ENE 2XX: Renewable Energy Systems and Control

Center 1: Environmental Science and New Energy Technology
Syllabus

Lectures: July 3-7 & July 10-12, 14:00–15:35, Zhiyuan Bldg C3-2011

Website: (`https://ecal.berkeley.edu/files/ene2xx/`) Used to distribute course materials

Instructors

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Catalog Description

This course provides students with the fundamental tools for design and control of renewable energy systems. We specifically focus on convex optimization theory as our main toolset. Applications of interest include batteries, electric vehicles, renewable energy, power systems, and smart buildings/homes.

Prerequisites: Graduate student standing, multivariable calculus, linear algebra, programming, physics-mechanics, physics-electromagnetism, thermodynamics.

Objectives

1. To encourage the development of a "systems and control perspective" necessary for the design and management of energy systems.
2. To provide students with an introduction to energy systems across multiple infrastructures, including transportation, buildings, and power systems.
3. To strengthen students' programming and mathematical analysis skills.

Student Learning Outcomes

1. Students who complete the course will have a basic introduction to classical systems-and-control concepts: mathematical modeling, optimization, and optimal control.
2. Students who complete the course will have studied various "toy" renewable energy systems and controls problems, including power systems economic dispatch and solar+storage energy management.

Contents

The lecture-by-lecture course contents are provided in "Schedule.pdf". In addition to lectures, there is one homework assignment and one project whose topics are sequenced.

Assignment	**System & Control Tool**	**Energy Application**
HW	Linear Programming & Robust Programming	Power System
Project	Second Order Cone Programming	Microgrids

Recommended Textbook Material:

No textbooks are required. Course notes have been developed specifically for ENE 2XX, and will be distributed directly to students. Nevertheless, the following textbooks are officially recommended for additional background:

- G. M. Masters, Renewable and Efficient Electric Power Systems, John Wiley & Sons, 2013
- S. Boyd and L. Vandenberghe, Convex optimization. Cambridge University Press, 2009.

Assessment & Grading:

Homework	20pts	One assignment due Friday July 7
Project	30pts	Assignment due Friday July 14

A total of 50pts are possible.

Numerical Computing

Numerical computing software is required for the assignments. Students have the option to use MATLAB or Python. It is expected that students have access to this software via computers on-campus, or their personal computers.

Policies

Late Submissions: Two points are subtracted for each 24 hours submitted late (rounded up to nearest integer).

Regrade Policy: If you feel a problem was graded incorrectly, you may submit a regrade request to the head instructor. This request MUST be submitted within one week of receiving the graded assignment, with a short paragraph justifying the regrade. Any regrade request is subject to a full regrade, i.e. points may be lost. Our grading philosophy is to achieve *consistency* and *transparency*.

Planned Absences: You may request to submit assignments early or late. E-mail me your request three days prior to the assignment due date. Requests due to extended holidays will not be granted. Requests due to emergencies or personal reasons will be handled case-by-case.

Late Enrollment: Students require instructor permission to enroll after the first day of classes. Missed assignment deadlines will result in zero credit, unless otherwise arranged with the instructor.

E-mail Correspondence

Use [ENE 2XX] in your message subject. We typically respond within one day, however our ability to help declines as e-mail volume increases. Please be considerate and concise. Do not wait until the due-date to ask questions, otherwise they may not be answered.

Code of Conduct

Students must abide the Code of Conduct. For further reference, see the Berkeley Campus Code of Student Conduct at `http://sa.berkeley.edu/code-of-conduct`.