

ECE 697GC: Green Computing

Syllabus for Spring 2017

General Info

Instructor: David Irwin
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Office: Knowles Engineering Building 211D
Office Hours: Mondays 2pm - 4pm
Class Meetings: WF 4:00pm - 5:15pm in Marston 220
Webpage: <http://www.ecs.umass.edu/ece697gc>
Textbook: None

Course Description

This course will introduce students to the new area of Green Computing. The course will cover emerging problems associated with the rapid growth in energy consumption of modern computing infrastructures, including data centers, and discuss recent research focused on mitigating these problems. The course will also cover ways to leverage computation, networking, and sensing to improve the energy-efficiency of society, e.g., by automatically regulating energy consumption in buildings, homes, etc. The topics covered will enable students to develop the diverse range of skills required to perform research in Green Computing, including background in sensor/actuator networks (to monitor and control loads), operating systems (for scheduling loads), economics (to understand electricity markets), privacy (to prevent leaking information on occupant behavior), and electrical engineering (to understand characteristics of the smart grid).

Organization

This course is a graduate-level seminar that will consist primarily of reading, presenting, and critiquing the research papers in the field of green computing. There is no textbook or prerequisites, although students should have some background and/or interest in operating systems and distributed systems topics. A pdf version of the syllabus for the course is available [here](#).

Each class will generally consist of two conference-style student presentations of a pre-assigned research paper, consisting of roughly a 25 minute presentation with 12 minutes left for questions and discussion. Each student will be expected to make 1-2 presentations (including slides) during the semester, and actively participate in questions and discussions of papers. In addition to presentations, students will be required to write a detailed review and critique of 2-3 papers (including those they present), similar in to a conference- or journal-style review for a paper. Students will also be required to define and complete a semester-long project. Students will choose the topic in consultation with the instructor to ensure it is a suitable topic for the course. Each project may consist of a team of 3-4 students. The final deliverable for the project will be a research-style paper (in ACM format), 10-12 pages in length, that describes and evaluates the project's problem and proposed solution.

The course will alternate each focusing on topics focuses on improving the energy-efficiency of computing versus improving the energy-efficiency of society. A tentative list of per-week topics on computing includes: Renewable Integration, Leveraging Energy Storage, Building Balanced Systems, Energy-efficient Networking, Green Storage, and Power Proportionality. A tentative list of per-week topics on improving society's energy-efficiency includes: Smart Buildings, Grid Peak Reduction, Non-intrusive Load Monitoring, Security and Privacy, Renewables and Storage, and Demand Response.

Grading Details

Grades will be computed as follows:

- 5% Class Participation
- 10% Project Proposal
- 15% Paper Reviews
- 30% Paper Presentations
- 40% Final Project

Class Participation

Lectures are mandatory and you are expected to attend regularly. One goal of this course is to promote discussion of current research in Green Computing among all class members. As such, you are encouraged and expected to ask questions, point out weaknesses, and make observations during class.