

Syllabus

Renewable Energy & Sustainability Term 2019-II Course Information

Instructor: Prof. Cesar Barraza-Botet, PhD

Mechanical Engineering

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Office hours: Mondays 9:00-12:00; Tuesdays 9:00-11:00, 14:00-18:00; Wednesdays 9:00-10:00.

Course Description

The aim of this course is to introduce students to cutting-edge technologies, barriers and opportunities to the development of sustainable energy systems in the framework of the energy transition driven by Climate Change action. This course will meet weekly for a formal seminar on each course topic. Expert researches and practitioners in energy systems engineering and sustainability will be invited to class to participate as seminar speakers. A portion of each seminar will be devoted to insightful discussion where student will actively participate and prepare each seminar topic beforehand.

Grading:

1st Part (30%):

- Topic preparation and discussion participation: 10%
- Seminar reaction paper: 10%
- Project proposal: 10%

2nd Part (30%):

- Topic preparation and discussion participation: 10%
- Seminar reaction paper: 10%
- Project technical report: 10%

3rd Part (40%):

- Topic preparation and discussion participation: 10%
- Seminar reaction paper: 10%
- Project pitch: 20%

Topic preparation and Discussion Participation

Students will be required to analyze 2 reference papers for each topic and actively participate in the discussion sessions. These discussions will be in large groups and allow for greater interaction with each week's speaker. Discussion sessions will take place after the one-hour presentations and will last approximately one additional hour. Failure to participate in the discussion session shortening it to less than one hour would negatively impact the grading of the overall class. The discussion sessions will take place in the same language of the invited speaker's presentation (English or Spanish).

Reaction Papers

These are intended to give students the opportunity to reflect on and respond to the seminar topics and issues covered in class. Students will be required to write three reaction papers during the course of the semester. Students may choose any topic covered during the first part (3 seminars) for the first reaction

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paper; any topic covered during the second part (4 seminars) for the second reaction paper; and any topic covered over the third part of the semester (3 seminars) for the third reaction paper. You may not repeat a topic in your reaction paper. All the reaction papers must be written in English. Each reaction paper should be two pages (plus references) with single or 1.5 line spacing, size 12 font, and 1-inch margins.

General Overview on Reaction Papers:

No outside research or reading beyond the 2 reference papers is required for your reaction papers; however, reading additional information may be helpful for your own understanding and may provide a better grounding or justification for positions taken in your reaction paper. Begin by briefly summarizing the topic in a paragraph at the beginning of your paper and then use the remainder of the paper to provide a reaction to the topic as well as to the views/perspectives presented by the speaker. It is acceptable for you use your reaction paper to address a piece of the presentation that was not the main topic or theme. In this instance, you will probably not be able to react to the views/perspective presented by the speaker. Instead, you should take the opportunity to share your thoughts, using background and factual information to support them. [Example reaction papers](#) will be provided for your reference.

Keys to Effective Reaction Papers

1. As a rule of thumb, keep the summary of the seminar to no more than 1-2 short paragraphs. Do not summarize the entire lecture unless it is relevant to the rest of your paper. The summary should be used to set the context for the discussion that follows.
2. Since reaction papers are meant to be short, try to be concise and well organized in your writing. A helpful approach is to focus on 3 or 4 main points you wish to make. Use a topic or thesis sentence at the end of your introduction to summarize the topics you will discuss in your paper. Then, use a paragraph (or so) to discuss each topic.
3. Do not forget to use transition sentences at the end of your paragraphs between each of the topics.
4. Lastly, include a concluding paragraph that summarizes the main points.

Grading for Reaction Papers

General guidelines for grading of papers are as follows:

5.0: Student work exhibits original and of exceptional intellectual quality, very well written and presented, supported logically by thoughtful arguments that are well supported by outside literature, well structured, and complete.

4.0: Students work exhibits high intellectual quality, well written and well presented, supported logically and well documented, progresses logically, well-organized, and complete.

3.0: Students work exhibits average intellectual quality, is written intelligibly, is supported somewhat by some textual documentation, writing progresses logically, and is complete.

2.0: Students work exhibits below average intellectual quality, written and/or presented poorly, not adequately supported or argued and poorly documented, progresses illogically, and/or is incomplete.

1.0: Students work exhibits unacceptable intellectual quality, badly written and/or presented, unsupported, illogical, and/or incomplete.

Term Project

For the term project, teams of 5 students must identify a marginalized community with lack of access, deficiency or low-quality of energy and propose a sustainable solution from the seminar topics. The

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negative impacts of such conditions may be represented by having limited (a few hours per day) to no access to electric power for lighting, food refrigeration and cooling/heating; or non-clean fuels (such as wood) and stoves for cooking and fireplaces for heating that may generate indoor air pollution, and resulting health issues. Three oral deliverables must be presented by the students in English, one per each part of the semester as follows:

1. A 5-minute project proposal presentation with a maximum of 5 PowerPoint slides including: (1) community of study, (2) identification of the energy access issue to tackle, (3) impacts of the energy issue on the community's health and well-being (4) evaluation of available energy resources, and (5) proposed technology solution.
2. A 5-minute technical report on the proposed solution where students analyze the technology initially proposed and potential alternatives, which must include the household's expected energy demand, solution design, (e.g., how to deal with technological disadvantages, how to adapt the sustainable solution to traditional on-grid infrastructure), physical implementation (mechanical, thermal and electrical installation requirements), and environmental impacts of the solution.
3. A 10-minute project pitch to a hypothetical "Funding Agency" in a poster format, which should include social and economical aspects of the proposed solution along with the components of the technical report and the project proposal. The teams must convince the "Funding Agency" to fund their proposed solution over the others. Keep in mind that the "Funding Agency" seeks to maximize the impact of the funds provided, so the greater realistic impact with the lower implementation costs will most likely be granted funds. [Instructions on how to create your poster](#) and a [template](#) are provided.

Schedule of Seminars

Date	Time	Speaker	Topic	Room
22-Jul	12:00-15:00; 15:00-18:00	Cesar Barraza	Course Introduction	Fab Lab-302
29-Jul	12:00-15:00; 15:00-18:00	Cesar Barraza	Energy Use, Sustainability & Climate Change	Fab Lab-302
5-Aug	14:00-16:00	Maria F. Gomez	Bioenergy	TBD
12-Aug	13:00-15:00	Angelica Anzola	Corporate Sustainability	TBD
<u>26-Aug</u>	<u>12:00-15:00; 15:00-18:00</u>	<u>1st Midterm</u>	<u>Project Proposal</u>	<u>Fab Lab-302</u>
2-Sep	13:00-15:00	Carlos Dominguez	Solar Photovoltaics	TBD
9-Sep	14:00-16:00	Martha Cobo	Hydrogen: The fuel of the future	TBD
16-Sep	12:00-14:00	Carlos Jimenez	Solar Thermal	TBD
23-Sep	13:00-15:00	Alvaro Molina	Renewables & Efficiency in HVAC Systems	TBD
<u>30-Sep</u>	<u>12:00-15:00; 15:00-18:00</u>	<u>2nd Midterm</u>	<u>Project Technical Progress</u>	<u>Fab Lab-302</u>
7-Oct	12:00-14:00	Alejandro Acosta	Microorganisms for Energy	TBD
21-Oct	13:00-15:00	Giulia Forestieri	Efficiency & Sustainability in Buildings	TBD
28-Oct	12:00-14:00	Manuel Figueredo	Carbon Capture Technologies	TBD
<u>18-Nov</u>	<u>12:00-15:00; 15:00-18:00</u>	<u>Final</u>	<u>Project Pitch</u>	<u>Fab Lab-302</u>