

15-280.  
LSC: AP- 8/27/15  
UWUCC: AP- 9/1/15  
Senate: App 10/6/15

## New Course Proposal Template

Steps to the approval process:

1. Complete the applicable template(s) and email them to the departmental or program curriculum committee chair.
2. The curriculum chair emails the proposal to the curriculum committee, then to the department/program faculty for a vote and finally to the department/program chair.
3. The department/program chair emails the proposal to [curriculum-approval@iup.edu](mailto:curriculum-approval@iup.edu); this email will also serve as an electronic signature.
4. Curriculum committee staff will log the proposal, forward it to the appropriate dean's office(s) for review within 14 days and post it on the X Drive for review by all IUP faculty and administrators. Following the dean's review the proposal goes to the UWUCC/UWGC and the Senate.
5. Questions? Email [curriculum-approval@iup.edu](mailto:curriculum-approval@iup.edu).

Contact Person:	Steve Hovan	Email Address:	Hovan@iup.edu
Proposing Depart/Unit:	Geoscience	Phone:	7-2379

Course Prefix/Number	See the Registrar's list of Unavailable course numbers at <a href="http://www.iup.edu/WorkArea/linkit.aspx?LinkIdentifier=id&amp;ItemID=129323">http://www.iup.edu/WorkArea/linkit.aspx?LinkIdentifier=id&amp;ItemID=129323</a> GEOS119
Dual/Cross Listed	<i>Dual Listed - Courses listed at two levels, such as undergraduate and graduate, masters and doctoral, etc. Cross Listed = Course has more than one prefix such as GEOG/RGPL 233.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes with: <a href="#">Click here to enter text.</a>
Number of Credits	(UG) Class Hours - 3 (UG) Lab Hours - 0 Credits - 3
Prerequisite(s)	none
Corequisite(s)	<i>This means that another course must be taken in the same semester as the proposed course</i> none
Additional Information (Check all that apply. Note: Additional documentation will be required)	<input checked="" type="checkbox"/> Liberal Studies (please also complete Template C) <input type="checkbox"/> Teacher Education (Is it Step 1 a prerequisite or is it part of the Professional Education Sequence If so please also complete Template D) <input checked="" type="checkbox"/> Distance Education (Please also complete Template E)
Course Title	Geology of Energy Resources
Recommended Class Size (optional) (provide justification)	Are you recommending a class size: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  If yes: (check one of the following reasons and provide a narrative explanation) <input checked="" type="checkbox"/> Pedagogical <input type="checkbox"/> Physical limitation of classroom <input type="checkbox"/> Accreditation body standards/recommendations <input type="checkbox"/> Other Explanation (required): On-line sections will be limited to the maximum of 30 students to allow for reasonable faculty-student electronic interaction and essay writing assignments/exams. On-campus sections will be open for large enrollment (100-175 students, depending on classroom availability) with assignments/exams modified accordingly (e.g. short-answer and multiple choice exams) to allow this course to serve a larger population of students as a non-lab liberal studies science elective.

## Template A

<p>Catalog Description</p>	<p><i>Guidelines: Do not include pre/co-requisite information here. The registrar prefers a concise description of course content, beginning with an active verb.</i></p> <p>Examines the geological environments that create energy resources. <del>Comparison of</del>Compares patterns of energy development globally and nationally with particular emphasis placed on the development of Pennsylvania's energy resources. <del>Study of the relationship</del>Studies relationships of environmental impacts to current levels of energy use, both in terms of climate and water. Culminates with a look at factors that affect future energy demand in terms of population growth and standard of living.</p>
<p>Student Learning Outcomes</p> <p><i>(These should be measurable, appropriate to the course level, and phrased in terms of student achievement, not instructional or content outcomes)</i></p> <p><i>If dual listed, indicate additional learning objectives for the higher level course.</i></p>	<p>Students will gain an understanding of the nature and role of energy in the world and daily lives accompanied by the ability to apply this understanding to answer questions and solve problems.</p> <p>In particular, students will:</p> <ol style="list-style-type: none"> <li>1. understand how fossil fuels such as oil, gas and coal are formed by processes of organic decay, sediment formation and geothermal heating.</li> <li>2. investigate how fossil fuels can be discovered and produced using conceptual models of ancient geologic environments and past tectonic events.</li> <li>3. examine how radioactive materials are concentrated into ores by igneous, metamorphic and sedimentary processes, and discover the geologic problems with long-term storage of radioactive waste materials..</li> <li>4. explore how plate tectonic history and landscape evolution control the availability and economic viability of renewable energy resources such as geothermal, hydro-electric, wave and wind energy.</li> <li>5. synthesize an understanding of the environmental impacts of energy exploration, development and usage for each type of fuel and/or power covered in class</li> </ol>
<p>Brief Course Outline:</p> <p><i>Give an outline of sufficient detail to communicate the course content to faculty across campus. It is not necessary to include specific readings, calendar, or assignments.</i></p>	<p style="text-align: center;">Brief Course Outline</p> <p><b>Part A: The Rock Cycle and the Role of Energy</b>      An overview of our planet's age and structure      External and internal energy that drives the rock cycle      The impact of plate tectonics on energy resources</p> <p><b>Part B: The Geology of Oil and Gas</b>      Depositional environments of oil and gas      Decay and thermal maturation processes      Oil and gas migration and reservoirs      Exploration techniques for oil and gas      Tar sands, shale gas and other unconventional sources      Environmental impacts of oil and gas use</p> <p><b>Part C: The Geology of Coal</b>      Depositional environments of coal      Coal ranks and classification      Coal mining techniques      Environmental impacts of coal use</p> <p><b>Part D: The Geology of Radioactivity</b>      The discovery of fission and fusion      Formation of uranium and other ores      Environmental impacts of nuclear energy use</p> <p><b>Part E: Geothermal Energy</b>      Distribution of the Earth's internal heat      Harvesting heat for power versus heat pumps      Environmental impacts of geothermal energy use</p> <p><b>Part F: Hydroelectric, wave and wind energy</b>      Landscape evolution and energy      Coastline changes and climate      Environmental impacts of water and wind energy</p> <p><b>Part G: The Future Of Energy</b>      Population growth and energy demand</p>

Template A

	US Energy policy and decision-making
<b>Rationale for Proposal</b>	
Why is this course being proposed?	<p>This course is designed for non-majors as both a Liberal Studies non-lab elective and as a tool for work-force development for energy resources management. Students majoring in non-scientific fields such as business, regional planning, safety science and political science will gain a broad understanding of how natural energy resources such as shale gas form and what environmental impacts are created by their development and use. With this understanding, students will be better prepared to make more informed decisions about energy development, efficient use of energy, and reduce environmental risks and negative impacts of energy usage. Existing courses such as GEOS 101 The Dynamic Earth must cover the entire span of geologic processes and earth features, and usually cover energy-related topics in a week or less. This new course will cover the material in much more depth, allowing students to debate and respond to energy related issues in a way that will help them become Responsible as well as Informed and Empowered Learners.</p>
How does it fit into the departmental curriculum? (Check all that apply)	<input type="checkbox"/> Major Requirement <input type="checkbox"/> Minor Requirement <input type="checkbox"/> Core Requirement <small>(Interdisciplinary core – e.g. Business/Education)</small> <input type="checkbox"/> Required Elective <input type="checkbox"/> Liberal Studies <input checked="" type="checkbox"/> Open Elective <input type="checkbox"/> Other
Is a similar class offered in other departments?	<input type="checkbox"/> Yes Please provide comment: <input checked="" type="checkbox"/> No. To my knowledge, the only similar course offered is GEOG335 – Geography of Energy. Our course will examine the specific geological environments and history that influences energy resources and development issues. There may be minor overlap between in the portion that covers “Future of Energy”, but overall we view these courses as complimentary to each other.
Does it serve the college/university above and beyond the role it serves in the department?	<input checked="" type="checkbox"/> Yes Please provide comment: This course will serve as an additional option for students to fulfill their non-lab science elective requirement. An understanding of issues related to the development and use of energy is relevant to all students as well as many community members. <input type="checkbox"/> No
Who is the target audience for the course?	<input type="checkbox"/> Course Designed for Majors ( <input type="checkbox"/> Required <input type="checkbox"/> Not Required) <input type="checkbox"/> Course Designed for Minor <input type="checkbox"/> Departmental Elective <input type="checkbox"/> Restricted to Majors/Minors <input checked="" type="checkbox"/> Open to Any Student <input checked="" type="checkbox"/> Liberal Studies <input type="checkbox"/> Other –
Implications for other departments	<p>A. What are the implications for other departments (For example: overlap of content with other disciplines, requirements for other programs)?</p> <p>The Department of Geography and Regional Planning has been contacted on 3/23/15 about the possibility of partial overlap with their course, GEOG335 – Geography of Energy and their faculty indicated full support for our new course proposal (see attached letter). We anticipate that this course will be of general interest to several programs-departments with programs and students interested in the regional energy industry including Geography and Regional Planning, Safety Sciences, and ECOB Management. In addition, students enrolled in IUP’s new Sustainability Studies program will also likely find this course to</p>

Template A

	<p>be very informative.</p> <p>B. How have you addressed this with other department(s) involved? What was the outcome of that attempt? (Attach documents as appropriate)</p> <p>Department Chairs and program coordinators from each of the programs mentioned (Safety Sci, Geography, Sustainability, Management) were sent an initial draft of our course proposal outlining the content and learning goals. Each indicated their support (letters attached).</p>
<hr/>	
<ul style="list-style-type: none"><li>• Are resources available/sufficient for this course?    <input type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> NA</li><li>• Is the proposal congruent with college mission?    <input type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> NA</li><li>• Has the proposer attempted to resolve potential conflicts with other academic units?    <input type="checkbox"/> Yes    <input type="checkbox"/> No    <input type="checkbox"/> NA</li></ul>	
<p>Comments: <a href="#">Click here to enter text.</a></p>	

## Liberal Studies Course Proposal Template

15-282.  
LSC: AP-8/27/15  
UWUCC: AP-9/1/15

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Contact Person(s)	Steve Hovan	Email Address	Hovan@iup.edu
Proposing Department/Unit	Geoscience	Phone	7-2379

**1. Liberal Studies Course Designations (GEOS119 – Geology of Energy)**

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Learning Skills:  English     Mathematics

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Knowledge Area:     History     Literature     Philosophy or Religious Studies     Fine Arts

Natural Science Laboratory     Natural Science Non-Laboratory     Social Science

Dimensions of Wellness

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Global and Multicultural Awareness

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Writing Intensive

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Liberal Studies Elective (please mark the designation(s) that apply – must meet at least one)

Global Citizenship                       Information Literacy                       Oral Communication

Quantitative Reasoning                       Scientific Literacy                       Technological Literacy

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**2. Expected Undergraduate Student Learning Outcomes (EUSLOs) – Describe how each Student Learning Outcome in the course enables students to become Informed Learners, Empowered Learners, or Responsible Learners (see <http://www.iup.edu/WorkArea/DownloadAsset.aspx?id=181694>).**

**GEOS119 – Geology of Energy Resources**

**Objective 1:** Students will understand how fossil fuels such as oil, gas and coal are formed by processes of organic decay, sediment formation and geothermal heating.

**Expected Student Learning Outcomes 1 and 2** Informed and Empowered Learners

**Rationale:** Fossil fuel deposits are a limited global resource whose distribution has a direct impact on the economic status of all modern societies. Course content and assignments will help students understand why fossil fuels are distributed unequally around the planet in terms of both abundance and quality.

**Objective 2:** Students will investigate how fossil fuels can be discovered and produced using conceptual models of ancient geologic environments and past tectonic events.

**Expected Student Learning Outcomes 1 and 2** Informed and Empowered Learners

## Template C

**Rationale:** Workforce development in energy-rich regions such as western Pennsylvania requires students to understand conceptual geologic models which can be used to predict and produce new reserves of oil, gas and coal. Team-building course assignments will engage students in the actual interpretation of the rock formations and underground structures where fossil fuels can be found.

### **Objective 3:**

Students will examine how radioactive materials are concentrated into ores by igneous, metamorphic and sedimentary processes, and discover the geologic problems with long-term storage of radioactive waste materials.

**Expected Student Learning Outcomes 1 and 2** Informed and Empowered Learners

**Rationale:** To make informed judgments about the direction of future energy policies, students must understand the natural limits and distribution of nuclear fuels and the environmental impacts of nuclear waste disposal. Course assignments will allow students to explore the processes that concentrate radioactive elements and the geologic issues of long-term nuclear waste disposal.

**Objective 4:** Students will explore how plate tectonic history and landscape evolution control the availability and economic viability of renewable energy resources such as geothermal, hydro-electric, wave and wind energy.

**Expected Student Learning Outcomes 1, 2 and 3** Informed, Empowered and Responsible Learners

**Rationale:** The common assumption that fossil and nuclear fuels can be easily replaced in our current economic structures by renewable energy resources is challenged by the actual geologic and economic limits of renewable resource development. Course content and assignments will enable students to compare and evaluate the potential risks, benefits and limits of using different power sources in both current and future economic settings.

**Objective 5:** Students will synthesize an understanding of the environmental impacts of energy exploration, development and usage for every type of fuel and/or power covered in class.

**Expected Student Learning Outcomes 1, 2 and 3** Informed, Empowered and Responsible Learners

**Rationale:** All energy exploitation comes with a cost in terms of environmental impacts. Course assignments will ask students to reflect on the relative environmental impacts of using oil, gas, coal and nuclear energy resources and compare those to the different but equally significant impacts associated with the use of renewable sources of energy such as geothermal hydro-electric, wave and wind energy.

### 3. Description of the Required Content for this Category – *Narrative on how the course will address the Selected Category Content*

This course introduces students to the fundamental processes that control the distribution and use of energy resources across the globe. This course is intended to give students enough knowledge of energy resource science to permit them to make informed decisions as citizens, both on the personal level (“Should I install a heat pump for my house?”) and on a broad national level (“Should I vote for someone who wants to expand nuclear power use or someone in favor of more hydro-electric dams?”). The strong emphasis on how geology determines our energy destiny and how our use of energy in turn affects the entire global environment makes this course significantly different from our majors courses offered on campus.

### 4. All Liberal Studies courses are required to include perspectives of diverse cultures and have a supplemental reading. Please answer the following two questions.

- a) Liberal Studies courses must include the perspectives and contributions of ethnic and racial minorities and of women whenever appropriate to the subject matter. Please describe how your course will meet this criterion.

Readings taken from Vassar College Professor Jill S. Schneiderman’s collection of essays entitled “The Earth Around Us: Maintaining a Livable Planet” [W.H. Freeman and Company; New York, 2000, 455p.; ISBN 0-7167-3397-8] will showcase contributions that female scientists have made to geology. Authors published in this collection include Marcia Bjornerud (Lawrence University), Allison McFarlane (George Mason University), Cathryn Manduca (Carleton College), Kirsten Menking (Vassar College), Naomi Oreskes (University of California at San Diego), and Jill Singer (Buffalo State University).

- b) Liberal Studies courses require the reading and use by students of at least one non-textbook work of fiction or non-fiction or a collection of related articles. Please describe how your course will meet this criterion.

In addition to the textbook “Energy, Environment, and Climate”, the class will read major portions of Richard Muller’s 2012 book entitled “Energy for Future Presidents”. These readings will be used as a springboard for reflective assignments and group discussions on the ethics of energy use and environmental impact assessment.