**ECO 405/505**

**SL: Sustainable Energy Economics and Policy**

**Spring 2020 SYLLABUS**

Tuesdays & Thursdays 9:30-10:45pm

Estabrooke 130

**COURSE INFORMATION**

**Course Description**

This course examines tradeoffs associated with the technical, economic, environmental, and social implications of energy supply, distribution, and use in the context of transitioning toward a sustainable energy future. Students examine a variety of renewable and non-renewable energy options for electricity, heating and transportation. Students assess quantitative and qualitative indicators of sustainability related to greenhouse gas (GHG) emissions and climate change, air and water quality, human health and safety, energy security, wildlife and the environment, technological efficiency and availability. They examine the effect of policies (e.g., carbon prices, emissions targets, efficiency requirements, renewable portfolio standards, feed-in tariffs) on these indicators and tradeoffs. The course provides brief introductions to environmental life cycle assessment (LCA), social benefit cost analysis (SBCA) and multi-criteria decision analysis (MCDA), as they apply to energy issues. Students apply course concepts to a service-learning project in which they work with people from surrounding communities on local sustainable energy solutions. Students may not receive credit for both ECO 405 and ECO 505. This course has been designated as a UMaine service-learning course.

Field trips may be required. Depending on the nature and distance of field trips, students may be asked to arrange their own transportation, with volunteer drivers/carpooling or bus use encouraged, or transportation may be provided. Depending on the circumstances, an alternative assignment may be accepted in cases where a student is unable to make it to a field trip. Safety issues are not anticipated during field trips, but all University policies regarding field trip safety will be followed.

**Undergraduate General Education Requirements**: Population and the Environment and Quantitative Literacy.

**Undergraduate Prerequisites:** C- or better in ECO 120 and a C- or better in either MAT 116 or MAT 126

**Credits**: 3

**COURSE DELIVERY METHOD**

**Mode of Instruction**: In-person, with online content

**Learning Management System**: Google Classroom (<https://classroom.google.com>, class code: **kvs91b5**)

**Preferred Hardware**: Laptop with HDMI connector for access to Google Docs, Sheets, Forms, Drive, and Classroom

**FACULTY INFORMATION**

**Dr. Sharon Klein**

Associate Professor

School of Economics

Winslow Hall, Room 305C

207-581-3174

sharon.klein@maine.edu *(when sending email to this address, please start the subject line with the course designator (e.g., ECO 405 or ECO 505))*

**Office Hours**: TBD during first week of class

**INSTRUCTIONAL MATERIALS AND METHODS**

**Required Texts:** There is no required text for this course. All required readings and videos will be available through the course website in Google Classroom (<https://classroom.google.com>, class code: **kvs91b5**). It is recommended that students bring a laptop and HDMI connector to class if they have one. This is not required, but may make some in-class activities easier.

**Google Classroom** will be our main stop for most course content. This is where I will post weekly readings, videos, some assignments, as well as announcements and most grades. I may ask you to submit some assignments through Classroom. You will receive grades for these assignments through Classroom. Classroom also links to Google Drive (GD) so if you have GD installed on your computer and set up to automatically sync, you can access the Classroom folder for this course directly from your computer’s desktop. Alternatively, you can visit your GD through your web browser and find the Classroom folder for this course in there.

**Google Programs:** We will be using many Google programs (Docs, Sheets, Forms, Slides) to facilitate active and collaborative learning. Students should familiarize themselves with these programs and make sure they know how to use them and attend office hours early on if they are having trouble. There will be resources posted on Google Classroom to help students familiarize themselves with these programs.

**Non-Traditional Teaching Methods**

This course uses active, inquiry-based, project-based, service- and collaborative learning methods, as well as a partial “flipped” classroom model to enrich student understanding of the material and help students develop professionally and personally (for more information, see: <https://www.youtube.com/watch?v=MdymI61hLPY&list=PLE8C54256779B374D&index=3&feature=plpp_video>). There will be times we will use a traditional lecture-style approach to class, but most of the time in class, students will be expected and required to actively engage in discussions, debates, problem-solving, and other activities that help improve learning outcomes, problem-solving and critical thinking skills, confidence, retention of information, group collaboration, and many other important aspects of learning. In order to participate fully in these activities, students will need to do readings, watch videos, and complete written assignments outside of class, on time. Students will be graded on each of these important components of learning, in-class (through quizzes and other in-class activities) and out-of-class (through the project). It is also recommended that students bring a laptop and HDMI connector to class if they have one. This is not required, but may make some in-class activities easier.

#### True to the spirit of inquiry-based learning, I may not always give a direct answer to a question but rather encourage students to find the answers on their own. This may seem frustrating and inefficient at times, but finding answers on their own helps students understand concepts at a deeper level and retain information better. I will provide direct answers when necessary, and I will be open about when I am being indirect and why.

Service-learning is a “teaching method which combines community service with academic instruction as it focuses on critical, reflective thinking and civic responsibility. Service-learning programs involve students in organized community service that addresses local needs, while developing their academic skills, sense of civic responsibility, and commitment to the community” (<http://umaine.edu/volunteer/service-learning/>). This course integrates community service related to sustainable energy with course content because it helps students better understand their own role in achieving a sustainable energy future and improves learning outcomes.

**COURSE GOAL**

The main goal of this course is to expand student understanding and reasoning skills related to energy choices, issues, and policies in the context of the varied social, economic and environmental implications of energy production, distribution and use.

**INSTRUCTIONAL OBJECTIVES**

1. Distinguish between concepts of power and energy, and convert between power and energy units across a wide range of energy resources, technologies and uses.
2. Define sustainability and sustainable energy.
3. Compare current energy trends and markets in Maine, the U.S., and the world, and identify the factors influencing these trends over time and space.
4. Identify and evaluate potential sustainable energy solutions across a diverse array of sustainability indicators, including but not limited to: production efficiency & cost, annual capacity factor, geographic and temporal availability, air pollution, water pollution, water & land use, social acceptability, human health impacts, and safety.
5. Compare the economic sustainability of different energy options through calculations of levelized cost of energy, net present value, and/or payback period.
6. Explore sustainability tradeoffs associated with different energy options through brief introductions to life cycle assessment (LCA), benefit-cost analysis (BCA), and/or multi-criteria decision analysis (MCDA).
7. Assess and compare the implications of current and potential future energy policies (including carbon prices, emissions targets, efficiency requirements, renewable portfolio standards, and feed-in tariffs) on sustainable energy development.
8. Engage incitizen-oriented solutions to energy-related problems.
9. Evaluate the role of civic engagement and service learning in creating and implementing sustainable energy solutions.

**STUDENT LEARNING OUTCOMES**

*Upon successful completion of this course, students will be able to*:

1. Explain, to an audience of mixed energy knowledge, the most pressing sustainable energy-related problems and associated policies/solutions.
2. Evaluate the quantitative and qualitative technical, economic, environmental, and social costs and benefits of different energy solutions.
3. Formulate sustainable energy solutions that maximize overall benefits.
4. Find, develop, and/or participate in local sustainable energy solutions.

**GRADING AND COURSE EXPECTATIONS**

#### Components of Final Grade:

|  |  |
| --- | --- |
| Weekly Quizzes | 35% |
| In-Class Activities | 35% |
| Project | 30% |

#### The final semester grade will be the sum of the weighted total of Weekly Quizzes, In-Class Activities, and Project grades and will be assigned as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| A (93 or above) | A- (90-92.9) | B+ (87-89.9) | B (82-86.9) |
| B- (80-81.9) | C+ (77-79.9) | C (72-76.9) | C- (70-71.9) |
| D+ (67-69.9) | D (62-66.9) | D- (60-61.9) | F (59.9 or less) |

These grading components and grade assignment chartapply to both ECO 405 and ECO 505 students; however, the details about what contributes to these grades, as described below, differ somewhat for ECO 505 students. Differences are explained on the last page of this syllabus in the ADDITIONAL ECO 505 REQUIREMENTS section.

#### Weekly Quizzes (35%)

It is very important for students to come to class ready to actively participate and learn. In many ways, all students in the class depend on each student doing his/her own part. In general, on the first day of class for the week (e.g., Monday for a MWF class; Tuesday for a TTh class), students will be expected to have completed a set of course material that I will post online a week ahead of time with instructions about what should be read (e.g., journal articles), watched (e.g., videos), and/or explored (e.g., interactive websites). Students will be required to complete an online quiz based on the assigned material and based on what was learned in class the previous week. Sometimes these quizzes will be taken at home and sometimes in class. The lowest quiz grade will be dropped at the end of the semester. The amount of material required to read/watch/explore each week will taper off toward the end of the semester as the Project component takes up more time.

#### In-Class Assignments (35%)

All students are expected to attend class each day and be prepared with a **calculator** (phone, tablet or computer are acceptable substitutes)**, paper** and **pen/pencil**. Students are welcome to take notes on a computer or tablet, but they must also bring paper and pen/pencil. Students are encouraged to bring a laptop computer for use with **Google Forms, Docs, Sheets, Drive, and Classroom**, but this is not required. Students are expected to attend ALL scheduled class meetings and participate in ALL learning activities during class times, which may include group discussions, reflections, debates, games, problem-solving (often involving math – hence the calculator, paper and pencil), individual writing, etc. For many of these assignments, you will work collaboratively with people at yourlearning table to answer questions in Google Docs, Forms, Sheets, or to collaboratively prepare a presentation in Google Slides. In-class activities will build off of the weekly course material students prepare at home (e.g., the readings, videos, and interactive website explorations upon which they are quizzed) and help students build knowledge to work toward future assignments and the project. Students will earn one in-class activity grade of up to 10 pts for each class meeting. On some days, this grade may be assigned based purely on attendance (e.g., 10 pts for attending, 0 pts for not). On some days, there may be more specific assignments with more specific grading criteria (e.g., writing answers to 5 questions worth 2 pts each, group work based on a rubric handed out ahead of time, etc). If there are more than one specific assignment in one class period, the in-class activity grade for that class period will be the average of all of the scores for that class period, for a score out of 10 pts max. At the end of the semester, the in-class activity grades for all class periods will be added up; the lowest in-class activity grade will be dropped (subtracted); the total divided by the total points possible and multiplied by the component weight shown in the table above.

Depending on the specific assignment, **problem-solving** assignments usually will be graded on whether the student (or group) obtained the correct answer and/or used the appropriate procedure to arrive at the correct answer. **Discussions, debates, and individual writing assignments** will be graded either based on whether all parts of the assignment were complete or using rubrics posted in Classroom. **Games** will be graded in a similar fashion to a quiz – the grade will depend on getting the correct answer, providing the correct explanation, etc. On average, 1-5 in-class questions each day will require accessing a **Google Form** (see above).

#### Project (30%)

The project will integrate student learning outcomes and service-learning through a written report, poster presentation, workshop, or oral presentation, where the audience may include community partners, students and faculty from other classes, and other interested parties. The exact nature of the project may vary each time the course is taught based on the most pressing service needs at the time. Typically, students form teams to work collaboratively with community partners on projects related to sustainable energy that meet community needs. Depending on the needs at the time, students may be involved in activities such as building window inserts, creating and testing brochures/advertising materials for community sustainable energy projects, conducting research on a topic of need identified by the community partner, developing and implementing an information workshop for a community partner, etc. In some cases, students may be required to meet a minimum number of service hours. However, they will be evaluated primarily on their learning experience through community partner evaluation, peer evaluation, and/or reflection assignments/papers. Final projects may be presented to the community partners at a location determined by each group and partner. There may be individual and/or collaborative components to the project. Assigned course material (e.g., readings, videos, etc), in-class activities, and service will help students make progress on the project throughout the semester. As part of the project, students will be required to engage in service in a local community to make progress on a real sustainable energy solution. More instructions will be presented during the first month of class. Some service projects may require field trips, which will either occur during class time or during a time negotiated in advance with students to work with their schedules. Depending on the nature and distance of field trips, students may be asked to arrange their own transportation, with volunteer drivers/carpooling or bus use encouraged, or transportation may be provided. Depending on the circumstances, an alternative assignment may be accepted in cases where a student is unable to make it to a field trip. Safety issues are not anticipated during field trips, but all University policies regarding field trip safety will be followed.

**COURSE POLICIES**

**Classroom Culture**

This class tends to be a mix of students from economics, engineering, environmental science, and other academic backgrounds. In addition to this academic diversity, each student has their own cultural and social backgrounds, lived experiences, family traditions, political leanings, and set of ethics and values. These differences represent valuable opportunities for us to open our minds to new ideas and ways of thinking and respect different perspectives in our class discussions. I encourage students not to shy away from discussions that involve differences in opinion or disagreements but rather practice demonstrating active listening, constructive feedback, and respectful debating. These are not easy skills to master, and we will spend much class time practicing these skills. We will not find sustainable energy solutions by either mindlessly fighting or, on the other extreme, avoiding conflict. We must learn how to listen, learn, respect, and grow.

**Extra Credit**

Several extra credit opportunities are available - more information and specific instructions are located in the “Extra Credit” topic area in Google Classroom.

**Late/Missed Assignments**

I understand that life happens, and I don’t want to waste student time and mine discussing excuses and/or valid reasons for missed assignments. For this reason, I will drop the 1 lowest Quiz and the 1 lowest In-Class Assignment grade at the end of the semester. Students also have the opportunity to earn Extra Credit. Therefore, there will be NO opportunities to makeup missed work, and late assignments will NOT be accepted. The only exception is if the University has granted a student a leave from course duties for some reason - in this case, the proper documentation would be required to makeup missed or late assignments within the appropriate timeframe specified on the University documentation. Students must arrange a meeting with me (outside of class time) as soon as possible in a situation like this, so we can work out the timeline for makeup work. If a student knows in advance s/he will miss an assignment due to sporting events, field trips for other classes, or some other official event, s/he must inform me in writing (i.e., email) as soon as s/he knows of the conflict, and complete assignments prior to the deadlines if possible or meet with me to schedule new deadlines.

**Communication Policy & Extra Help**

Check Google Classroom regularly for announcements, assignments and other communication from me.

If you have a question or need extra help, please do the following **in order**:

1. Review the course materials on Google Classroom (i.e., syllabus, instructions, announcements, readings, videos, etc.) and see if there are already answers available in these materials.
2. Check the discussion threads surrounding the course materials to see if your question has already been asked and answered.
3. If your question has not been asked yet in Classroom, but it may apply to other students, please post your question to the appropriate course material discussion thread and/or ask your question in class so all students can benefit.
4. If your question is more individual in nature and/or you have not found an answer after completing steps 1-3, please email me. There may be time to ask a quick question before or after class, but for some questions – especially where I may need to look something up – email works better. Please send email requests for meetings **at least 48 hours ahead of time** – depending on my travel and research schedule, I may need more time than this.

I expect emails from students to me (and vice versa) to be composed professionally with complete sentences and proper English writing style with no spelling mistakes or cryptic abbreviations (i.e, an email is not a text message), a CLEAR subject line that includes the course designator (e.g., ECO 405 or ECO 505) and a clear, concise question. I reserve the right not to respond to emails that don’t meet these qualifications.

During the weekdays, I will try to respond to emails within a 36-hour turnaround time. I will try to respond to emails sent on weekends/holidays within 60 hours.  I teach other courses, do research, and have a personal life, so please be patient and respectful.

**UNIVERSITY POLICIES**

**Academic Honesty Statement:** Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

**Students Accessibility Service Statement**: If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me privately as soon as possible.

**Course Schedule Disclaimer (Disruption Clause):** In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

**Observance of Religious Holidays/Events:** The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student’s grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

**University Sexual Discrimination Reporting Policy**

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

**If you want to talk** **in confidence** to someone about an experience of sexual discrimination, please contact these resources:

For *confidential resources on campus*: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000**.

For *confidential resources off campus*: **Rape Response Services:** 1-800-310-0000 or **Spruce Run**: 1-800-863-9909.

**Other resources:** The resources listed below can offer support but may have to report the incident to others who can help:

For *support services on campus*: **Office of Sexual Assault & Violence Prevention: 207-581-1406**, **Office of Community Standards: 207-581-1409**, **University of Maine Police: 207-581-4040 or 911**. Or see the OSAVP website for a complete list of services at <http://www.umaine.edu/osavp/>

**COURSE SCHEDULE**

Please access the most updated Course Schedule on Google Classroom.

##### ADDITIONAL ECO 505 REQUIREMENTS

Students enrolled in ECO 505 will be receiving credit for a graduate level course. Therefore, more will be expected of them in terms of workload and quality of work. Although the grading *scale* will be the same for graduate students as what is outlined above for undergraduate students, the following modifications to the grading *components* apply to all ECO 505 students:

#### Weekly Quizzes (35%)

In addition to everything ECO 405 students must do in this component, ECO 505 students must complete ALL “optional” course material (e.g., readings, videos, etc) posted on Google Classroom and may be required to answer additional, different, and/or more difficult/detailed Quiz questions. ECO 505 students are also expected to take initiative on course material and quizzes – rather than waiting to be told what to do, they should anticipate what needs to be done and initiate solutions where appropriate.

#### In-Class Activities (35%)

In addition to everything ECO 405 students must do in this component, ECO 505 students are expected to take on a leadership role in collaborative group work – supporting and educating undergraduate students in research efforts and in-class activities. ECO 505 students are also expected to take initiative on in-class activities – rather than waiting to be told what to do, they should anticipate what needs to be done and initiate solutions where appropriate.

#### Project (30%)

In addition to everything ECO 405 students must do in this component, ECO 505 students:

1. Will have additional requirements and a separate grading rubric for their Project.
2. May be required to participate in meetings with me outside of class throughout the semester to obtain additional instruction and check in about the status of the project.
3. May be expected to take a more active role in the service portion of the Project (e.g., volunteer for additional hours, help with logistics and leadership)
4. Will be required to write an **individual** full-length (10-15 page) research paper for their project **in addition** to any collaborative work.
   1. The paper may use some collaborative work, but also must add more detail, greater depth in examining the issues, and include content related to skills and information acquired independently.
   2. In addition, ECO 505 students must identify 3 academic journals, which may be appropriate for submitting this paper for publication, and explain why these journals may be appropriate, with specific references to the journal description and impact factors. ECO 505 students do not actually have to submit their paper for publication, rather this portion of the assignment is included because graduate students should gain experience in selecting academic journals for publication in a variety of topic areas.
   3. Further instructions and a grading rubric for the ECO 505 final paper will be available on Google Classroom at the beginning of the semester. The ECO 505 final paper will be due at the end of the final exam period as an online submission to Google Classroom.
5. Are expected to take initiative on project research and service – rather than waiting to be told what to do, they should anticipate what needs to be done and initiate solutions.