Syllabus

SEC 501: Solar Engineering and Commercialization - I

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Course Intent
The Professional Science Masters program in Solar Energy Engineering and Commercialization (PSM-SEEC) is a program that has been established and developed to help meet the "Energy Engineering" mandate in the National Academy of Engineering Grand Challenges. This course, Solar Engineering and Commercialization – I, is designed to be the introductory building block in the PSM-SEEC program.

Course Participants and Prerequisites:
The course is designed for graduate students in the science, technology, engineering, and mathematics (STEM) fields with a strong interest in solar energy systems and their role in the technological society. Competence in upper division engineering, mathematics, materials, and problem solving skills is expected. Although some review of semiconductor materials, electronics, etc. will be given in class, the student must be able to fill in knowledge gaps as needed. It is a required class for students in the PSM-SEEC program.

Enrollment requirements:
Prerequisites: Graduate Engineering Students
Antirequisite: SEC 598 Solar Engineering and Commercialization I

Course Description:
This course examines the fundamentals of the solar energy enterprise regarded from a systems engineering perspective. The course examines solar energy technology, economic issues, and policy matters, and reviews the impact of these three areas on the design process and system operation of photovoltaic systems at the residential and commercial scales. The course educational objectives for the participants include:
- Learning the basic principles in photovoltaic system design
- Thinking critically and seriously about the nature of solar energy and its use
- Formulating views and insights regarding energy resources, conservation, photovoltaic economics, government subsidies, etc.
- Expressing and defending these views orally and in writing
The course includes lectures, case studies, interactive classroom projects and guest speakers.

Course Learning Outcomes
- Students will be able to apply the engineering design process to the development of photovoltaic systems at the residential and commercial scales
- Students will understand how to characterize the solar market for residential systems and its methods of finance and applicable permitting and regulations.
- Students will understand role of policy (local, state, and federal) in solar development and commercialization
• Students will learn about the impact of their designs in a global and societal context
• Students will demonstrate their knowledge of design and effective communication by carrying out and presenting two class projects related to contemporary solar energy issues

Course Texts and Resources:
• Various web resources (National Renewable Energy Laboratory, Energy Information Administration, etc.)
• Various trade journals (SolarPro, PV Magazine, etc.)
• Daily PV news sources (Greentech Media, Utility Dive, Advanced Energy Economy, etc.)

Course Deliverables:
A normal array of brief quizzes (most every class), homework sets (bi-weekly), two research projects that include written reports, oral presentations, and poster sessions. All of the work (apart from the quizzes) will be carried out in team format, as cooperative learning is expected and encouraged.

Grading Components:
• Quizzes (Daily) – 15%
• Assignments (Biweekly) – 25%
• Midterm Project (Week 09) – 25%
• Final Project (Final Exam Period) – 35%

Grading Scale
A+ = 97.0-100
A = 93.0-96.9
A- = 90.0-92.9
B+ = 87.0-89.9
B = 83.0-86.9
B- = 80.0-82.9
C = 70.0-79.9

Course Format:
The class schedule, assignments, solutions, class presentations, etc., will be posted only on a class webpage.
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<th>Topic</th>
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<td>PV Systems – Solar Cells and Solar Modules</td>
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<td>PV Systems – Batteries, Electronic Control Devices, Balance of Systems</td>
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<td>5</td>
<td>Class trip to Solar Power International conference</td>
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<td>6</td>
<td>PV Systems – Electronic Control Devices, Balance of Systems</td>
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<td>PV System Design Overview; Standards and Codes</td>
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<td>• Grid-Connected</td>
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<td>• Grid-Connected with Battery Storage</td>
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<td>• Economic Considerations</td>
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<td>12, 13</td>
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<td>• Utility and Public Utility Corporation Interactions</td>
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<td>• State and National Overview</td>
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<td>• Value of Solar and General Rate Case Examples</td>
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<td>14</td>
<td>Community Solar Overview</td>
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<td>15, 16</td>
<td>Commercial and Industrial Scale PV Systems</td>
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Classroom behavior policies:

- Cell phones must be silenced during class and students should refrain from answering or making phone calls and sending text messages during lectures. If they must do so, they will need to leave the classroom without disrupting the lecture and come back after they are done.
- Laptops should not be open during lectures.
- No recording devices of any kind can be used.
- Behavior that disrupts the lectures is not acceptable and students who engage in such behavior will be asked to leave.

Absence policies:

- Attendance to the lectures is required. If you miss any class, it will be your responsibility to obtain notes for the missed lecture.
- Make up exams will be given for absences that are due to religious observances/practices that are approved by university policy or due to other events or activities sanctioned by the university. In those cases, the student must notify the instructor in advance (preferably 1 week ahead for the midterm) so that arrangements can be made.
- If an absence is not due to a university sanctioned reason, missed exams will not be made up unless it is due to health issues (a doctor note will be required), or a personal emergency that is appropriately justified. Arrangements need to be made within 1 week following the absence, including a meeting with the instructor to provide justification for it. If there is no attempt on the part of the student to make these arrangements in this time frame, the missed exam will receive zero points.

Academic integrity and plagiarism policies:

- Academic integrity will be expected and enforced to the full extent of the current university policy.
- When clear indications of academic integrity violations are found, a warning will be issued for the first offense and will incur a penalty of ZERO points on that assignment. The second offense will be reported to the Dean’s office for university level disciplinary action and will result in an automatic failing grade for the course.
- This policy includes homework, exams and project reports.

Policy against threatening behavior:
All incidents and allegations of violent or threatening conduct by an ASU student will be reported to the ASU Police Department and the Office of the Dean of Students.

Disability resources:

- Students who require accommodation for a disability must be registered with the Disability Resource Center (DRC) and submit appropriate documentation from the DRC and appropriate arrangement will be made.
- Students who plan to make these arrangements should inform the instructor at the first convenient opportunity at the beginning of the semester to facilitate the process.