elec[2]	---	_____	3
		Total	*16-17*			*Total*	*16*
Senior Year Fall Semester			Credits	**Senior Year Spring Semester**			Credits
o ENST	405	Energy and Environment	3	o ENST**	4XC	Capstone/Practicum in ENST	4
o ENST	4XE	Ecological Economics	3	o Applications	---	_____	3
o Applications	---	_____	3	o Tech Elec[1]	---	_____	3
o Eco Elec[2]	---	_____	3	o ENST	4XB	Ecological Design	3
o Free Elec	---	_____	3-4	o CORE*	---	(non-ENST Advanced Study)_	3
		Total	*15-16*			*Total*	*16*
Total Credits Required = 120							

* Satisfies CORE program requirements; one of the HA, HL, HO, SH, or SB can also be used to satisfy a D (diversity) course if designated as such.

** Take after completion of 56 credits to also satisfy CORE advanced studies requirement.

[1] 6 credits of Technology electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

[2] 6 credits of Ecosystem electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

Environmental Science and Technology (ENST)
Environmental Health
Curriculum in Example 4-Year Plan

Student _____ UID _____

Phone _____ E-mail _____ Matriculation Date _____

Freshman Year Fall Semester			Credits	Freshman Year Spring Semester			Credits
o ENGL*	101	Introduction to Writing	3	o CORE*	---	(HA)_____	3
o CORE*	---	(HL)_____	3	o PHYS*	121	Fund. of Physics I –or-	4
o MATH*	140	Calculus I –or-	3-4	o PHYS*	117	Introduction to Physics	
o MATH*	220	Elementary Calculus I		o BSCI*	106	Principles of Biology II	4
o BSCI*	105	Principles of Biology I	4	o ENST	2XA	Intro to Env. Health	3
		Total	*13-14*			*Total*	*14*
Sophomore Year Fall Semester			Credits	**Sophomore Year Spring Semester**			Credits
o CORE*	---	(HL/HA/HO)_____	3	o CORE*	---	(SB)_____	3
o CHEM*	131	Chemistry I	3	o ENST*	200	Fundamentals of Soil Science	4
o CHEM*	132	Chemistry I Lab	1	o CHEM	231	Organic Chemistry I	3
o BSCI*	207	Principles of Biology III	3	o CHEM	232	Organic Chemistry I Lab	1
o CORE*	---	(SH)_____	3	o BSCI*	223	General Microbiology	4
		Total	*13*			*Total*	*15*
Junior Year Fall Semester			Credits	**Junior Year Spring Semester**			Credits
o BIOM	301	Intro to Biometrics	3	o ENGL*	393	Professional Writing	3
o ENST	3XA	Ecosystem Ecology	3	o CORE*	---	(SB)_____	3
o ENST	3XB	Ecosystem Health and	3	o ENST	389	Internship	1
o CHEM*	241	Prot.	3	o ENST	398	Seminar	3
o CHEM*	242	Organic Chemistry II	1	o ENST	3XC	Environmental Toxicology	3
o CORE*	---	Organic Chemistry II Lab	3	o EcoHealth [1]	---	_____	3
		(D)_____					
		Total	*16*			*Total*	*16*
Senior Year Fall Semester			Credits	**Senior Year Spring Semester**			Credits
o ENST	4XJ	Env. Contaminants	3	o ENST**	4XC	Capstone/Practicum in ENST	4
o HumanHealth[2]	---	_____	3	o CORE*	---	(non-ENST Advanced Study)_	3
o EcoHealth [1]	---	_____	3	o ENST	4XK	Eco. Risk Assessment –or-	3
o Free Elec	---	_____	3	o ENST	4XL	Human Hlth. Risk Assessment	
o Free Elec	---	_____	*3*	o HumanHealth[2]	---	_____	3
				o Free Elec	---	_____	3
		Total	*15*			*Total*	*16*
Total Credits Required = 120							

* Satisfies CORE program requirements; one of the HA, HL, HO, SH, or SB can also be used to satisfy a D (diversity) course if designated as such.

** Take after completion of 56 credits to also satisfy CORE advanced studies requirement.

[1] 6 credits of Ecosystem Health electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

[2] 6 credits of Human Health electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

Environmental Science and Technology (ENST)
Soil and Watershed Science
Curriculum in Example 4-Year Plan

Student _____ UID _____

Phone _____ E-mail _____ Matriculation Date _____

Freshman Year Fall Semester			Credits	**Freshman Year Spring Semester**			Credits
o ENGL*	101	Introduction to Writing	3	o CORE*	---	(HA)_____	3
o CORE*	---	(HL)_____	3	o CORE*	---	(HL/HA/HO)_____	3
o MATH*	140	Calculus I –or-	3-4	o BSCI*	106	Principles of Biology II	4
o MATH*	220	Elementary Calculus I		o PLSC	100	Intro to Horticulture –or-	4
o BSCI*	105	Principles of Biology I	4	o PLSC	101	Intro Crop Science	
		Total	*13-14*			*Total*	*14*
Sophomore Year Fall Semester			Credits	**Sophomore Year Spring Semester**			Credits
o CORE*	---	(SH)_____	3	o CORE*	---	(SB)_____	3
o PHYS*	121	Fund. of Physics I –or-	4	o CORE*	---	(SB)_____	3
o PHYS*	117	Introduction to Physics		o ENST*	200	Fundamentals of Soil Science	4
o ENST	2XA	Intro to Env. Health	3	o CHEM	231	Organic Chemistry I	3
o CHEM*	131	Chemistry I	3	o CHEM	232	Organic Chemistry I Lab	1
o CHEM*	132	Chemistry I Lab	1				
		Total	*14*			*Total*	*14*
Junior Year Fall Semester			Credits	**Junior Year Spring Semester**			Credits
o BIOM	301	Intro to Biometrics	3	o ENGL*	393	Professional Writing	3
o ENST	3XA	Ecosystem Ecology	4	o ENST	389	Internship	3
o CORE*	---	(D)_____	3	o ENST	398	Seminar	1
o GEOL	100	Physical Geology	3	o ENST	417	Soil Hydrology and Physics	3
o GEOL	110	Physical Geology Lab	1	o ENST	421	Soil Chemistry	3
				o Tech Elec[1]	---	_____	*3*
		Total	*13*			*Total*	*16*
Senior Year Fall Semester			Credits	**Senior Year Spring Semester**			Credits
o ENST	422	Soil Microbiology	3	o ENST**	4XC	Capstone/Practicum in ENST	4
o Tech Elec[1]	---	_____	3	o CORE*	---	(non-ENST Advanced Study)_	3
o Breadth Elec[2]	---	_____	3	o Tech Elec[1]	---	_____	3
o ENST	414	Soil Morph., Gen., Class.	4	o Free Elec	---	_____	3-4
o Free Elec	---	_____	3-4	o Breadth Elec[2]	---	_____	3-4
		Total	*16-17*			*Total*	*16-18*
Total Credits Required = 120							

* Satisfies CORE program requirements; one of the HA, HL, HO, SH, or SB can also be used to satisfy a D (diversity) course if designated as such.

** Take after completion of 56 credits to also satisfy CORE advanced studies requirement.

[1] 9 credits of Technical electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

[2] 6-7 credits of Breadth electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

Environmental Science and Technology (ENST)
Natural Resources Management
Curriculum in Example 4-Year Plan

Student _____ UID _____

Phone _____ E-mail _____ Matriculation Date _____

Freshman Year Fall Semester			Credits	Freshman Year Spring Semester			Credits
o ENGL*	101	Introduction to Writing	3	o CORE*	---	(HA)_____	3
o CORE*	---	(HL)_____	3	o CORE*	---	(HL/HA/HO)_____	3
o MATH*	140	Calculus I –or-	3-4	o BSCI*	106	Principles of Biology II	4
o MATH*	220	Elementary Calculus I		o GEOL	100	Physical Geology –and –	3
o BSCI*	105	Principles of Biology I	4	o GEOL	110	Phys Geol Lab *-or-*	1
				o GEOG	201	Geog of Env Syst –and-	3
				o GEOG	211	Geog of Env Syst Lab	1
		Total	*13-14*			*Total*	*14*
Sophomore Year Fall Semester			Credits	**Sophomore Year Spring Semester**			Credits
o CORE*	---	(SH)_____	3	o CORE*	---	(SB)_____	3
o PHYS*	121	Fund. of Physics I –or-	4	o CORE*	---	(SB)_____	3
o PHYS*	117	Introduction to Physics		o ENST*	200	Fundamentals of Soil Science	4
o ENST	2XA	Intro to Env. Health	3	o CHEM	231	Organic Chemistry I	3
o CHEM*	131	Chemistry I	3	o CHEM	232	Organic Chemistry I Lab	1
o CHEM*	132	Chemistry I Lab	1				
		Total	*14*			*Total*	*14*
Junior Year Fall Semester			Credits	**Junior Year Spring Semester**			Credits
o BIOM	301	Intro to Biometrics	3	o ENGL*	393	Professional Writing	3
o ENST	3XA	Ecosystem Ecology	4	o ENST	389	Internship	3
o AREC	240	Intro. to Econ. and Env.	4	o ENST	398	Seminar	1
o GEOG	340	Geomorphology –or-	3-4	o AREC	332	Intro. to Nat. Res. Policy –or-	3
o GEOL	340	Geomorphology		o ENST	4XE	Ecological Economics	3
o CORE*	---	(D)_____	3	o GVPT	273	Intro. to Env. Politics	3
		Total	*17-18*			*Total*	*16*
Senior Year Fall Semester			Credits	**Senior Year Spring Semester**			Credits
o SOCY	305	Scarcity and Mod. Society	3	o ENST**	4XC	Capstone/Practicum in ENST	4
o Mgmt. Elec	---	_____	3	o Mgmt. Elec	---	_____	3
o Sci. Elec	---	_____	3	o Sci. Elec	---	_____	3
o Free Elec	---	_____	4-6	o CORE*	---	(non-ENST Advanced Study)_	3
				o Free Elec	---	_____	3
		Total	13-15			*Total*	*16*
Total Credits Required = 120							

* Satisfies CORE program requirements; one of the HA, HL, HO, SH, or SB can also be used to satisfy a D (diversity) course if designated as such.

** Take after completion of 56 credits to also satisfy CORE advanced studies requirement.

[1] 6 credits of Resource Management electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

[2] 6 credits of Resource Science electives courses are required; courses must be relevant to the students ENST option area and chosen in accordance with advisor

APPENDIX H
BENCHMARKS FOR ENST CONCENTRATIONS

APPENDIX H – Benchmarks for ENST Concentrations

Environmental Science and Technology (ENST) Benchmarks

Student _____ UID_____

Phone_____ E-mail_____ Matriculation Date_____

By 30 credits, student should have passed the following courses:

Course	*Semester*	*Grade*
ENGL 101_ Introduction to Writing		
MATH 140 [1] Calculus I		
BSCI 105 Principles of Biology I		

[1] Environmental Health, Soil and Watershed Science, and Natural Resources Management will accept MATH 220

By 60 credits, student should have passed the following courses:

Course	*Semester*	*Grade*
BSCI 106 Principles of Biology II		
CHEM 131/132 Chemistry I and Lab		
ENST 200 Fundamentals of Soil Science		

By 90 credits, student should have passed the following courses:

Course	*Semester*	*Grade*
CHEM 231/232 Organic Chemistry I and Lab		
PHYS 121[2] Fundamentals of Physics I		
BIOM 301 Biometrics		

[2] PHYS 117 may be substituted with advisor approval

APPENDIX I
LEARNING OUTCOMES ASSESSMENT FORMS AND RUBRICS

ASSESSMENT PLAN — ENVIRONMENTAL SCIENCE AND TECHNOLOGY

(Program of Study / Major / Degree Level, etc.)

Program Contact: Andrew Baldwin Phone: ext. 5-7855 E-mail: baldwin@umd.edu

Date submitted to Academic Unit Head: _____

Program Goals: "The goal of the Environmental Science and Technology program is to teach students concepts dealing with understanding environmental problems and designing solutions that manage, mitigate, or reverse ecological impacts. In the program students are provided multi-disciplinary quantitative design skills, analytical tools, and socioeconomic concepts to understand and solve complex environmental issues."

Relevance of goals to the mission statements and/or strategic plans of the University, College, or Program as applicable: The goals of the ENST Program are relevant to the College of Agriculture and Natural Resources whose mission includes "developing scientifically-based land use practices and policies", "understanding animal and plant biology", "profitably managing farms and agribusiness in harmony with ecosystems", and "integrating the use and protection of natural resources". Quotes from: 2007/2008 University of Maryland Undergraduate Catalog p. 53

Student Learning Outcomes (list the three-to-five most important)	**Assessment Measures and Criteria** (describe one or more measures for each outcome and criteria for success)	**Assessment Schedule** (initial year, and subsequent cycle)
1. Students will be able to understand and be able to apply basic mathematical reasoning to their research efforts and critical analysis.	A standard assessment will be administered to graduating seniors prior to graduation. The assessment will cover basic computational methods (such as use of statistical formulas). A committee of faculty will construct the assessment and review the results in the semester in which the capstone course is offered. Seventy percent of students should achieve a level of 3 or higher on the attached rubric.	In Spring semester of each academic year we will perform the assessment for each graduating senior.

Student Learning Outcomes (list the three-to-five most important)	**Assessment Measures and Criteria** (describe one or more measures for each outcome and criteria for success)	**Assessment Schedule** (initial year, and subsequent cycle)
2. Students will be able to exhibit understanding in both the social and natural sciences.	Using the required product from the internship course (ENST 389) or Special Topics in Environmental Science and Technology (ENST 499) an assessment will be made of the student's understanding. Seventy percent of students should achieve a level of 3 or higher on the attached rubric.	In Spring semester of each academic year we will perform the assessment for each graduating senior.
3. Students will be able to communicate clearly and effectively in writing and orally.	Student will successfully demonstrate the ability to deliver oral presentations in one or more ENST courses. Seventy percent of students should achieve a level of 3 or higher on the attached rubric.	In Spring semester of each academic year we will perform the assessment for each graduating senior.

APPENDIX I – Learning Outcomes Assessment Forms and Rubrics

Mathematical Reasoning Rubric

1----------2----------3----------4----------5

Scant *Substantially Developed*

Can set up a problem but not use mathematical operations.

Can solve problems completely and show detailed calculations of mathematical operations

Understanding of Social and Natural Sciences Rubrics

1----------2----------3----------4----------5

Scant *Substantially Developed*

Social science issues are not mentioned.

Social science issues are discussed and articulated thoroughly.

1----------2----------3----------4----------5

Scant *Substantially Developed*

Natural science issues are not mentioned.

Natural science issues are discussed and articulated thoroughly.

Written and Oral Communication Rubrics

1----------2----------3----------4----------5

Scant *Substantially Developed*

Product (paper or project) is not well organized, there are writing style differences among sections, and many uncorrected technical errors.

Issues logically developed and product (paper or project) is well organized and well written. No typographical or grammatical errors.

1----------2----------3----------4----------5

Scant *Substantially Developed*

Often mumbles or cannot be understood. Slouches and/or does not look at people during presentation. Very little use of facial expressions of body language. Did not generate much interest in topic being presented.

Speaks clearly and distinctly all (95-100%) the time, and mispronounces no words. Stands up straight, looks relaxed and confident, establishes eye contact with everyone in the room. Facial expressions and body language generate a strong interest and enthusiasm about the topic in others.