

UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

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

Submitted by: John Byrne phone number 831-8405

Department: Center for Energy and Environmental Policy email address jbbyrne@udel.edu

Action: Add Major

(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term 09/F

(use format 04F, 05W)

Current degree BS

(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: _____

(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name: Energy and Environmental Policy

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

Revising or Deleting:

Undergraduate major / Concentration: _____

(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: _____

(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: _____

(Must attach your Graduate Program Policy Statement)

Graduate Program of Study: _____

(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: _____

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

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

ENEP 117: Science, Society & Energy. This will be part of the First Year Experience requirement in the major. The course offers students a basic but complete background on the origin and the fate of energy and how that is relevant to the society. It will also provide students with opportunities to become familiar with the University of Delaware, its academic departments including the ENEP program, and other various resources on campus and library resources.

ENEP 250: Introduction to Energy Policy. This course will be part of the Core Curriculum for the major and is required for all majors. It will introduce students to the field and provide a survey of energy policies, economics and technology and their impact on the environment. This course aligns with overall program goals in the following manner:

- 1) Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. This course emphasizes theory and analysis and their application to energy systems. The nature of the energy field is inherently multidisciplinary and course content includes the multidimensionality of developing and maintaining energy systems.
- 2) Students will understand the complex social and biophysical interactions. The course focuses on the interactions between social and natural systems in the development of energy systems. It emphasizes the interplay between natural resources use and economic development, the mediating role of energy systems in this dynamic.
- 3) Students will gain an understanding of the influence of policy and economics on the development of the energy sector, with special emphasis on sustainable energy. This course incorporates theories of social and economic development and their implication for development of energy systems in a global context. The course emphasizes a sustainable energy framework as central to evaluation of the society-energy relationship.
- 4) Students will gain an understanding of local, national and global energy and environmental policy interactions and the policy options for addressing them in government, civil society, and industry. This course focuses on the role and character of globalization on energy and development. Key elements include the changing structure and behavior of major social institutions such as government and industry, and emergence of new institutions in civil society.
- 5) Students will gain an understanding of local, national and international policy and governance systems. The course references historical evolution of governance and energy as a field of study. It includes an evaluation of political paradigms and the centrality of the E4 (energy, economy, environment, equity) principles in public sector operations at the local and international level.

ENEP 364: Internship Fieldwork. This is part of the Discovery Learning Experience requirement in the major. All students will be expected to complete 3 internship credits in an organization, public agency or business in the field. This course aligns with overall program goals in the following manner:

1. Students gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. This course utilizes knowledge learned from across disciplines in application of a contemporary energy policy issue.
2. Students will gain an understanding of local, national and/or global energy and environmental policy interactions and the policy options for addressing them in government, civil society and industry. This course content focuses on contemporary energy problems in the major sectors of the field, and application of classroom knowledge to formulation of analysis and problem resolution. The course facilitates conceptualization and problem-solving among and between different sectors in energy technology and policy development.
3. Students will gain a basic understanding of local, national and international policy and governance systems. The course content incorporates applied knowledge in multi-scale political organizations, bridging political organizational theory and practice

ENEP 402: Electricity Policy & Planning. The course is required to support the proposed undergraduate energy and environmental major as an elective. Currently the Center for Energy and Environmental Policy (CEEP) offers ENEP 867 (Electricity Policy & Planning) as a

graduate course, but there are no courses offered at the undergraduate level. This course relates to the overall program goals in the following manner:

1. Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. The course emphasizes application of analytical tools that integrate social and environmental impacts of electricity production and distribution. The course utilizes technical assessment methodologies and planning tools that incorporate economic and social criteria to evaluate electric sector operations.
2. Students will understand the complex social and biophysical interactions. The course emphasizes the role of electricity in economic and social development, in the context of finite natural resources. Course content focuses on the energy resource requirements for “Business as Usual” development and “Sustainable Development” models of development and the attendant long-term viability of environmental-social relations.
3. Students will gain an understanding of the influence of policy and economics on the development of the energy sector, with special emphasis on sustainable energy. The course specifically analyzes the electricity sector as one form of energy in contemporary energy and development studies. Sustainable development theory is utilized as the basic framework from which to evaluate efficient and equitable development and the historical and future role of policy in establishing appropriate scale and structure of electricity production and distribution.

ENEP 410: Political Economy of Environment. The course is required to support the proposed undergraduate ENEP major as an upper division elective. This course aligns with overall program goals in the following manner:

1. Students will gain an understanding of the influence of policy and economics on the development of the energy sector, with special emphasis on sustainable energy. This course focuses on major theoretical frameworks influencing policy and practice in energy and environmental policy. It emphasizes the role of theory in the practice of nature-society relations, and economic development. The course emphasizes environmental sustainability and social equity in evaluating theoretical developments in the field of energy and environmental policy.
2. Students will gain an understanding of local, national and global energy and environmental policy interactions and the policy options for addressing them in government, civil society, and industry. This course focuses the character of globalization on energy and development, and the evolution of alternative theories to explain and understand the multi-scale/multi-dimensional energy and environmental policy developments. Key elements include the changing structure and behavior of major social institutions such as government and industry, and emergence of new institutions in civil society.
3. Students will gain an understanding of local, national and international policy and governance systems. The course references historical evolution of governance and energy as a field of study. It includes an evaluation of political paradigms and the centrality of sustainability and equity principles in governance systems at the local and international level.

ENEP 424: Sustainable Energy Policy & Planning. This course is required as a capstone course for the proposed undergraduate ENEP major. This course is currently offered at the graduate level (ENEP 824). ENEP is proposing to additionally offer this course as an upper division undergraduate course as well. This course meets the following proposed major learning outcomes from the energy and environmental policy program:

1. Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. The course emphasizes sustainable energy

theory and policy in terms of economic and environmental impacts, with a special focus on climate change. The course also reviews technical and policy applications of alternative energy technologies including on-site field evaluations of local alternative operating energy systems (e.g., wind farms, photovoltaic manufacturing plants and operations, etc)

2. Students will understand the complex social and biophysical interactions. This course focuses on analysis of sustainable energy technologies in comparison to conventional fuels including energy efficiency, distributed energy resources and energy storage, natural gas, hydrogen and renewable energy sources. This course also focuses on sustainable energy strategies in terms of their economics, impacts on the environment and integrates university faculty with research and application expertise on the interactions of social and biophysical interactions in the context of energy development.

ENEP 425: Energy: Resources, Technologies & Policies. This course is required as part of the core curriculum for the proposed undergraduate major in ENEP. Currently CEEP offers ENEP 625 (Energy Policy & Administration) as a graduate course, but there are no courses to fulfill the objectives of an introductory level undergraduate course. This course meets the following proposed major learning outcomes from the ENEP program:

1. Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. This course focuses on application of energy and environment policy assessments utilizing multi-disciplinary analytic models on energy consumption and production. The course emphasizes qualitative and quantitative research methodologies.
2. Students will gain an understanding of the influence of policy and economics on the development on the energy sector with an emphasis on sustainable energy. The course focuses on current policy analysis techniques utilized in the energy sector and critical evaluation of strengths and weaknesses of each. Emphasis is on the application of models, with a focus on assessment of distributed environmental and social impacts of energy technologies.

ENEP 426: Climate Change: Science, Policies & Political Economy. This course is required to support the proposed undergraduate ENEP major as an upper division elective. This course meets the following proposed undergraduate major learning outcomes:

1. Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. The course emphasizes the integration of cross-disciplinary theory and policy assessments of national and international development patterns and environment with a focus on climate change. The course also includes analysis of the role of energy production and consumption on atmospheric changes utilizing analytic frameworks from the sciences and social sciences.
2. Students will understand the complex social and biophysical interactions with respect to climate change. The course focuses on the role of human activity on biophysical processes associated with climate change. It focuses on multidisciplinary research in alignment with the Intergovernmental Panel on Climate Change working groups I (physical and scientific assessment), II (vulnerability of socio-economic and natural systems to climate change), and III (mitigating climate change)
3. Students will gain an understanding of the influence of policy and economics on the development of the energy sector, with special emphasis on sustainable energy. The course focuses on the institutional development of the energy sector in relation to development economics and environmental sustainability. The role and structure of policy analysis in determining viable options for energy, development and environmental goals is emphasized.

4. Students will gain an understanding of local, national and global climate change policy interactions and the policy options for addressing them in government, civil society, and industry. The course focuses on evaluation of the efficacy and challenges of international governance institutions in addressing multi-scale environmental problems such as climate change. The role of sectoral actors in participation in United Nations Framework Convention on Climate Change are analyzed and compared, with specific attention to national development goals and global economic actors.

ENEP 468: Research in Global Energy Policies. This course is required to support the proposed undergraduate ENEP major as an advanced elective. Currently there are no advanced research courses at the undergraduate level specifically focused on international energy policy. This course aligns with overall program goals in the following manner:

1. Students will gain an understanding of local, national and global energy and environmental policy interactions and the policy options for addressing them in government, civil society, and industry. The course emphasizes global perspective on the conflicts and challenges of meeting energy needs among divergent communities and nations. It focuses on the multi-sector realities of energy systems, and the energy system's role in development.
2. Students will gain an understanding of local, national and international policy and governance systems. The course provides a concentration-specific (students select one of three concentration areas in the undergraduate major) review of policy as applies to technology development, energy regulation, and development assistance. It includes an evaluation of existing energy networks and the interactions of policy and economics in the development of alternative energy systems.

ENEP470: Readings in U.S. Energy Policy. This course is required to support the proposed undergraduate ENEP major as an advanced elective. Currently there are no courses at the undergraduate level specifically focused on U.S. energy policy. ENEP 625 (Energy Policy & Administration) is offered at the graduate level. This course aligns with overall program goals in the following manner:

1. Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. This course focuses on energy technology development and U.S. energy regulatory policy. The independent reading concentrates U.S. public sector operations including subsidy and regulatory frameworks applicable to energy technologies, industrial practices and community systems. It emphasizes the inherently multidisciplinary practice of energy development in the U.S. context and the intersections of multi-sector organizations in the production and regulation of energy and environment.
2. Students will understand the complex social and biophysical interactions. This is an advanced course focusing on the interactions between social and natural systems in the development of U.S. energy systems. It requires advanced critical assessments of the interplay between natural resources use and economic development, the mediating role of U.S. energy systems in energy and environmental policy.
3. Students will gain an understanding of the influence of policy and economics on the development of the energy sector, with special emphasis on sustainable energy. This course emphasizes an advanced level of analysis with respect to U.S. energy demands and economic development. It focuses on technological developments and the role of U.S. regulatory systems on the scale, speed and scope of energy technology implementation. The course emphasizes sustainable energy frameworks and ties internship, previous classroom learning into a specialized independent study course.

ENEP 472: Senior Research Paper. This part of the Advanced Curriculum requirement in the major. All students will be expected to write an original analytical paper that addresses an important issue in the respective concentration area. This course aligns with overall program goals in the following manner:

1. Students will gain cross-disciplinary knowledge and skills in the field of energy and environment associated with energy use. This course focuses on integration of theory and policy in the formation of an original research project. Emphasis is on problem-solving which is central to energy and environmental practice. Energy and environmental theory is referenced and applications of appropriate quantitative and qualitative methodologies are used.
2. Students will understand the complex social and biophysical interactions. The course focuses on the economic and policy interactions between social and natural systems in the research project. Emphasis is on finite resources, environmental and ecosystem sustainability, and societal energy needs.
3. Students will gain an understanding of the influence of policy and economics on the development of the energy sector, with special emphasis on sustainable energy. This course focuses on the specific organizational actors and their roles in the development of energy systems. The course emphasizes the balance of biophysical environmental processes and social processes in the development of energy policy.
4. Students will gain an understanding of local, national and global energy and environmental policy interactions and the policy options for addressing them in government, civil society, and industry. This course focuses on the role and character of globalization on energy and development in an original research project. Key elements include the changing structure and behavior of major social institutions such as government and industry, and emergence of new institutions in civil society.
5. Students will gain an understanding of local, national and international policy and governance systems. The course focuses on current public sector systems and effective regulatory apparatuses for sustainable energy systems. The original research emphasizes delineation of appropriate level governance structures, public sector rules and government/ industry roles in energy systems.

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

The proposed major is cross-disciplinary and intercollegiate in design and will prepare students to attain effective skills in oral and written communication as it relates to energy and environmental policy.

The program was designed to provide students with learning opportunities that emphasize cross-disciplinary critical analysis of contemporary energy and environmental problems and to investigate effective solutions. Classroom knowledge is supplemented with internship and research requirements to prepare students on how to apply their knowledge in real world contexts.

The curriculum requires students to work independently and successfully in their coursework. Students will also be expected to work collaboratively in their internship fieldwork and will have the opportunity to work with their peer and graduate students in research projects coordinated by the Center for Energy and Environmental Policy and collaborating universities and research institutes with which it has formal exchange agreements.

The proposed major includes ethics and responsibilities in community and society as components within courses that constitute the core curriculum. In addition, courses in this specific content area are included in the Advanced Curriculum Electives for all concentrations.

The proposed cross-disciplinary, intercollegiate major is based on the premise that understanding the diverse ways of thinking underlying the search for knowledge in the arts, humanities, sciences and social sciences is essential for educated and engaged individuals. The major includes courses from all of these disciplines.

The proposed major includes an internship field requirement to develop the ability to integrate academic knowledge with experiences that extend the boundaries of the classroom. In addition, the Center for Energy and Environmental Policy has created a partner network of more than 25 universities and research institutes. It has also organized a successful intern locator program. The Center annually supports 20-25 sponsored research projects, with students integrated into this work. CEEP's infrastructure will provide an important source of intellectual and professional support, and in some cases, majors may be offered undergraduate research assistantships.

The proposed program includes courses in international and global relations from several disciplinary perspectives including political science, geography, economics and energy & environmental policy. These courses will provide students with a good foundation from which to develop an international perspective and to understand the social, economic and environmental complexities in a global society.

Identify other units affected by the proposed changes:

The Colleges of Arts & Science, Business & Economics, Engineering, and Human Services, Education & Public Policy are affected. The deans of the four colleges have indicated their support in writing (see the full proposal, Appendix D). One course in the Department of Chemical Engineering and one new course in the School of Urban Affairs & Public Policy would receive additional enrollment as a result of the proposed major. Letters of support from the department chairs of the two units have been provided (see the full proposal, Appendices C & D). The Director of the University Libraries has reviewed the proposal in detail and has concluded that the impact on the Libraries is not significant (see the full proposal, Appendix B).

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

The undergraduate major aligns with the academic priorities of the University's stated goals to promote programs which engage in cross-disciplinary (or cross fertilization) efforts to create integrated and critically reflective solutions to the world's pressing energy and environmental challenges. The program is designed to provide students with core knowledge of the energy sector and its environmental impacts and to foster graduates who will be instrumental in developing long-term effective and sustainable solutions. Building upon the excellence of existing faculty, centers and departments that support education and research in the energy and environmental field, this major offers an intercollegiate faculty and program of courses that bridge science, social science, engineering, and public policy.

The undergraduate major draws on the wide-ranging strengths of the University to provide a comprehensive program that combines technical expertise, theoretical preparation and practitioner experience. Its vision is to engage students in creative and unconventional approaches to problems of theory and practice, and to provide them with the requisite skills to contribute to the field in international, national and local contexts. University faculty with expertise in policy analysis, economics, the social and natural sciences, and engineering will offer students the opportunity to learn from a diverse and extensive array of courses, but with a common and directed focus to address the needs of society to transition to a sustainable energy

future.

The proposed undergraduate major in Energy and Environmental Policy will complement programs being offered at the University. It will also educate and build core competencies and skills for prospective practitioners who will work at the intersections of business, technology, government, research and civil society sectors seeking to improve energy and environmental policy. This major will complement existing programs, adding greater breadth and depth in undergraduate coursework, research and practical experience.

Program Requirements:

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

UNIVERSITY REQUIREMENTS	10 credits
ENGL 110 Critical Reading and Writing	(3)
First Year Experience (ENEP 117: Science, Society & Energy)	(1)
Discovery Learning Experience (fulfilled by taking ENEP 364: Internship)	
Second Writing Course	(3)
Multicultural Requirement	(3)

BREADTH REQUIREMENTS	31 credits
Group A: Understanding of the creative arts and humanities	(9)
Group B: Understanding of culture and institutions over time	(6)
Group C: Understanding of human beings and their environment	(6)
Group D: Understanding of natural phenomena through analysis	(10)

MAJOR REQUIREMENTS

All students are required to take the five Core Courses (15 credits), four Capstone Courses (12 credits), and Internship Field Experience (3 credits) and produce a Senior Research Paper (6 credits). In addition, students must choose from one of three concentration areas and fulfill the Advanced Course Required (ACR) and Advanced Course Electives (ACE) requirements listed in each.

Core Courses **15 credits**

Core Courses are **required** of every student in the ENEP major. These courses address the conceptual/basic principles of the major and are taught at the introductory (100-200) level.

ENEP 250: Introduction to Energy Policy	(3)
GEOG 236: Conservation of Natural Resources: Global Issues	(3)
POSC220: Introduction to Public Policy OR UAPP 225 Crafting Public Policy	(3)
ECON151: Introduction to Micro-Economics: Prices and Markets	(3)
PHYS143: Energy, Technology and Society	(3)

Concentration Areas **48 credits**

Beyond the Core Courses, students choose to specialize in one of three concentrations: Energy, Economics and Public Policy; Energy, Environment and Society; and Energy, Science and Technology. Each concentration has an advanced course curriculum that consists of a set of required courses (noted as **ACR**), which must be taken by students choosing that concentration; and a set of elective courses (noted as **ACE**) to be selected from a menu of designated course options. (See below for individual Concentration requirements.)

Capstone Courses (CAP) 12 credits

GEOG 422: Resources, Development and the Environment
ENEP 424: Sustainable Energy Policy and Planning
ENEP 425: Energy: Resources, Technologies and Policies
CHEG 625: Green Engineering

Internship (3 credits) and Senior Research Paper (6 credits) (IRP) 9 credits

Minimum Credits to Graduate with this Major 125 credits

ENERGY, ECONOMICS AND PUBLIC POLICY CONCENTRATION

Students must complete the 6 courses (18 credits) listed under Advanced Curriculum Required (ACR). In addition students must complete 10 courses (30 credits of Advanced Curriculum Electives (ACE)).

Advanced Curriculum Required Courses (ACR) 18 credits

(To fulfill the ACR requirements students may choose from the three options listed below)

ACR: ECON 300 Intermediate Microeconomic Theory¹ 3 credits
ACR: FREC/ECON 343 Environmental Economics 3 credits
ACR: ENEP 402 Electricity Policy and Planning 3 credits
ACR: POSC 350 Politics and the Environment 3 credits

One of the following:

ACR: ENEP 468 Research in Global Energy Policies 3 credits
ACR: ENEP 470 Readings in U.S. Energy Policy 3 credits

One of the following:

ACR: ECON 422 Econometric Methods & Models I 3 credits
ACR: MATH 201 Introduction to Statistical Methods I 3 credits
ACR: POSC 300 Data Analysis for Political Sciences 3 credits
ACR: STAT 370 Introduction to Statistical Analysis I 3 credits

Advanced Curriculum Elective Courses (ACE) 30 credits

(30 credits are to be chosen from the list below to satisfy this part of the ACE requirement. Other courses can be added with the approval of the advisor)

ACE: BUAD 301 Introduction to Marketing 3 credits
ACE: BUAD 472 Marketing, Society and the Environment (Prerequisite:
BUAD 301) 3 credits
ACE: ECON 152 Introduction to Macroeconomics 3 credits
ACE: ECON 311 Economics of Developing Countries 3 credits
ACE: ECON 360 Government Regulation of Business 3 credits
ACE: ECON 422 Econometric Methods & Models I 3 credits
ACE: ECON 426 Mathematical Economic Analysis 3 credits
ACE: ECON 463 Economics of Regulation 3 credits
ACE: ECON/FREC 471 Futures and Options Markets 3 credits
ACE: ENEP 410 Political Economy of Environment 3 credits
ACE: POSC/COMM 425 Energy/Environmental Policy, Public
Opinion, Media and Politics 3 credits

¹ This course will be replaced with ECON367 (Economics of Energy) when it receives a permanent number.

ACE: ENEP 468 Research in Global Energy Policies	3 credits
ACE: ENEP 470 Readings in U.S. Energy Policy	3 credits
ACE: ENEP 426 Climate Change: Science, Policy and Political Economy	3 credits
ACE: GEOG 250 Computer Methods in Geography	4 credits
ACE: GEOG 372 Geographic Information Systems	3 credits
ACE: GEOG 412 Physical Climatology	4 credits
ACE: GEOG/UAPP 428 Land Use & Environmental Planning	3 credits
ACE: GEOL 421 Environmental and Applied Geology	3 credits
ACE: MATH 201 Introduction to Statistical Methods I	3 credits
ACE: MATH 202 Introduction to Statistical Methods II	3 credits
ACE: MATH 221 Calculus 1	3 credits
ACE: MATH 241 Analytical Geometry and Calculus A	4 credits
ACE: MATH 242 Analytical Geometry and Calculus B	4 credits
ACE: PHIL 340 Cross Cultural Environmental Ethics	3 credits
ACE: POSC 300 Data Analysis for Political Sciences	3 credits
ACE: POSC 301 State and Local Government	3 credits
ACE: POSC 311 Politics of Developing Nations	3 credits
ACE: POSC 323 International Political Economy	3 credits
ACE: STAT 370 Introduction to Statistical Analysis I	3 credits
ACE: STAT 371 Introduction to Statistical Analysis II	3 credits
ACE: UAPP 325 Public Policy Analysis	3 credits
ACE: UAPP 410 Making Convincing Policy Arguments	3 credits
ACE: UAPP 419 Policy Leadership and Ethics	3 credits
ACE: UAPP 427 Evaluating Public Policy	3 credits
ACE: UAPP 440 Contemporary Policy Issues	3 credits
ACE: Foreign Language (up to 8 credits)	8 credits

ENERGY, ENVIRONMENT AND SOCIETY CONCENTRATION

Students must complete the 4 courses (12 credits) listed as the Advanced Curriculum Required courses (ACR). In addition students must complete 11 courses (33 credits of Advanced Curriculum Electives (ACE). This includes 4 courses (12 credits) from the Methods Menu, and 7 courses (21 credits) from the Social Science Menu.

Advanced Curriculum Required Courses (ACR) 12 credits

ACR: ENEP 426 Climate: Science, Policy and Political Economy	3 credits
ACR: POSC 350 Politics and the Environment	3 credits
ACR: POSC/COMM425 Energy/Environment Policy, Public Opinion, Media and Politics	3 credits
ACR: ECON 300 Intermediate Microeconomic Theory ²	3 credits

Advanced Curriculum Elective Courses (ACE) 36 credits

Methods Menu (ACE)	12 credits
(12 credits are to be chosen from the list below to satisfy this part of the ACE requirement. Other courses can be added with the approval of the advisor)	
ACE: MATH 201 Introduction to Statistical Methods I	3 credits
ACE: MATH 202 Introduction to Statistical Methods II	3 credits

² This course will be replaced with ECON367 (Economics of Energy) when it receives a permanent number.

ACE: MATH 221 Calculus 1	3 credits
ACE: MATH 241 Analytical Geometry and Calculus A	4 credits
ACE: GEOG 250 Computer Methods for Geography and Environmental Science	4 credits
ACE: GEOG 412 Physical Climatology (MATH 241 and GEOG 250 required)	4 credits
ACE: GEOG 456 Hydro-Climatology (MATH 241 and GEOG 250 required)	3 credits
ACE: GEOG 372 Geographic Information Systems (GIS)	3 credits
ACE: ECON 422 Econometric Methods & Models I	3 credits
ACE: POSC 300 Data Analysis for Political Sciences	3 credits
ACE: STAT 370 Introduction to Statistical Analysis I	3 credits
ACE: STAT 371 Introduction to Statistical Analysis II	3 credits
ACE: STAT 408 Statistical Research Methods I	3 credits
ACE: STAT 475 Statistics for Environmental Sciences	3 credits

Social Science Menu (ACE) **24 credits**
 (24 credits are to be chosen from the list below to satisfy this part of the ACE requirement. Other courses can be added with the approval of the advisor)

ACE: ECON/FREC 444 Economics of Environmental Management	3 credits
ACE: ENEP 402 Electricity Policy and Planning	3 credits
ACE: ENEP 410 Political Economy of the Environment	3 credits
ACE: ENEP 468 Research in Global Energy Policies	3 credits
ACE: ENEP 470 Readings in U.S. Energy Policy	3 credits
ACE: FREC/ECON 343 Environmental Economics	3 credits
ACE: FREC 424 Resource Economics	3 credits
ACE: FREC 450 Topics in Environmental Law	3 credits
ACE: GEOG/UAPP 428 Land Use & Environmental Planning	3 credits
ACE: GEOL 112 Earth Resources and Public Policy	3 credits
ACE: GEOL 304 Earth System Science	4 credits
ACE: GEOL 421 Environmental and Applied Geology	3 credits
ACE: PHIL 340 Cross Cultural Environmental Ethics	3 credits
ACE: PHIL 448 Environmental Ethics	3 credits
ACE: POSC 311 Politics of Developing Countries	3 credits
ACE: POSC 323 International Political Economy	3 credits
ACE: POSC 456 Disaster and Politics	3 credits
ACE: SOCI 331 World Population, Profiles and Trends	3 credits
ACE: SOCI 470 Environmental Sociology	3 credits
ACE: SOCI 471 Disasters, Vulnerability and Development	3 credits
ACE: UAPP 325 Public Policy Analysis	3 credits
ACE: UAPP 427 Evaluating Public Policy	3 credits
ACE: Foreign Language (up to 8 credits)	8 credits

ENERGY, SCIENCE AND TECHNOLOGY

Students must complete the 6 courses (18 credits) listed as the Advanced Curriculum Required courses (ACR). In addition students must complete 10 courses (30 credits of Advanced Curriculum Electives (ACE)).

Advanced Curriculum Required Courses (ACR) **18 credits**

ACR: CHEM 103 General Chemistry I	4 credits
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ACR: ECON 300 Intermediate Microeconomic Theory ³	3 credits
ACR: ENEP 426 Climate Change: Science, Policy and Political Economy	3 credits
ACR: MATH 241 Analytic Geometry and Calculus A	4 credits
ACR: PHYS 201 Introductory Physics I	4 credits

Advanced Curriculum Elective Courses (ACE) 30 credits

(30 credits are to be chosen from the list below to satisfy this part of the ACE requirement. Other courses can be added with the approval of the advisor)

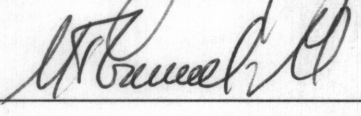
ACE: BUAD 301 Introduction to Marketing	3 credits
ACE: BUAD 472 Marketing, Society and the Environment (Prerequisite: BUAD 301)	3 credits
ACE: CHEM 104 General Chemistry II	4 credits
ACE: ECON 300 Intermediate Microeconomics Theory	3 credits
ACE: ECON 311 Economics of Developing Countries	3 credits
ACE: ECON 343 Environmental Economics	3 credits
ACE: ELEG415/615 Electric Power and Renewable Energy Systems	3 credits
ACE: ELEG 491 Ethics and Impacts of Engineering	2 credits
ACE: ELEG/MSEG 676 Sustainability	3 credits
ACE: ENEP 402 Electricity Policy and Planning	3 credits
ACE: ENEP 410 Political Economy of Environment	3 credits
ACE: ENEP 468 Research in Global Energy Policies	3 credits
ACE: ENEP 470 Readings in U.S. Energy Policy	3 credits
ACE: ENEP/POSC/COMM 425 Energy/Environmental Policy, Public Opinion, Media and Politics	3 credits
ACE: GEOL 304 Earth System Science	3 credits
ACE: GEOL 421 Environmental and Applied Geology	3 credits
ACE: GEOG 250 Computer Methods in Geography (Prerequisite: MATH 115 or MATH 117)	4 credits
ACE: GEOG 372 Geographic Information Systems	3 credits
ACE: GEOG 412 Physical Climatology (Prerequisite: MATH 241 and GEOG 250)	4 credits
ACE: GEOG/UAPP 428 Land Use & Environmental Planning	3 credits
ACE: MATH 115 Pre-Calculus	3 credits
ACE: MATH 117 Pre-Calculus for Scientists & Engineers	4 credits
ACE: MATH 221 Calculus 1	3 credits
ACE: MATH 242 Analytic Geometry and Calculus B (Prerequisite: MATH 241)	4 credits
ACE: MEEG 435 Wind Power Engineering	3 credits
ACE: MEEG 442 Introduction to Fuel Cells	3 credits
ACE: MSEG 667: Ethics in Nanoscience	3 credits
ACE: PHIL 340 Cross Cultural Environmental Ethics	3 credits
ACE: POSC 350 Politics and the Environment	3 credits
ACE: POSC/COMM 425 Energy/Environmental Policy, Public Opinion, Media and Politics	3 credits
ACE: STAT 370 Introduction to Statistical Analysis I	3 credits
ACE: STAT 371 Introduction to Statistical Analysis II	3 credits
ACE: UAPP 325 Public Policy Analysis	3 credits
ACE: UAPP 427 Evaluating Public Policy	3 credits
ACE: Foreign Language (up to 8 credits)	8 credits

³ This course will be replaced with ECON367 (Economics of Energy) when it receives a permanent number.

ROUTING AND AUTHORIZATION:

(Please do not remove supporting documentation.)

Department Chairperson  Date November 1, 2008

Dean of College  Date 12/03/08

Chairperson, College Curriculum Committee _____ Date _____

Chairperson, Senate Com. on UG or GR Studies _____ Date _____

Chairperson, Senate Coordinating Com. _____ Date _____

Secretary, Faculty Senate _____ Date _____

Date of Senate Resolution _____ Date to be Effective _____

Registrar _____ Program Code _____ Date _____

Vice Provost for Academic Affairs & International Programs _____ Date _____

Provost _____ Date _____

Board of Trustee Notification _____ Date _____