ENVE 160 / ES 260 – Sustainable Energy
Spring 2019 Syllabus

Instructor: Dr. Marie-Odile P. Fortier
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Office location: Science & Engineering 2 (SE2) room 386
Office hours: Wednesdays 3:00pm to 5:00pm. Please note that occasional changes in office hours will be communicated via CatCourses announcements.

Graduate teaching assistant: Shirin Mehrazi
Email: smehrazi@ucmerced.edu
Office hours: Tuesdays and Thursdays 5:20pm to 6:20pm in the SE2 lobby.

Class time: Tuesday and Thursday, 3:30pm to 5:20pm

Class location: Classroom and Office Building (CLSSRM) room 113

Materials: No textbook required. Assigned readings will be provided on CatCourses.

Prerequisites: ENVE 020 or instructor permission.

Catalog Course Description: Current systems for energy supply and use. Renewable energy resources, transport, storage, and transformation technologies. Technological opportunities for improving end-use energy efficiency. Recovery, sequestration, and disposal of greenhouse gases from fossil-fuel combustion.

Course Goals: Students will be introduced to the science and engineering of energy technologies including fossil fuel, solar, bioenergy, and wind approaches. With this understanding, students will be able to assess the environmental impacts of alternative energy designs that are currently used and being developed as emerging technologies. Students will apply basic mathematical and scientific concepts to analyze energy systems. The goal of the final project will be to design a new problem and collect and analyze secondary data to solve the problem. The project will include a literature review to develop writing skills and an oral presentation. Homework assignments will be designed to further develop critical thinking skills. Through assigned readings from the scientific literature and lectures that cover recent events and broader perspectives on energy, students will be able to explore the complexity and societal importance of sustainable energy using systems thinking.

Student Learning Outcomes: Given realistic restrictions including geographic limits and population needs, students will be able to develop a range of energy systems including current and emerging technologies, determine their relative sustainability (social, environmental, and economic), and assess their contribution to energy security and energy justice. Furthermore, students will be able to solve problems in class meetings, homework assignments, and exams that concern our current understanding

of energy systems as well as discuss the knowledge gaps that require further research through a literature review writing assignment. Students will master mathematical and scientific methods required for assessing engineering metrics related to sustainable energy; they will be able interpret environmental engineering data and simulate experimental systems; they will have the environmental and teamwork skills to contribute to a sustainable energy design project; they will understand computational tools to analyze such systems; and, they will have reflected on the significance of environmental engineering with respect to meeting global sustainable energy challenges.

This course is designed in part to meet the student learning outcomes expected of an ABET-accredited undergraduate engineering program, which are:

1. "an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies." [Directly from: https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2019-2020/#GC2]

Student Evaluation:

Students will be graded based on the completion and quality of the following: discussion board posts on assigned readings on CatCourses, homework assignments, class participation, exams, and elements of a final project, as outlined in the table below. The class participation will be based on attendance and on participation in assigned work and discussions during class.

Discussion board posts will be due once to twice a week, depending on the readings and topics. Dr. Fortier will announce assigned discussion board posts and readings no later than the end of the class session prior to the class session by which they must be completed.

Although graduate students and undergraduate students in the course will be presented with the same materials, the graded items will differ in their directions and expectations depending on whether a student is enrolled in ENVE 160 or ES 260. Undergraduate students will complete the final project in groups and graduate students will complete the final project individually.

Detailed guidelines and due dates for the graded items will be provided as they are introduced during the semester. Please note that *homework assignments*, *discussion board posts*, and *exams* must always be completed independently.

Graded Items	**Percentage of Final Grade**
Homework assignments	25%
Discussion board posts	15%
Class participation	5%
Final project planning milestone	5%
Final project paper and presentation	15%
Midterm exam	15%
Final exam	20%

Grading Scale:

Range	**Grade**	**Range**	**Grade**
92.5 – 100	A	77.5 – 79.4	C+
89.5 – 92.4	A-	72.5 – 77.4	C
87.5 – 89.4	B+	67.5 – 72.4	C-
82.5 – 87.4	B	60.0 – 67.4	D
79.5 – 82.4	B-	< 60.0	F

Class Guidelines and Useful Information:

1. **Attendance Policy**: Attendance is required in the course and will be recorded daily. Attendance will count towards the class participation grade.

2. **Assigned Reading**: Students are expected to complete the assigned readings prior to class and to be informed participants in class discussions. CatCourses discussion posts of the readings should contribute meaningfully to the analysis and/or reflections of the readings to earn full credit.

3. **Individual Work Policy**: Unless a graded item is explicitly labeled as group work, it must be completed independently (without collaboration with other students). This includes all homework assignments. Otherwise, the students involved are committing an act of academic dishonesty (see #8 below).

4. **Late Assignment Policy**: Assignments must be turned in at the beginning of the class period during which they are due. Assignments turned in after the start of class on the due date will be deducted by 5%. Late assignments will be penalized 10% per day. No late assignments will be accepted beyond one week after the due date. The exception to the late assignment policy is discussion posts, which will not be graded if submitted after their due date and time.

5. **Extensions**: On a case-by-case basis for emergencies and unusual circumstances, a penalty-free extension to turn in a graded item may be allowed. Dr. Fortier has the sole authority to determine whether an extension will be granted and may require proof.

6. **Classroom Resources**: Recording of lectures, either via audio or video recordings, is not permitted. Laptops may only be used during class for note-taking purposes. The Powerpoint

lectures will be posted on CatCourses after each class. However, any notes written on the board or projected via document cam will not be posted on CatCourses.

7. **Sharing Submitted Work**: Dr. Fortier reserves the right to keep copies of any work submitted for grading in the course for the purposes of maintaining ABET accreditation; names will be redacted to maintain confidentiality whenever possible.

8. **Academic Dishonesty**: Academic dishonesty is a breach of trust between a student, one's fellow students, or the instructor(s). Academic penalties at the University level may result from infractions of academic integrity, which include plagiarism and cheating. Please review the UC Merced Academic Honesty Policy at http://studentconduct.ucmerced.edu/ and ask Dr. Fortier any questions that you may have on what constitutes an infraction in our class.

9. **Inclusive Excellence**: As an institution, we embrace inclusive excellence by addressing inequities in student success, utilizing best educational practices, and embracing the strengths of a diverse and inclusive community. During classroom discussions, we may be challenged by ideas different from our lived experiences and cultures. Understanding individual differences and broader social differences will deepen our understanding of each other and the world around us. In this course, people of all races, ethnicities, genders and gender identities, religions, ages, sexual identities, disabilities, socioeconomic backgrounds, regions and nationalities (as examples) are strongly encouraged to share their unique perspectives and experiences, respectfully.

10. **Accommodations for Students**: University of California, Merced is committed to creating learning environments that are accessible to all. If you anticipate or experience physical or academic barriers based on a disability, please feel welcome to contact Dr. Fortier privately in order to discuss options. In addition, please contact Student Accessibility Services (SAS) at (209) 228-6996 or disabilityservices@ucmerced.edu as soon as possible to explore reasonable accommodations. All accommodations must have prior approval from Student Accessibility Services on the basis of appropriate documentation. If you anticipate or experience barriers due to pregnancy, temporary medical condition, or injury, please feel welcome to contact Dr. Fortier in order to discuss options. You are encouraged to contact the Dean of Students for support and resources at (209) 228-3633 or https://studentaffairs.ucmerced.edu/dean-students. If an emergency or a different challenge occurs during the semester, please let Dr. Fortier know and begin a discussion for the possibility of a plan that meets your needs and the course requirements. Furthermore, if Dr. Fortier's office hours and/or our teaching assistant's office hours do not work with your schedule and you would like our assistance, please email us at least three days in advance of an assignment due date to schedule an alternative time to meet.

11. **Basic Needs Resources**: Any student who has difficulty affording groceries or accessing sufficient food, or who lacks a safe and stable place to live, is urged to contact the Dean of Students for support. Additional resources exist through the campus' Basic Needs services, located in SSM 130.

Course Schedule (subject to revision; any updates will be announced):

Week	Dates	Topics
1	1/22 1/24	Overview of our energy situation Measures of energy quality
2	1/29 1/31	Units and introduction to thermodynamics for energy systems Energy supply and distribution
3	2/5 2/7	Energy supply and distribution Energy storage; Energy justice
4	2/12 2/14	Energy consumption Assessment of environmental impacts
5	2/19 2/21	Coal Oil and gas
6	2/26 2/28	Nuclear energy Harnessing energy from waste
7	3/5 3/7	**Midterm exam** Wind energy
8	3/12 3/14	Wind energy Wind energy
9	3/19 3/21	Solar energy Solar energy
10	3/26 3/28	No class – Spring Break No class – Spring Break
11	4/2 4/4	Solar energy Geothermal energy
12	4/9 4/11	Hydropower Ocean energy
13	4/16 4/18	Biomass energy Biomass energy
14	4/23 4/25	Algae for bioenergy Renewable energy futures
15	4/30 5/2	Energy in the mining sector Energy in the transportation sector
16	5/7 5/9	Energy in the agricultural sector Project presentations
17	5/13	**Final Exam** (6:30-9:30pm)