

EE 4163 - Energy Conversion and Storage Lab 1.0 credit
[Prerequisite: 4161 or concurrent registration]

Instructor

P.I. Cohen and P.J. Imbertson

Meeting times and place

KHK 3-xxx

Text

An electronic version of the laboratory manual is available to students.

Course description

This laboratory course compliments the lecture course EE 4161. The parent course for this laboratory experience (EE 4161 Energy Conversion and Storage) examines the fundamental physics and chemistry of selected energy conversion and energy storage devices and their use and interconnect strategies in electric power applications. This laboratory course provides hands-on experiences with the topics of 4161.

Course goals and objectives

The students should develop a practical understanding of the design and application of several energy conversion and energy storage systems.

This course addresses Student Learning Objectives. Students in this course:

Can identify, define, and solve problems

The laboratory manual will ask for specific measurements to be made or specific features to be designed. The students will be graded on their success.

Can locate and critically evaluate information

Design questions will require students to find typical costs or material characteristics. The students will be graded on specific metrics.

Have mastered a body of knowledge and a mode of inquiry

The students will be required to write lab reports that include a discussion of the theory of operation of the device or system being tested, the main issues, and the results of their measurement or design process. The students will be graded on a predefined rubric consisting of clarity, correctness, appropriateness, and completeness.

Can communicate effectively

The clarity and logical organization of the laboratory reports will be graded on the communication skills demonstrated in their reports.

Class assignments and deliverables

Formal, group laboratory reports will be submitted for each laboratory completed.

Policy on late or missing assignments and deliverables

A third of a point will be deducted for each week that a report is late. A missing lab will reduce the grade by one point (4 point scale).

Labs: The students will complete 5 labs from the following:

1. Accelerated Battery Life Tester
2. Model an InGaN/GaN solar cell using software supplied by the instructor
3. Solar PV Grid-Tie Lab power flow – connecting a solar module to the grid
4. Battery and super capacitor Characterization
5. Match solar cell and battery: are their options here on charging rate?
6. Compare a fuel cell to a battery
7. Economic analysis of a particular solar cell
8. Develop a solar Lantern
9. Evaluate the costs vs savings of a tracker for a monocrystalline Si photovoltaic cell
10. Deposit CdTe (in preparation)

Student Conduct Code:

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see:

http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

Use of Personal Electronic Devices in the Classroom:

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference: <http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.html>.

Scholastic Dishonesty:

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code:

http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Makeup Work for Legitimate Absences:

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see:

<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.

Appropriate Student Use of Class Notes and Course Materials:

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see:

<http://policy.umn.edu/Policies/Education/Education/CLASSNOTESSTUDENTS.html>.

Grading and Transcripts:

The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:

- A 4.000 - Represents achievement that is outstanding relative to the level necessary to meet course requirements
- A 3.667
-
- B 3.333
- +
- B 3.000 - Represents achievement that is significantly above the level necessary to meet course requirements
- B 2.667
-
- C 2.333
- +
- C 2.000 - Represents achievement that meets the course requirements in every respect
- C 1.667
-
- D 1.333
- +
- D 1.000 - Represents achievement that is worthy of credit even though it fails to meet fully the course requirements
- S Represents achievement that is satisfactory, which is equivalent to a C- or better.

For additional information, please refer to:

<http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html>.

Sexual Harassment

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:

<http://www1.umn.edu/regents/policies/humanresources/SexHarassment.html>

Equity, Diversity, Equal Opportunity, and Affirmative Action:

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy:

http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html.

Disability Accommodations:

The University is committed to providing quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Services and provide documentation of your disability. The course instructor must provide information regarding a course's content, methods, and essential components. The combination of this information will be used by Disability Services to determine appropriate accommodations for a particular student in a particular course. For more information, please reference Disability Services: <http://ds.umn.edu/Students/index.html>.

Mental Health Services:

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: <http://www.mentalhealth.umn.edu>.