

ECO 405/590 Sustainable Energy Economics and Policy
Spring 2019 SYLLABUS
Wednesdays 1:00-3:50pm
Barrows Hall 126

COURSE INFORMATION

ECO 405/590: Sustainable Energy Economics and Policy

3 credits

Course website: <https://classroom.google.com> (*instructions for access will be given on first day of class*)

Instructor

Dr. Sharon Klein

Assistant Professor

School of Economics

Winslow Hall, Room 305C

207-581-3174

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Office Hours: Wednesdays 10-11am, starting the second week of classes

Prerequisites

ECO 120 and ECO 121, or MAT 126, or permission

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 energy options, with a focus on renewable energy sources (solar, wind, biomass, hydro, and geothermal power), energy efficiency and conservation, nuclear power, and natural gas, alongside policies to mitigate negative effects. The course adopts a systems-thinking approach, considering options for electricity, heating and transportation and the interplay between these options. 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, economic development, 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 a brief introduction to environmental life cycle assessment (LCA), a method for considering the environmental impact of a product or process from the “cradle to the grave”, as well as a more in-depth introduction to social benefit cost analysis (SBCA) and multi-criteria decision analysis (MCDA). Students apply course concepts to a service-learning project in work with people from surrounding communities on local sustainable energy solutions. This is a service-learning and project-based course. Field trips may be required. Students may not receive credit for both ECO 405 and ECO 590.

This course meets the University of Maine’s general education requirement for Population and the Environment¹.

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.

Student Learning Outcomes

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

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, geographic and temporal availability, air pollution, water pollution, water & land use, social acceptability, human health impacts, and safety.
5. Calculate annual capacity factor, levelized cost of energy, net present value, and payback period for different energy projects.
6. Quantitatively compare sustainability tradeoffs associated with different energy options using life cycle assessment (LCA), benefit-cost analysis (BCA), and 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 in **citizen-oriented solutions to energy issues**.
9. Evaluate the role of civic engagement and service learning in creating and implementing sustainable energy solutions.

We will measure these learning outcomes throughout the semester through **homework, in-class activities, service, and a research project**.

INSTRUCTIONAL MATERIALS & 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> (*instructions for access will be given on first day of class*)).

Google Classroom

Google Classroom will be our main stop for most course content. This is where I will post weekly readings, videos, and homework assignments, as well as announcements and most grades. You will submit your homework (and occasionally some in-class 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. Downloading and accessing GD through your computer directly (through Finder on Mac or one of your computer file folders on Windows) can sometimes reduce issues associated with accessing GD through a web browser. You can access our course on Classroom here: <https://classroom.google.com>. I will provide the course code on the first day of classes and go through a little tutorial.

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=Mdyml61hLPY&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 and out-of-class.

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/>). Community service related to sustainable energy is a required component of this course because it helps students better understand their own

role in achieving a sustainable energy future.

GRADING AND COURSE EXPECTATIONS

Components of Final Grade:

Homework Assignments	25%
In-Class Assignments	25%
Research Project	30%
Service	20%

The final semester grade will be the sum of the weighted total of Homework, In-Class Assignment, Research Project, and Service grades and will be assigned as follows:

A (90 or above)	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- (60-69.9)	F (59.9 or less)	

Homework Assignments (25%)

It is very important for students to come to class ready to actively participate and learn. In many ways, the rest of the class depends on each student doing his/her part in this way. Weekly homework assignments are essential to being prepared. Homework assignments will consist of reading and/or watching videos and writing a reflection; answering specific questions about course material; and/or conducting independent research. Homework assignments will be submitted through the Google Classroom website <https://classroom.google.com> (*instructions for access will be given on first day of class*). The 1 lowest homework assignment grade will be dropped at the end of the semester. Homework assignments will taper off toward the end of the semester as the Research Project component becomes more prominent.

In-Class Assignments (25%)

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 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, pop quizzes, etc. In-class assignments will build off of Homework assignments and help students build knowledge to work toward future assignments and the research project. The 1 lowest in-class assignment grade will be dropped at the end of the semester.

Depending on the specific assignment, **problem-solving** assignments, games, and **pop quizzes** 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.

Research Project (30%)

The research project will integrate student learning outcomes and service-learning through a written report, poster presentation, or oral presentation, where the audience may include community partners, students and faculty from other classes, and other interested parties. There may be individual and/or collaborative components to the project. Homework assignments, in-class activities, and service will help students make progress on the research project throughout the semester. More instructions will be presented during the first month of class.

Service (20%)

Students will be required to engage in service in a local community to make progress on a real sustainable energy solution. For example, in the past, students have: helped build interior window inserts to reduce heat loss through old drafty residential windows in the Bangor/Orono area.; worked with a local municipality to analyze an energy problem they are having; designed a sustainable energy license plate for the state of Maine. Students are expected to contribute a minimum of 20 hours over the course of the semester to activities that serve the community on an energy-related issue. Students will be graded based on meeting the required number of hours, providing high quality service in a dedicated, caring, and professional manner, and submitting complete responses to service reflection questionnaires. The service project will be integrated into the research project analysis. I will provide more information during the first week of classes.

Course Policies

Extra Credit

A limited number of extra credit opportunities will be available at different times throughout the course – I will post these on Classroom as they become available. Students are welcome to propose ideas for extra credit assignments that I have not yet made available. All extra credit assignments must be submitted to Classroom by the last day of classes. Students may earn up to a maximum of 10 extra credit points to be applied to either their Homework OR In-Class Assignment total semester points (the equivalent of 1 additional assignment). Please see “Extra Credit” in Classroom for instructions and a list of acceptable ideas.

Late/Missed Assignments

I understand that life happens, and I don't want to waste your time and mine discussing excuses and/or valid reasons for missed assignments. For this reason, I will drop the 1 lowest Homework assignment and the 1 lowest In-Class Assignment at the end of the semester. You also have the opportunity to earn credit for up to 1 additional Homework or In-Class assignment through 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 you 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. You 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 you know in advance you are going to miss an assignment due to sporting events, field trips for other classes, or some other official event, you are expected to let me know as soon as you know 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 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) 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

Student Accessibility 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 (the instructor of the course) privately as soon as possible.

University 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.

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 OSASP website for a complete list of services at <http://www.umaine.edu/osavp/>

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.

Tentative Course Outline

This will be posted on Classroom on the first day of classes and is subject to change.

Additional ECO 590 Requirements

Students enrolled in ECO 590 will be receiving credit for a graduate level course. Therefore, more will be expected of them in terms of workload and quality of work. The following changes to the information listed above apply to all ECO 590 students:

- 1) ECO 590 students must complete ALL "optional" readings/videos listed on Classroom and may be required to answer additional Homework or In-Class Assignment questions.
- 2) ECO 590 students may be required to participate in additional meetings with me throughout the semester to obtain additional instruction and check in about the status of the final paper.
- 3) ECO 590 students may be expected to take a more active role in service projects (e.g., volunteer for additional hours, help with logistics and leadership)

- 4) ECO 590 students will be required to write an individual full-length (10-15 page) research paper for their project **in addition** to any collaborative work.
 - a. 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.
 - b. In addition, ECO 590 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 590 students do not actually have to submit their paper for publication, rather this portion of the assignment is included because graduate students need to gain experience in selecting academic journals for publication in a variety of topic areas.
 - c. Further instructions and a grading rubric for the ECO 590 final paper will be available on Classroom at the beginning of the semester. The ECO 590 final paper will be due at the end of the final exam period as an online submission to Google Classroom.
- 5) ECO 590 students are expected to take on a leadership role in collaborative group work – supporting and educating undergraduate students in research efforts.
- 6) ECO 590 students are expected to take initiative on research and course work – rather than waiting to be told what to do, they should anticipate what needs to be done and initiate solutions.

ⁱ (1) The stated objectives and outcomes address the learning outcome goals for the University of Maine's general education requirement for the area of *Population and the Environment*, which state (in brief):

Courses included in the Population and Environment sub-category help students to understand how humankind interacts with our finite physical and biological environment by addressing:

- (a) The role of both local and global environmental change on the quality of human life;
- (b) The pervasive role of human population growth on environmental quality and the quality of life, both in industrial and developing countries;
- (c) The influence of cultural, religious, economic, educational and political factors on population growth and environmental quality; and
- (d) Possible solutions to the population/environmental problems, which may include the role of technological advancements, a re-examination of educational and political institutions, enlightened reassessment of traditional religious and economic conceptions, and rethinking contemporary Western conception of "the good life"