

UW GEOL 3650: Energy for Society Course Syllabus - 2015

Instructor: James D. Myers
Office: ESB 3030
Office hours: MWF 8:00-8:50 am
phone: 766-2203

Class Meeting Times: MWF 9:00-9:50 am
Lecture Location: EIC 201
Lab Location: ESB 1004
e-mail: magma@uwyo.edu

Class Objective

Energy is critical to all human societies regardless of development level. For industrialized societies, energy must be abundant, cheap and convertible into a variety of different forms. Without access to energy, industrialized societies would collapse economically, socially and politically. Consequently, considerable time and money are spent finding and exploiting energy sources. Currently, this effort is concentrated on non-renewable fossil fuels with their many attendant environmental problems. Yet, the looming decline of petroleum and natural gas supplies as well as concern about climate change suggests more effort will be spent in the future to develop renewable sources of energy, e.g. wind, tidal, biomass, etc.

Because of the energy demands of our industrialized nation, citizens are constantly faced with questions about public energy policy. Should ANWR be opened for petroleum drilling? Is the short-term gain from coal bed methane production worth the long-term environmental impact and social disruption? Are industry's claims about clean coal technology substantiated? Is nuclear power a viable means of reducing the production of greenhouse gases? Typically, citizens formulate their responses to these questions based on a limited understanding of energy; perceived economic, political and social impacts of energy development; and an imperfect appreciation for potential short- and long-term environmental impacts of energy extraction. However, making an informed energy decision requires: 1) a mastery of a range of basic skills (fundamental literacies); 2) a knowledge of specialized scientific abilities (technical literacies); 3) a scientific understanding of energy including its forms and the scientific laws governing its use and conversion; 4) an appreciation of the geology of energy; 5) a knowledge of how different energy sources are extracted and processed; 6) a recognition of the environmental impacts of energy exploration, extraction, processing and use; and 7) an understanding of how energy exploration, development and use impacts local, regional, national and international social groups (citizenship literacies). This course is designed to provide you, i.e. a citizen, with the skills to formulate successfully informed and reasoned responses to particular energy exploration, exploitation and use questions.

Many advanced environmental, legal and political science classes take a similar approach to discussing energy development. This course differs from them in three important aspects. First, it assumes that a scientific understanding of energy and a geologic appreciation of different energy sources are critical components for addressing energy issues. Thus, unlike other courses it starts with a sound scientific and geologic background. Second, the intended audience for the class is likely to play a very different role in public discussions than those of the more advanced classes. To illustrate, consider a public hearing to discuss the impact of natural gas development across a wildlife migration route. The advanced classes are designed to prepare the professionals who would be sitting in front of the meeting conducting it. In contrast, this course is designed to meet the needs of the citizens sitting in the audience. Few of you in this class are likely to become professionals dealing with energy issues. However, many of you, if not all, are likely to be impacted by them as citizens. Finally, this course explicitly recognizes the importance of supplemental skills (literacies) necessary to utilize scientific knowledge in the resolution of societal issues. Thus, it provides you will amply opportunity to master these literacies while also acquiring

scientific understanding. Mastery of these skills will aid you in many other endeavors outside this course.

Goals: To prepare you so that as a citizen you can participate in discussions about energy in an informed and constructive manner. To accomplish this, the course will:

- review qualitative assessment, quantitative calculation and graph interpretation skills (*fundamental literacies*) needed to assess energy questions economically;
- introduce the techniques (*technical literacies*) necessary for evaluating the geological aspects of energy resources;
- describe the methods (*citizenship literacies*) for assessing the social impacts of energy exploration, extraction and use;
- present the geologic content needed to understand the origin and distribution of a variety of the Earth's energy sources; and
- build an awareness of comparative, international and global decision-making processes through historical and contemporary case studies of energy development and use.

Outcomes: Upon completion of GEOL3650, you will be able to:

- identify data/information needed to make an informed decision about energy;
- understand the basics of the geologic formation of both renewable and non-renewable energy sources;
- assess the range of potential social impacts associated with specific energy projects; and
- formulate means of evaluating systematically proposed energy development projects.

Literacies: To understand the content of a scientific discipline, it is necessary to master a number of different skills, i.e. literacies. These literacies fall into three basic groups: fundamental, technical and citizenship. The ***fundamental literacies*** allow you to manipulate the data and information of a science. Although they are ones you should have used previously in your educational career, you may have not had much practice with them recently. The fundamental literacies include:

- the power to read a *table* and interpret a *graph or chart*;
- the facility to make *qualitative assessments*; and
- the capacity to perform simple *quantitative calculations*.

For many sciences like geology, which describes the formation and setting of many energy resources, an additional set of literacies are necessary. These literacies allow you to understand and appreciate the scale of geological change and structures. Because of their more advanced nature, you may have had limited practice with some of these literacies. Indeed, some may be completely new to you. The ***technical literacies*** consist of:

- the skill to *read* different types of maps;
- the ability to *visualize* in three dimensions; and
- the capacity to *conceptualize* changes through time.

The application of scientific understanding to societal problems requires both discipline specific knowledge as well as the ability to predict how modification of natural systems will affect different cultures and societies. The ***citizenship literacies*** allow you to assess resource issues as they impact different social and political groups. As with the technical literacies, your previous experience with these literacies may be very limited. The citizenship literacies comprise:

- social context literacies

- understanding of a sense of history and its significance
- appreciation of population demographics
- comprehension of economic context
- command of culture and social structure
- critical thinking literacies
 - prediction of manifest and latent consequences
 - recognition of potential short- and long-term impacts
 - identification of externalities, including unanticipated, hidden and shared costs
- informed engagement literacies
 - ability to devise alternative strategies
 - capacity to achieve common ground

This course will provide you with practice mastering all of these literacies as you learn the scientific and geologic basics of energy resources.

Class Logistics

Class Organization: This is a lecture-lab course. The geology, production, and use of energy sources will be presented through lectures and lecture activities. From the lectures, you will gain an understanding of the technical aspects of energy extraction and development. The lab will introduce you to the skills (literacies) necessary to apply this scientific and technical background to various energy problems.

Each lab case study will cover multiple weeks. The first week of a topic will concentrate on the fundamental and technical literacies. During this session, you will use these skills to investigate a hypothetical energy source geologically. The second week of a topic will examine the economic status of an energy resource. Finally, the third week will introduce the citizenship skills you will need to gauge the social and cultural impact the development of the energy source may entail. Literacies will be progressively added as we move through the semester. By the middle of the semester, you will have had practice with all the fundamental, technical and citizenship literacies and will be able to use them independently in the remaining lab activities. Each week, the lab will be introduced with a short narrative describing a real world instance where the energy issue covered in lab has impacted real people. These case studies have been selected to present both a national and international perspective of energy exploration, extraction, and use.

For each lab, you will be asked to formulate a course of action and articulate and defend that position in both written and oral arguments. As with real world issues, there are no clear-cut answers to any decision that must be made. Rather, you must defend your position using the energy knowledge you have learned and the literacies you have mastered.

Attendance/Participation Policy

Lecture attendance is not mandatory, but remember some topics not presented on the Web will be covered in lecture and there are lecture activities that are graded and part of your final grade. All lecture activities are fair game for exam questions. If you have a university-excuse, you may make up a lecture exam within one week of when the exam was originally administered.

Attendance in lab is mandatory. The lab syllabus, which you will receive the first week of lab, more fully describes how the lab will work, attendance policy and make-up options for missed work.

Web Sites: The course will be using two Web sites throughout the semester. You will find all the content for lecture and lab on the GEOL3650 web site (<http://www.gg.uwyo.edu/geol3650>). Questions or comments about this Web site should be directed to me. Grades, assignments, announcements and general course logistics will be handled by the WyoCourses web site (accessed through WyoWeb or WyoCourses (<http://www.uwyo.edu/wyocourses/>)). Any questions about this Web site should be directed to WyoCourses (phone: 307-766-4357(HELP); email: wyocourses@uwyo.edu). Within the first week of class, you must upload a picture of yourself for the WyoCourses Web site (instructions: <http://guides.instructure.com/s/2204/m/4212/l/41956-how-do-i-add-a-profile-picture>). Since this is an aid for me in learning names and refreshing my memory for those who later request references, please upload only a head-and-shoulders picture.

Grading: Your grade will be based on a total of 1295 points that are divided between three lecture exams, a final exam, lecture and lab reading questionnaires, lab quizzes, oral presentations, written reports, lab exercises, and lecture worksheets. The large number of graded activities should ensure that if you do poorly on one task, e.g. an exam, your final

grade need not be adversely affected if you perform well on other tasks. The grading scheme for the class is summarized in the table below:

activity	number of points	percentage of final grade
lecture reading questionnaires (14 @ 10 pts/ea)	140	11
lecture worksheets (15 @ 10 pts/ea)	150	12
lecture exams (3 @ 100 pts/ea)	300	23
final exam (1 @ 200 pts)	200	15
lab (see breakdown below)	505	39
Total Points	1295	100

Note: This class scheme reflects what was planned at the beginning of the semester. I reserve the right to modify exam times or the grading system in response to unforeseen events that may occur during the semester. Thus, the class tasks and grading scheme are likely to change as the semester progresses. The most current class schedule can be found on the WyoCourses class web site.

Each week there will be a weekly lecture reading questionnaire. They will constitute 140 points of your final grade (11 %). Each questionnaire will cover readings posted on the class Web site. The questionnaire is due by midnight on the due date. Questionnaires will be submitted and graded via the Web. You can work on a questionnaire as many times as you wish before the due date. When you click the 'Take the Quiz' button, the questionnaire pops up with all the questions and places to enter your answers. If you scrolled to the bottom of the page, in small text next to the button that says Submit Quiz, it will say "Not saved". Answer any question and your answer will be saved automatically and the text at the bottom of the page will change to "Quiz saved at -". Notice that you don't have to do anything to save your work; it is automatically saved when changes are made. Once you have answered all the questions to the best of your abilities, click the 'Submit Quiz' button and your questionnaire will be graded automatically and your results reported. You won't see the correct answers until after the due date. It is not necessary to complete a questionnaire in one session. If you click on a tab on the left side of the page while doing a questionnaire a dialog box will pop up. It will say "You're about to navigate away from this page. Continue anyway?" (seems like strange wording to me, but...). If you click OK, you will go to the page for which you clicked the tab. When you navigate back to a questionnaire you have worked on previously, the button at the bottom of the page will now say Resume Quiz. Clicking the button will bring up the questionnaire again, but this time with any previous answers you entered in their appropriate boxes. You can change these responses and/or answer new questions. Again only submit the questionnaire when you have answered all the questions and are ready to have it graded. By the way, you will periodically see a green banner across the top of the page indicating the quiz is being saved. You have two opportunities to complete a reading questionnaire. Be sure to note your answers and which questions you answered incorrectly before you take the questionnaire again. When you click the 'Take the Quiz Again' button, the form is reset and all, even correct, your answers are erased. After midnight on the due date, you can no longer change the questionnaire although you can view your answers and the correct answers. Questionnaires can be worked on at any time during the semester prior to their deadline.

Throughout the semester you will complete 15 lecture worksheets worth 10 points each. The 150 points from these worksheets will comprise 11% of your final grade. Worksheets are done in class and are unannounced. They are not graded, rather you simply sign the attendance sheet for that day to get the points. If you miss a class when a lecture worksheet is completed, you can only make it up if you have a valid excuse for missing

class. Lecture worksheets will focus on topics we have covered in lecture and provide you an opportunity to apply your new knowledge.

Three hundred points (23 %) will be from three lecture exams. The exams will be on:

- Wednesday, February 25, 9:00 am, EIC 201
- Monday, April 6, 9:00 am, EIC 201
- Friday, May 8, 9:00 am, EIC 201

Each exam will be worth 100 points. They will cover the material presented in lecture and any assigned reading, but not the labs. Exams are short answer. Past exams and their keys are posted on the class Web site. Use them when you study. You must obtain prior permission to take an exam at any time other than during the scheduled period. If you skip an exam, you fail it with a zero. *Note the final lecture exam (Exam III) is during the last week of classes.*

There will also be a 200 point final exam (15 %) on Wednesday, May 13 from 8:00 am to 10:00 am in EIC 201. This exam will be comprehensive and have approximately twice the number of questions as one of the hourly exams. At least 50% of the points on the final exam will be from questions taken from the three lecture exams.

The lab will make up the final 515 points (40 %) of the course grade. The breakdown for the various lab activities and their points are:

activity	points	% of lab grade
lab reading questionnaires (13@10 pts/ea)	130	26
lab exercises (4 @ 25 pts/ea)	100	20
lab quizzes (4 @ 10 pts/ea)	40	8
oral presentations (5 @ 10 pts/ea)	50	10
lab written reports (5 @ 25 pts/ea; 4 @ 15 pts/ea)	185	37
Total Points	505	100

Note: This lab schedule reflects what was planned at the beginning of the semester. It will likely change as the semester progresses. The most current lab schedule can be found on the WyoCourses class web site.

All students must participate in lab and complete the assigned exercises. Unlike lecture, attendance of lab is mandatory. You must receive a passing lab grade to pass the course. The lab syllabus, which you will receive the first week of lab, more fully describes how the lab will work. There will be no lab final. There are four lab quizzes during the first five weeks of the semester. These are taken online in the lab classroom. The quizzes will be available at the beginning of the official lab class period and until 10 minutes after class starts. Thus, if you have a 1:10 pm lab, you can take the quiz on one of the lab computers between 1:10 and 1:20 pm. *If you come to lab late and miss the quiz cut-off time, you fail the quiz.* At various times during the semester, you will have oral and written reports to present the results of your evaluation of a particular energy problem. As with all real life energy questions, there are no clear-cut answers to the problems you will address. The conclusions you reach and the reports you present will be graded on how well you justify your conclusions. The rubrics used to grade the presentations and reports are posted on WyoCourses. Lab reading questionnaires work the same way the lecture ones do.

The final grades for this class will be assigned in the following manner:

Grade	percentage	point range
A ⁺	≥ 97	≥ 1256

A	93-96	1204-1255
A ⁻	90-92	1166-1203
B ⁺	87-89	1127-1165
B	83-86	1075-1126
B ⁻	80-82	1036-1074
C	70-79	907-1035
D	60-69	777-906
F	< 60	< 777

There will be no curve for the class. A fixed grading scheme emphasizes that you are not competing with your peers for a grade. If all students in the class earn an A, I would be very happy. It would indicate you all worked hard and mastered the subject matter. *Note: This grading scheme reflects what was planned at the beginning of the semester. It will likely change as the semester progresses. The most current versions of the grading scheme can be found on the WyoCourses class web site.*

Communicating with me: My office is in ESB 3030 and my office hours are MWF 8:00-8:50 am. There are four ways to communicate with me: 1) during office hours; 2) by phone; 3) via email; and 4) by appointment. Perhaps the best way to reach me is via email. If you want, you can also simply drop by my office and try to catch me. I am usually in my office by 7:30 am and don't leave until after 5:00 pm.

Textbook: There is no required textbook for this course. Weekly readings will use the lecture notes posted on the Web, library reserve material, and various Web sites.

Academic Dishonesty: University Regulations (UNIREG 802) define academic dishonesty as an act or attempted act which misrepresents one's involvement in an academic task in any way, or permits another student to misrepresent the latter's involvement in an academic task by assisting in the misrepresentation. Some examples of academic dishonesty include: a) representing as one's own work material copied or borrowed from any source, written or otherwise, public or private, without proper citation of the source; b) using a ghost writer, commercial or otherwise, for any type of assignment; c) doing a class assignment for someone else or allowing someone to copy one's assignment; d) using notes or prepared information in an examination unless authorized by the instructor; e) taking an examination for someone else or allowing someone to take an examination for oneself; f) copying from, or assisting, another student during an examination; or g) stealing, or otherwise improperly obtaining, copies of an examination before or after its administration. Academic dishonesty will result in failure of the course.

The University of Wyoming is built upon a strong foundation of integrity, respect and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated. Teachers and students should report suspected violations of standards of academic honesty to the instructor, department head or dean. Academic dishonesty will result in failure of the course.

Class Effort: According to the UW catalog "Each credit hour unit requires an average of three hours of student effort per week". Since this is a 4 credit course, you should expect to work a minimum of twelve hours a week outside of class meetings. To get a good grade in the class, expect to work more than this. Also prepare for exams well in advance. Don't start studying the night before and expect to earn a good grade on the exam.

Special Needs: If you have a physical, learning, or psychological disability that requires special accommodations, please let me know as soon as possible. You will need to register with and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 330 Knight Hall, 766-6189, TTY: 766-3073.

I reserve the right to make changes to the syllabus, e.g. exam dates, the grading scheme, etc. in response to unforeseen events that may arise during the semester. I will announce these changes in class. In addition, changes in grading scheme will be reflected in the grading system on the WyoCourses class Web site.