1. **Course Intent:** The Professional Science Masters program in Solar Energy Engineering and Commercialization (PSM-SEEC) is a program that has been developed to help meet the "Energy Engineering" mandate in the National Academy of Engineering Grand Challenges. This course, *Solar Engineering and Commercialization – II*, is a companion course to SEC501, and designed to be a finishing building block in the PSM-SEEC program.

2. **Designation:** The course is designed for graduate students in STEM, business, architecture, and public policy with a strong interest in solar energy systems and their role in the technological society. The companion course SEC 501 (Solar Engineering and Commercialization, I) is a pre-requisite for this course for students in the PSM-SEEC program.

3. **Course Description:**
   This course examines the fundamentals of the solar energy enterprise at the utility scale - the components, the design process, the economic issues, and the policy matters in large scale photovoltaic systems – in both the design of these systems (both central plant and aggregated forms) and their interface with the existing (and future) electrical grid. The course educational objectives for the participants include:
   - Learning the principles in utility-scale photovoltaic system design
   - Thinking critically and seriously about the interaction of photovoltaic systems with the national grid
   - Formulating views and insights regarding energy resources, conservation, economics, government incentives, and so on, at the utility scale
   - Expressing and defending these views orally and in writing

   The course includes lectures, case studies, interactive classroom projects and guest speakers.

4. **Prerequisites:**
   - Graduate Student Status; SEC501 for PSM-SEEC students
   - An all-abiding interest in solar energy

5. **Overall Course Objectives and Course Outcomes:**
   a. The overall objective of the course is to introduce students to solar commercialization.

   b. Specific Course Outcomes include:
      - Students will review the operation of the current electricity business
• Students will be able to apply the engineering design process to the development of photovoltaic systems at utility scales
• Students will examine the design and development of large-scale Community Choice Aggregation systems
• Students will understand how to characterize the solar market for utility scale systems and its methods of finance and applicable permitting and regulations.
• Students will understand role of policy (local, state, and federal) in utility scale 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 one or more class projects related to contemporary utility scale solar energy issues

6. **Instructor:**
   - Ron Roedel, Professor Emeritus
     - Room GWC 328
     - Telephone: 480-965-5268, Email: r.roedel@asu.edu

7. **Grading:**
   - Grading will be determined by a weighted average of homework, quiz, exam, and project scores. The typical weights are approximately:
     - Quizzes (10%)
     - HW (25%)
     - Project 1 or Midterm Exam (30%)
     - Final Project (35%)
   - The final values for the grading weights will be reached by consensus with the class members
   - The grades are:
     - A: 90.0-100.0
     - B+: 87.0-89.9
     - B: 80.0-86.9
     - C+: 77.0-79.9
     - C: 70.0-76.9
     - Etc.

8. **Assignments:**
   - All written work will be neat, organized, and easy to read. Homework problems must show all work and the answers must be clearly marked. Showing how you arrived at the answer is as important as the answer. There is no answer at the back of the book, so the reviewer must determine if your logic and calculations have yielded the right answer.
   - Written papers will be typed, neat and of professional quality.
• Homework will be assigned approximately weekly

9. **Quizzes**
   • Quizzes will also be given approximately weekly. The quizzes will be in-class. Students are required to bring paper, pencil and calculator to all class sessions. Some or all of the quizzes will be based on reading assignments, prior homework sets, and lectures.

10. **Midterm**
    • There might be one midterm examination. The exam may include concept questions as well as problems with solutions in short answer, multiple choice, etc.
    • Alternatively, we may consider a midterm research project. A class discussion will be held to determine whether we have an exam or a project/paper

11. **Final Celebration**
    • In place of a final exam, student teams will present the results of an extensive research project. The presentation will include two components, an oral presentation of the highlights of the research (through a ppt slide show) and a poster presentation, to mimic a technical conference. More details will be forthcoming during the class.

12. **Topics**
    The course will address the following topics among others:
    • Course Overview
    • Writing and Presentation Skills and Resources
    • The Business of Electricity
    • Overview of Technologies—PV
    • Economic Issues relevant to large-scale PV
    • The Solar Market
    • Solar Policies relevant to large-scale PV
    • Case Studies: Commercial, Non-Profits, Third-Party
    • Case Studies: Large Utility Power Plants
    • Reliability and Maintainability
    • Team Project

13. **Absence Policy:**
    
    **Instructor’s general policy:** Students must contact the instructor for an approved absence. Absences are allowed for illness, major injury, or the following:
    
    • Excused absences related to religious observances/practices that are in accord with [ACD 304–04](#), “Accommodation for Religious Practices” [given in-part below]
a. The university community should in all its activities be sensitive to the religious practices of the various religious faiths represented in its student body and employees. Faculty are asked to recognize the obligations of their students who may be participating in the observance of religious holidays. (See the Council of Religious Advisors for more information about various religious holidays.) Students should notify faculty at the beginning of the semester about the need to be absent from class due to religious observances.

b. Board of Regents policy prohibits discrimination against any student, employee, or other individual because of such individual’s religious belief or practice, or any absence thereof.

c. Administrators and faculty members are expected to reasonably accommodate individual religious practices (e.g., by an adjustment to the academic or workplace environment, such as rescheduling, flexibility in scheduling, voluntary substitutions, job reassignments, modification of grooming requirements). A refusal to accommodate is justified only when undue hardship to the university’s legitimate business purposes would result from each available alternative of reasonable accommodation (e.g., requires more than ordinary administrative costs, diminishes the efficiency in other jobs, infringes on other employees’ job rights or benefits, or impairs campus/workplace safety). Contact the Office of the Executive Vice President and Provost or the Office of Equity and Inclusion for assistance in determining undue hardship or reasonable accommodation.

Excused absences related to university sanctioned events/activities that are in accord with ACD 304–02, “Missed Classes Due to University-Sanctioned Activities”

a. Students who participate in university-sanctioned activities that require classes to be missed, should be given opportunities to make up examinations and other graded in-class work. However, absence from class or examinations due to university-sanctioned activities does not relieve students from responsibility for any part of the course work required during the period of the absence.

b. The executive vice president and provost of the university or designee shall determine, for the purposes of this policy, whether a particular event qualifies as a university-sanctioned activity.

c. In each college, a specific individual (e.g., dean’s designee) should be responsible for facilitating adherence to this policy. In particular, students who participate in university-sanctioned activities should be given the opportunity to make up examinations or other graded in-class work due to classes missed because of that activity, unless it can be shown that such an accommodation would constitute an unreasonable burden on the instructor. Should disagreement arise over what constitutes such a burden, the instructor and the student should initially contact the academic unit chair or the dean’s designee.

d. The specific activity program coordinator (e.g., assistant athletics director for academic services, director of forensics, director of bands) should, as early as possible, provide the college-designated individual with the class schedule of any student who may be required to miss class because of a university-sanctioned activity.

e. Students should inform their instructors early in the semester of required class absences. Instructors should attempt to provide opportunities for equivalent work, either before or after the class absence, in accordance with any academic unit or college requirements, which may apply.

f. Incomplete grades (I) should not be used unless deemed necessary by the respective faculty.

13. Classroom Behavior:

Students are expected to conduct themselves as professionals during class. The general use of cell phones and pagers is not allowed. However, if the student is
expecting an important message such as from a doctor, then the cell phone or pager may be put on buzzer to alert the student of the call. If the student needs to respond to the call, then they should take the call outside of the classroom. **Texting is not allowed during class. Students not following the policy may receive a reduction in their grade.**

14. **Honor Policy:**

- Ethical conduct is a major part of being an engineering professional. Students will follow the university policies given below. For the purpose of this course, students are encouraged to work with others on the homework problems. For other assignments, the instructor will tell the students whether they must work independently or they can work in groups. Exams and quizzes will be based solely on the work of the individual student—no sharing of information or answers is allowed.

- The Student Academic Integrity Policy of Arizona State University requires each student to act with honesty and integrity and to respect the rights of others in carrying out all academic assignments (see: [http://www.asu.edu/studentaffairs/studentlife/judicial/](http://www.asu.edu/studentaffairs/studentlife/judicial/)).

- Violations of academic integrity include, but are not limited to, cheating, fabrication, tampering, plagiarism and/or facilitating such activities. A discussion of professional ethics that is especially relevant to FSE students can be found at [http://www.fulton.asu.edu/fulton/departments/acad_affairs/integrity.php](http://www.fulton.asu.edu/fulton/departments/acad_affairs/integrity.php).

- For specifics on the ASU policy requiring academic integrity and against plagiarism, see [Student Academic Integrity Policy](http://www.asu.edu/studentaffairs/studentlife/judicial/).

- Policy against threatening behavior, per the Student Services Manual, SSM 104–02, “Handling Disruptive, Threatening, or Violent Individuals on Campus”

- It is not anticipated that any course content will be offensive to any student, however, if this is the case, the student should notify the instructor who will take the appropriate action.

- A reminder to students when requesting accommodation for a disability that they must be registered with the Disability Resource Center (DRC) and submit appropriate documentation from the DRC.
The course content, including lectures, is copyrighted material and students may not sell notes taken during the conduct of the course (see ACD 304–06, “Commercial Note Taking Services” for more information).

15. Final point:

• The information in the syllabus, other than grade and absence policies, may be subject to change with reasonable advance notice.