Life and Physical Sciences
Texas A&M University
Core Curriculum Cover Sheet
Initial Request for a course to be considered for the Fall 2015 Core Curriculum

1. This request is submitted by (department name): Dwight Look College of Engineering

2. Course prefix and number: ENGR 101
   Texas Common Course Number: N/A
   Energy: Resources, Utilization and Importance to Society

3. Semester credit hours: 4

6. This request is for consideration in the following Foundational Component Area:
   ☐ Communication
   ☐ Mathematics
   ☑ Life and Physical Sciences
   ☐ Language, Philosophy and Culture
   ☐ Creative Arts
   ☐ American History
   ☐ Government/Political Science
   ☐ Social and Behavioral Sciences

7. This course should also be considered for International and Cultural Diversity (ICD) designation:
   ☐ Yes
   ☑ No

8. How frequently will the class be offered? Every Spring Semester

9. Number of class sections per semester: 7 Including 1 honors section

10. Number of students per semester: 75

11. Historic annual enrollment for the last three years: 10A = 85 11A = 59 12A = 80

   This completed form must be attached to a course syllabus that sufficiently and specifically details the appropriate core objectives through multiple lectures, outside activities, assignments, etc. Representative from department submitting request should be in attendance when considered by the Core Curriculum Council.

13. Submitted by: Christine Economides
    Course Instructor
    Approvals:

14. Department Head

15. College Dean/Designee

For additional information regarding core curriculum, visit the Texas Higher Education Coordinating Board website at www.thecb.state.tx.us/corercurriculum2014

See form instructions for submission/approval process.
Texas A&M University

Core Curriculum

Initial Request for a Course Addition to the Fall 2014 Core Curriculum

Foundational Component Area: Life and Physical Sciences

In the box below, describe how this course meets the Foundational Component Area description for Life and Physical Sciences. Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

The proposed course must contain all elements of the Foundational Component Area. How does the proposed course specifically address the Foundational Component Area definition above?

The ENGR 101 course engages students in describing energy sources, explaining energy conversions, exploring historical developments of physical and chemical interactions among natural phenomena that govern today's energy technologies, and applying scientific methods to evaluate possible future energy scarcity, the implications of energy consumption on the environment, and ways to sustain the standard of living in developed countries while enabling developing and undeveloped regions to share in the use of energy to provide for basic and expanding needs. Students are assigned reading from an iBook developed for this course with NSF funding in preparation for each lecture week. Invited guest lecturers supplement the assigned reading with first-hand knowledge of various non-renewable and renewable energy sources, environmental impacts on air, water, and global climate, and energy efficiency technologies. Students also participate in a two-hour recitation session with no more than 20 students. There they engage in discussion, research, and presentation on topics that apply scientific method to evaluating the sustainability of various energy choices considering environmental impact, economic viability, and social acceptance.

Core Objectives

Describe how the proposed course develops the required core objectives below by indicating how each learning objective will be addressed, what specific strategies will be used for each objective and how student learning of each objective will be evaluated.

The proposed course is required to contain each element of the Core Objective.

Critical Thinking (to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information):

The ENGR 101 course includes interactive lectures and a recitation lab. Lecture topics are summarized in the course syllabus, and recitation activities are summarized in a table provided in the course syllabus. In each recitation students apply the scientific method of inquiry to evaluate the sustainability of a particular energy choice. Sustainability is evaluated according to three criteria: environmental impact, economic feasibility, and social acceptability. The recitation lab provides a computer for each student to use to search online for facts and observations that enable analysis, evaluation, and synthesis of information required for discussion, writing the essays, and project work. In the lecture part of the course, students provide questions used in a subsequent lecture quiz that reflect key points in the lecture. In the 2-hr recitation students work in sections of 20 or less students on guided discussions, break out sessions, Internet searches, and other activities related to a weekly discussion topic and to the writing assignment due before the next recitation session. Students also work on a semester long team project that each team envisions, plans, executes, presents, and reports. The entire project experience promotes innovation from envisioning the project subject to fabricating a project product. The umbrella theme for the recitation is energy sustainability. Students who submit a quiz question used in the lecture quiz receive 100% for that quiz. Weekly essays and project assignments are graded using rubrics that evaluate their analysis and synthesis of the information discussed and researched in the recitation. Project presentations at the end of the semester demonstrate students' creativity and
Communication (to include effective development, interpretation and expression of ideas through written, oral and visual communication):

Many students participate orally in lecture, and all must participate orally in the recitation. Nearly 40% of the students last spring regularly provided quiz questions that were used in the lecture quiz. Each week students are asked to find current events relevant to the subject to be discussed that week in recitation. Over the course of the semester each student must explain the current event to the recitation class and answer questions from students about the event. The written essays exercise the same writing skills used in ENGL 104 and introduce them progressively over the course of the semester. Students write a total of 8 essays plus an annotated bibliography and a team-based final project report. Students have an opportunity to discuss project ideas in the 4th week of the semester with an experienced project manager who provides them useful feedback on how to quickly summarize a project idea and how to refine it into something achievable, and students get credit for attending this session. Students present the project to their section using one or more visual aids of their choice that they create including posters, powerpoint slides, videos, illustrated pamphlets, illustrated books, and physical models. By the time of the project presentation, students are able to present and defend their work, and the other students have learned to ask good questions of their peers.

Empirical and Quantitative Skills (to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions):

The homework for ENGR 101 is to write essays that emphasize empirical considerations. The recitation discussion is designed to acquaint students with suitable online resources containing observations and facts that inform the conclusions they take in the essay assignment. Projects require quantitative observations and calculations. Engineers may favor quantitative analysis of a technological innovation. Business majors tend to emphasize financial or economic aspects in the project. Other students may prepare and present quantitative analysis of a proposed idea to a selected audience. Still others may prepare a survey questionnaire that they administer to peers, to faculty, or to students at other universities, and they then statistically analyze the responses they receive.

Teamwork (to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal):

Students form teams during the first recitation. Since the course is an engineering outreach course offered to both engineering and non-engineering students, most students do not know other students in the recitation section. So, the teams are often quite diverse leading often to very stimulating team dynamics. There are 6 project assignments over the course of the semester. The first due the second week is the Project Vision, including a title for the project and a brief description. The second due the fourth week is the Project Proposal including Title, Subject, Goals, Background, Approach, Impact, and a Plan with a specific schedule of tasks to be performed. The third due the seventh week is the Project Contract, which is a final revision of the previous Project Proposal with a plan that should not be significantly altered after that point. The fourth due the eleventh week is the Project Product created by the students, which could be a brochure, a poster, a U-tube video, or many other possibilities that creative students may envision. The fifth is the Project Presentation attended by the professor and others that may be invited. The final Project Report is due during finals week and must conform to guidelines that include a summary of the project deliverables as well as analysis of the team work and project experiences.

Please be aware that instructors should be prepared to submit samples/examples of student work as part of the future course recertification process.
Welcome to ENGR 101! We are very excited that you have chosen to join this ongoing quest to address issues of energy and energy sustainability facing our world today. You will find that energy issues pose a set of unique challenges as well as opportunities to our society, and our world. It becomes increasingly clear that these challenges cannot be solved by engineers alone — and so we invite you to learn with us as we explore both historical and current events that shape the thinking, writing, and research we perform in our professional lives here at Texas A&M University.

**Orientation:**

As you embark on your learning in this course you may find that ENGR 101 is unlike other courses you have taken. We hope that by the end of this class you will

*Know:*
- What types of energy sources are available (fossil, alternatives, and renewables).
- How and where those resources are found, produced, and used.
- What key energy technologies enable our current standard of living.
- Who were major figures responsible for developing energy technologies historically and as we know them today.
- What major geopolitical issues impact energy availability and pricing.
- What challenges we face to ensure abundant cheap energy in the future that does not adversely affect the environment.
- How finding, producing, and using energy resources affect the environment.
- The distinction between global warming and anthropogenic global warming.
- The meaning and function of sustainability.
- The critical importance of energy to a sustainable world.

*And are able to:*
- Keep pace with current events and news pertaining to energy.
- Describe the size and importance of the energy industry.
- Appreciate the link between energy and wealth for nations (and states/provinces/territories).
- Compare and contrast energy sources, conversions, and carriers — and be able to recognize that these are neither inter-changeable, nor reversible.
- Compare energy resources with regard to economic, societal, and environmental costs.
- Describe the specific consequences of an action or an inaction concerning energy and the subsequent affects to the environment, economy and society due to such decisions.
- Apply the scientific method to evaluate the sustainability of various energy choices considering environmental impact, economic viability, and social acceptance.

In order to achieve the learning objectives given above, a variety of educational approaches and assessment methods will be used. **Each week** you will be required to perform the following tasks:

- Attend three 1-hour lectures/week with all students in ENGR 101.
- Actively participate in one 2-hour recitation with a small section of students. Each week the main recitation discussion will address a challenging and complex question pertaining to energy that will also be the subject of the essay assignment.
- Read an assignment from the textbook. There is a reading guide for each textbook reading assignment. Each Monday there will be a quiz on the reading that will reflect points emphasized in the reading guide. Both lectures and recitation rely on your familiarity with the background material found in the textbook. On Wednesday and Friday there will be a quiz covering material from the previous lecture.
- Find a current news event related to energy and post a brief summary or commentary of this event on BlackBoard.
- Research and write an essay. The essays in ENGR 101 will follow a succession of writing skills that will be helpful for other classes. There will be a total of 8 (eight) essays to write for this course.

Towards the end of the semester you will also be required to prepare and deliver a team project on a particular theme related to energy. This project will require a product, a presentation, and a final report.

**Grading Policy:**

The course grade will be determined from the following:

- Quizzes ................................................................. 30%
- Recitation Participation .......................................... 10%
- Current Events ...................................................... 10%
- Essays ................................................................. 30%
- Project ................................................................. 20%

Total = 100%
Grading Scale:

A ................................................................. 90-100%
B ................................................................. 80-89%
C ................................................................. 70-79%
D ................................................................. 50-69%
F ................................................................. 0-49%

Teaching Team:

The professor for this course is
Dr. Christine Elhig-Economides, Petroleum Engineering casel@tamu.edu +1.979.458.0797 RICH 710

Quiz Master:
TBA

The recitation instructors are:

Section 200: (Monday 1:50 p.m. – 3:40 p.m., RICH 313)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

Section 501: (Monday 4:10 p.m. – 6:00 p.m., RICH 313)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

Section 502: (Wednesday 11:30 a.m. – 1:20 p.m., RICH 313)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

Section 503: (Wednesday 1:50 p.m. – 3:40 p.m., RICH 313)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

Section 504: (Wednesday 4:10 p.m. – 6:00 p.m., RICH 912B)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

Section 505: (Thursday 03:55 p.m.-05:55 p.m., RICH 313)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

Section 506: (Tuesday 08:00 a.m. – 10:00 a.m., RICH 912B)
  Instructors TBA
  Co-Instructor TBA
  Learning Assistant TBA

A Learning Assistant is a student who took the course and who may be interning to become an Undergraduate Peer Teacher. Instructors are Undergraduate Peer Teachers or Graduate Teaching Assistants. Typically all have taken the course previously.
Course Materials:

Texts:
The iBook for this course is

*Live Energy*, by authors from Texas A&M University, Stanford University, the Pennsylvania State University, California State University, Long Beach, and University of Massachusetts Lowell, and supported by NSF TUES Grant 1022932. A download link will be provided for the iBook and for a PDF eBook version for those who do not have access to an iPad or an Apple computer.

Electronic Course Materials:
Course documents, assignments, and important announcements are found at the following link:

http://elearning.tamu.edu

Please log on to this site before Wednesday this week to confirm that you have access to the course website.

Clickers:
Every student will need to acquire an i>clicker2 for this class. Please purchase your clicker at the bookstore as soon as possible. You must register your clicker at this link: www.iclicker.com/Products/iclicker.

Class Participation:

Active class participation is encouraged during lectures and required during recitations. Your participation in recitation will be graded according to the following criteria:

Positive Attributes: (Traits we WANT to observe)
1. Enters into class discussion.
2. Contributes to the discussion by offering ideas and asking questions.
3. Comes to class prepared and demonstrates a clear understanding of assignments and class materials.
4. Listens when others talk — while working as a group and as the entire class.
5. Incorporates and adds to the ideas of others.
6. Uses the classroom computer as a source of information relevant to the class discussion.

Negative Attributes: (Traits we DO NOT WANT to observe)
1. Shows up late to class.
2. Sleeps in class.
3. Needs to be prompted to engage in class discussion.
4. Uses the classroom computer for purposes unrelated to the recitation activities.

Excused absences from lecture or recitation:

If you know in advance that you need to miss lecture or recitation, be sure to bring a note explaining the reason. If you miss lecture or recitation because you are ill, bring a note from the doctor. Excused absences do not penalize your grade; unexcused absences do.

Current Events:

Each recitation will start with current events. Before the deadline indicated by your recitation instructor you must post a brief (about one-half page) synopsis of a current event you have found particularly interesting in or on the news. Your instructor will pick 3 or more of the posted current events for presentation in recitation. When yours is selected, you will summarize your current event for the class with the help of your instructor and try to answer questions about it from other students. You can also volunteer to present a current event. Every student will be asked to present at least one current event over the course of the semester. (Therefore, please be prepared to present your current event at each recitation.)

Your synopsis should address the following questions:
• Where did your event come from? (Cite the article in any standard bibliography format — good examples of correct citation format can be found at [http://www.aresearchguide.com/12biblio.html](http://www.aresearchguide.com/12biblio.html).)
• What is your event about? (Provide a brief summary of the current event you chose for that week).
• How does this article relate to course learning objectives? Each week your recitation instructor will indicate the preferred current event topic for the next recitation.
Quizzes:
Each lecture starts or ends with a quiz where you are REQUIRED to use YOUR CPS clicker. Monday quizzes cover the reading assignment for that week. Wednesday quizzes cover key points from the Monday lecture. Friday quizzes cover key points from the Wednesday lecture. If there is no new reading, then the Monday quiz will cover key points from the previous Friday lecture. The Quiz Master will consider using quiz questions emailed from students up to 5 pm the day before the lecture class. If your quiz question is used in a quiz, you will get a perfect quiz score the day that it is used, provided that you are in class that day.

If you forget your clicker or miss a quiz because you arrived late, before leaving class that day submit your name on a sheet of paper to the Quiz Master along with an explanation why you did not take the quiz on line.

If you miss class with an excuse from a doctor, athletic coach, etc., be sure to bring your excuse to the Quiz Master.

It is YOUR RESPONSIBILITY to keep track of your quiz average on WebCT. Excused absences and excused missed quizzes do not count as zero and will be adjusted by the Quiz Master.

Semester Project:
In this class, the semester project is an opportunity for you to demonstrate your understanding of the issues surrounding energy and sustainability. The idea is for you to use scientific method to evaluate the sustainability of a selected energy option considering environmental impact, economic viability, and social acceptance with a team of 4 or 5 students, find and understand the resources that will help you do this evaluation, and produce an appropriate product to represent the outcome of your analysis. The energy option for your project is of your choosing and is to be approved by the teaching team. It should focus on energy and sustainability. It should answer a complex question and develop a product (paper, poster, video, ...) and present the answer including visual aspects with a targeted audience (campus students, Texas A&M professors, Texas citizens ...). Each team will also prepare a final report. Project Guidelines will be given out in the first recitation.

Late or Missing Recitation Assignments:
Due dates for recitation assignments depend on the time of the recitation section. Recitation instructors establish these dates and times on a regular weekly basis and will take points off the grade for late assignments. A missing assignment will result in a zero grade for that assignment.

Grade Appeal Process:
The teaching team members are dedicated to making this course a positive experience for all students. If you are concerned about a grade on a quiz, essay, current event, project, or participation, we suggest you first contact your recitation instructors. If you are still not satisfied, contact Dr. Ehlig-Economides. You can contact Dr. Ehlig-Economides by email to make an appointment for a meeting.

ADA Policy Statement: (Texas A&M University Policy Statement)

Americans with Disabilities Act (ADA) Policy Statement
The following ADA Policy Statement (part of the Policy on Individual Disabling Conditions) was submitted to the University Curriculum Committee by the Department of Student Life. The policy statement was forwarded to the Faculty Senate for information.
The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall or call 845-1637.

Academic Integrity Statement: (Texas A&M University Policy Statement)

Aggie Honor Code
"An Aggie does not lie, cheat, or steal or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the
Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge shall be preprinted and signed by the student:

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

Coursework Copyright Statement: (Texas A&M University Policy Statement)

The handouts used in this course are copyrighted. By "handouts," this means all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy them, unless you are expressly granted permission.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., that belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions about plagiarism and/or copying, please consult the latest issue of the Texas A&M University Student Rules (http://student-rules.tamu.edu/), under the section "Scholastic Dishonesty."
<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Topic</th>
<th>Reading Assignment Spring 2013</th>
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<tbody>
<tr>
<td>1</td>
<td>13-Jan</td>
<td>Energy Overview</td>
<td>Chapter 1.1</td>
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<td>15-Jan</td>
<td>Energy Overview</td>
<td>Energy Sustainability</td>
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<td>MLK Day</td>
<td>Energy Uses and Sources</td>
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<td>Hybrid Engines (Dr. Mark Elson, Mech. Eng.)</td>
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<td>Turbines and Jet Engines (Dr. Rodney Bowserox, Aerospace Eng.)</td>
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<td>Internal Combustion Engine (Dr. Tim Jacobs, Mech. Eng.)</td>
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<td>3-Feb</td>
<td>Electricity - A Historical Perspective</td>
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<td>5-Feb</td>
<td>Electric Power Generation and Transmission (Dr. B. Don Russell, Elec. Engr.)</td>
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<td>Bryan Texas Utilities (Dan Wilkerson)</td>
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<td>10-Feb</td>
<td>19th Century Miracle Fuel</td>
<td>Natural Gas</td>
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<td>12-Feb</td>
<td>Historical Environmental Issues</td>
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<td>14-Feb</td>
<td>Resource extraction and Power Generation</td>
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<td>17-Feb</td>
<td>20th Century Miracle Fuel</td>
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<td>Oil Exploration and Production</td>
<td>Fossil Energy Products &amp; Fuels</td>
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<td>21-Feb</td>
<td>Petroleum Geology (Dr. Yuefeng Sun, Geology and Geophysics)</td>
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<td>24-Feb</td>
<td>21st Century Miracle Fuel</td>
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<td>26-Feb</td>
<td>Global Natural Gas Supply and Distribution</td>
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<td>Unconventional Gas (Dan Steward, Republic Energy)</td>
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<td>Petrochemical Products (Kurt Swogger, Designed Nanotubes)</td>
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<td>19-Mar</td>
<td>Coal Liquefaction/Gasification</td>
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<td>Emissions Reductions in Texas (Dr. Jeff Haberl, Architecture)</td>
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<td>24-Mar</td>
<td>Global Climate Change - the Threat</td>
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<td>Nuclear Energy Basics (Dr. John Poston, Nuclear Eng.)</td>
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<td>Nuclear Energy Record (Dr. John Poston, Nuclear Eng.)</td>
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<td>Nuclear Power in Texas (Tim Powell, Nuclear Eng.)</td>
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<td>7/-Apr</td>
<td>Energy Geopolitics (Michael Economides, University of Houston)</td>
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<td>Solar Energy (Dr. Robert Bolog, Electrical &amp; Computer Eng.)</td>
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<td>16-Apr</td>
<td>Electricity from Wind Energy (Ray McPhail, BP)</td>
<td>Solar &amp; Wind Energy</td>
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<td>18-Apr</td>
<td>Water and Energy (Dr. Bill Batchelor, Civil Eng.)</td>
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<td>Energy Use in Agriculture (Dr. Bruce McCarr, Agricultural Economics)</td>
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<td>Energy from Plants (Dr. Sergio Capareda, Bio. and Ag. Engr.)</td>
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<td>Energy from Algae and Waste (Dr. Ron Lacey, Bio. and Ag. Engr.)</td>
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<td>28-Apr</td>
<td>Renewable Energy Transmission, Distribution, and Storage</td>
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<td>30-Apr</td>
<td>Wrap Up</td>
<td>Transmission, Distribution, and Storage</td>
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<td>5-May</td>
<td>Project Final Report Due by 5pm to RICH 710</td>
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<tr>
<td>Monday</td>
<td>Recitation week</td>
<td>Due Before Recitation During Recitation</td>
<td>Recitation Discussion</td>
</tr>
<tr>
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</tr>
<tr>
<td>18-Jun</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-Jun</td>
<td>1</td>
<td>About Me Essay, introductions, expectations from course (handout on Recitation Guidelines)</td>
<td>Go over Project Guidelines, Establish teams, Assign project coach (UPT, some Learning Assistants) to each team. Teams work on project titles.</td>
</tr>
<tr>
<td>1-Feb</td>
<td>2</td>
<td>About Me Essay, Sustainability, Project Summary - Resources during recitation</td>
<td>Further project teams and titles, and decide who is in the project leader role, before project summary, name of project leader and team member, exchange contact information.</td>
</tr>
<tr>
<td>8-Feb</td>
<td>3</td>
<td>CE Subject related to Project Work on Project Proposal</td>
<td>Discuss graded project summary, Review Project Guidelines on Project Proposal. Apply scientific method to evaluate sustainability aspects of the project proposal.</td>
</tr>
<tr>
<td>15-Feb</td>
<td>4</td>
<td>CE Coal Project Proposal</td>
<td>Project Peer Review Form.</td>
</tr>
<tr>
<td>22-Feb</td>
<td>5</td>
<td>CE Foreign Country Energy Issue, Review progress on project</td>
<td>Project update.</td>
</tr>
<tr>
<td>8-Mar</td>
<td>7</td>
<td>CE Subject related to Project Annotated Bibliography on Transportation</td>
<td>Discuss team member project assignments. Project Peer Review Form.</td>
</tr>
<tr>
<td>15-Mar</td>
<td></td>
<td>Spring Break</td>
<td></td>
</tr>
<tr>
<td>26-Apr</td>
<td>13</td>
<td>No CE</td>
<td>Project Presentation. Project Report is due Monday of 6th exam week. Project Peer Review Form.</td>
</tr>
</tbody>
</table>