UNIVERSITY OF MARY WASHINGTON -- NEW COURSE PROPOSAL

Electronically submit this completed form with PDF attachments to the Chair of the College Curriculum Committee.

<table>
<thead>
<tr>
<th>COLLEGE (check one):</th>
<th>Arts and Sciences</th>
<th>X</th>
<th>Business</th>
<th>Education</th>
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</thead>
<tbody>
<tr>
<td>Proposal Submitted By:</td>
<td>C. Whipkey</td>
<td>Date Prepared: 10/24/2012</td>
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<tr>
<td>Course Title:</td>
<td>Energy Resources and Technology</td>
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<tr>
<td>Department/discipline and course number*:</td>
<td>Earth and Environmental Sciences/EESC 340, cross-listed as GEOL 340</td>
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*This course number must be approved by the Office of the Registrar before the proposal is submitted.

Number of credits proposed: 3
Prerequisites: One of the following courses: Biol 122 or 126; Chem 112; Geol 112; EESC 110; or Phys 106.
Will this be a new, repeatable "special topics" course? (Do you want students to be able to take this new course more than once if the topic changes?) NO X YES

Date of first offering of this new course: FALL SEMESTER, year 2013
Proposed frequency of offering of the course: Once per year
List the faculty who will likely teach the course: C. Whipkey
Are ANY new resources required? NO X YES Document in attached impact statement

This new course will be (check all that apply):
Required in the major: General Elective X
Elective in the major: General Education**

**AFTER the new course is approved, a separate proposal must be sent to the General Education Committee.

Catalog Description: Prerequisite: One of the following courses: Biol 122 or 126; Chem 112; Geol 112; EESC 110; or Phys 106. Intended primarily for science majors, this course investigates the basic science and technology relating to alternative energy sources and fossil fuels. Students who complete this class will have a greater technical understanding of energy sources and the methods used to tap them.

COURSE HISTORY
Was this course taught previously as a topics or experimental course? YES X NO
Course Number and Title of Previous Course | Semester Offered | Enrollment
GEOL 421R, cross listed as EESC 421O | Fall 2011 | 17
GEOL 421R, cross listed as EESC 421O | Fall 2012 | 15

X CHECK HERE if the proposed course is to be equated with the earlier topics or experimental offerings. This means that students who took the earlier "topics" course will only be able to take the new course if they made a C- grade or lower in the earlier course.

NOTE: If the proposed course has not been previously offered as a topics or experimental course, explain in the attached rationale statement why the course should be adopted even though it has not been tried out.

REQUIRED ATTACHMENTS:
1. Rationale Statement (Why is this course needed? What purposes will it serve?)
2. Impact Statement (Provide details about the Library, space, budget, and technology impacts created by adding this new course. Include supporting statements from the Library, IT Department, etc. as needed.)
3. Sample Syllabus

Department Chair Approval: C. Whipkey Date: 10-25-2012
CCC Chair Approval: Bradley Hansen Date: 11/9/12
UCC Chair Approval: Date:

New Course Proposal Cover Sheet (July 2012)
1. Rationale Statement

Much of the energy used to power our industrial civilization is derived from petroleum. Although known recoverable reserves of U.S. petroleum have recently increased because of technological advancements, the U.S. still imports a substantial proportion of its oil and many analysts still predict a peak in worldwide oil production within the next few years, followed by irreversible decline. If this peak occurs, increasing world demand for oil will create shortages and could drive prices far higher than they have ever been. In addition, CO₂ emissions from fossil fuels apparently are leading to profound changes in the Earth’s climate, and the use of such fuels could be constrained in the future.

For all these reasons, alternatives to petroleum and other fossil fuels will likely be of great importance over the next few decades. This course investigates the basic science and technology relating to alternative energy sources and fossil fuels. Students who complete this class will have a greater technical understanding of the energy sources and the methods used to tap them.

This course is designed to give students, primarily natural science majors, knowledge of the basic science and technology of energy resources. This is a very important topic that is not addressed elsewhere at UMW. Our department believes that our students should have the opportunity to systematically study the basics of both fossil fuels and alternatives. Our students apparently agree, because the class has been filled to capacity (or above) both years it has been offered as a Topics class. Because student presentations are an integral part of the class, I capped enrollment at 15 each year, but last year (Fall 2011) felt compelled to force-add two students. This year’s (Fall 2012) class was filled to capacity.

2. Impact Statement

This new course will have no library, space, budget, or technology impacts beyond those that can be handled internally by our department.
3. Sample Syllabus

EESC 4210 / GEOL 421R: Energy Resources and Technology Fall 2012

Instructor: Charles Whipkey  
Office: 441 Jepson Science Center  
Email: cwhipkey@umw.edu  
Phone: 654-1428  
Office hours: Tue. 3:15 PM - 4:15 PM  
Wed. 10:50 PM - 11:50 PM; 1:00 PM - 3:00 PM  
Thu. 3:15 PM - 4:15 PM

Additional hours by appointment.

This class meets Tuesdays and Thursdays from 11:00 AM to 12:15 PM in Jepson 409.

Rationale: Much of the energy used to power our industrial civilization is derived from petroleum, and very cheap petroleum at that. The U.S. was once the world’s largest producer of oil, but now most production has shifted to politically unstable areas or to areas that are openly hostile to the U.S. and other Western nations. On the other hand, production of U.S. natural gas and oil has recently surged due to improved extraction technology. In addition to the complicated supply issues, CO₂ emissions from fossil fuels apparently are leading to profound changes in the Earth’s climate, leading to calls to reduce our use of carbon emitting fuels.

For all these reasons, alternatives to petroleum and other fossil fuels could be of great importance over the next few decades. But what are the alternatives? How do they work? Are they reasonable alternatives or fantasies that will never be practical?

Goals and objectives of this course: During this course we will investigate the basic science and technology of oil, gas, coal, and selected alternative energy sources. This will be a “nuts-and-bolts” class in the sense that our main concern will be to understand the nature of conventional and alternative energy resources and how they work in the real world. Our focus will not be on policy issues, global climate change, or economic matters, although it will not be possible to ignore those topics completely. When you have finished this class, you should have a greater understanding of the main sources of energy used by society and the technology used to tap those sources.

Readings: There is one required book for this class: Renewable Energy, 2nd ed., edited by Godfrey Boyle. Other resources will be disseminated or discovered as the class progresses.

Format of the class: No one person can be an expert on every energy source. My background is in geology, so I am most comfortable in discussing fossil fuels. Other members of the class may have backgrounds or interests in specific fossil fuels or alternatives. Because none of us, including the instructor, are qualified to “lecture” on all the topics we will cover, this class will be conducted in a modified seminar format in which everyone will be expected to master material from the textbook and other sources. Class discussion on each energy source will be followed by a quiz, then with presentations by individual students on selected aspects of the topic under discussion.

Quizzes will be given on most days (exceptions will be announced), and will typically consist of questions requiring short answers ranging in length from single words to mini-essays.

New Course Proposal Cover Sheet (July 2012)
Mid-term and final exams will be based on the technical material presented during the first and second parts of the semester. The format of the exams will be discussed later. The final exam is cumulative.

Presentations will typically be PowerPoint talks, but you may vary the format if you like. Just check with me first. Presentations will be assessed (that means graded) based on technical accuracy, quality of presentation materials, and delivery.

Participation and attendance are, of course, interrelated. Because of the nature of this course, you must make every effort to attend and participate in all classes. Your participation grade will include my assessment of your contribution to the class, including effort taken on your PowerPoint comment cards. If you miss four or more classes, your grade will drop by one letter regardless of other grades; if you miss eight classes, you will not pass this course.

A mid-semester grade of Unsatisfactory (U) will be assigned if any one of the grading criteria fall into the “D” range. There is no permanent consequence for a U grade; it is simply a way of letting you know that there are some issues that need to be addressed if you are to be successful in this class.

Honor Pledge: The following pledge must be written and signed on all work to be graded: I hereby declare upon my word of honor that I have neither given nor received unauthorized help on this work.

Note: The Office of Disability Services has been designated by the University as the primary office to guide, counsel, and assist students with disabilities. If you receive services through that office and require accommodations for this class, please make an appointment with me as soon as possible to discuss your approved accommodation needs. If you need accommodations (e.g. note taking assistance, extended time for tests, etc.), contact the Office of Disability Services at 540-654-1266.

Grading

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>20%</td>
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<tr>
<td>Mid-term exam</td>
<td>20%</td>
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<tr>
<td>Final exam</td>
<td>20%</td>
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<tr>
<td>Presentations</td>
<td>20%</td>
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<tr>
<td>Participation and attendance</td>
<td>20%</td>
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Material to be covered in the course

Part 1: During the first part of the course we will explore selected alternative energy technologies. Technical aspects of each topic will be covered so that we have a basic understanding of the subject, after which teams of two students will present detailed analyses of specific aspects of the energy technology.

A mid-term exam will be given at the conclusion of Part 1. The date of the exam is not set at this time because it is dependent on the nature of the topics covered.

Part 2: The second part of the course will explore technical and geological aspects of “traditional” or “mainstream” energy sources, including the fossil fuels (coal, petroleum, and gas) and nuclear power. This part of the class will follow a format similar to that of Part 1, with technical discussions, quizzes, and student presentations included in the class.

New Course Proposal Cover Sheet (July 2012)
A *final exam*, given during the final exam period, will cover material from Part 2 of the course.

*Tentative Schedule:* A general schedule is given below. Material will be covered in the following order, although the exact dates are not known at this time.

<table>
<thead>
<tr>
<th>Part 1: Renewable and alternative energy sources</th>
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<tbody>
<tr>
<td>Topic</td>
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<tr>
<td>1. Introduction to renewable energy</td>
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<td>2. Solar Photovoltaics</td>
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<td>3. Biofuels</td>
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<td>4. Wind energy</td>
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<td>5. Geothermal energy</td>
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*Renewable energy exam, one week after finishing our work with renewable energy*

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<tr>
<th>Part 2: “Traditional” or Mainstream” energy sources</th>
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<tbody>
<tr>
<td>6. Coal</td>
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<tr>
<td>7. Petroleum and natural gas</td>
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<td>8. Nuclear power</td>
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*Mainstream energy exam, during the final exam period (Thursday, December 13, noon – 2:30 PM)*