ECE441
SENIOR DESIGN PROJECT

Term: Fall 2010 / Winter 2011 / Spring 2011
Text: Design for Electrical and Computer Engineers
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COURSE OVERVIEW

ECE441/2/3 is the Electrical Engineering capstone design sequence. The course is intended to follow the engineering design model shown. The cycle is divided out over the various terms with the intention of a finished fully tested project being ready for the engineering expo. Research projects are also possible using the same model.

During ECE441, we will be describing the system level architecture. Once the top-level design is completed, we will continue to design the sub-blocks based on our specifications. While it will not be required, some basic implementation of the individual blocks is suggested as it will help create the design.

In ECE442, We will finish the implementation of the sub-blocks and after each one has been implemented and validated it will be integrated into the system level. Complete validation will not be needed until ECE443, but some of the system requirements will need to be validated during ECE442.

Finally in ECE443, we will finish out the project passing all system validation tests and presenting projects at the Engineering Expo.

It is important to remember that success in this course is your responsibility. Do not depend on the faculty advisor, sponsor, or mentor to keep your project on schedule. Advisors and mentors will support and guide you in completing your project successfully, but you must take the initiative and seek out their help. A successful project is worth your effort and provides a tangible example of your capabilities to potential employers.

COURSE LEARNING OUTCOMES

At the completion of the courses, students will be able to perform the following tasks:

1. Write a concise project description stemming from an identified objective. (ABET outcomes e, f, g)
2. Collect and review technical information on a project from relevant external resources. (ABET outcomes e, j)
3. Project the impact constraints for projects (Resources, Time, Finances) (ABET outcomes d, f)
4. Identify project milestones (ABET outcomes d, g)
5. Acquire tooling and hardware (components) for a breadboard / prototype. (ABET outcome k)
6. Present project information succinctly to a technically aware audience.  
   (ABET outcomes a, f, g)

   **Academic Dishonesty**

At Oregon State University academic dishonesty is defined by the Oregon Administrative Rules 576-015-0020.1.a-c as:

*An intentional act of deception in which a student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work.*

Academic dishonesty includes:

- **CHEATING** - use or attempted use of unauthorized materials, information or study aids or an act of deceit by which a student attempts to misrepresent mastery of academic effort or information. This includes unauthorized copying or collaboration on a test or assignment or using prohibited materials and texts.

- **FABRICATION** - falsification or invention of any information (including falsifying research, inventing or exaggerating data and listing incorrect or fictitious references).

- **ASSISTING** - helping another commit an act of academic dishonesty. This includes paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, or taking a test/doing an assignment for someone else (or allowing someone to do these things for you). It is a violation of Oregon state law to create and offer to sell part or all of an education assignment to another person (ORS 165.114).

- **TAMPERING** - altering or interfering with evaluation instruments and documents.

- **PLAGIARISM** - representing the word or ideas of another person as one's own OR presenting someone else's words, ideas, artistry or data as one's own. This includes copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project, then submitting it as one's own.

**IEEE Code of Ethics**

As a community of Electrical and Computer Engineers, we have a duty to present ourselves and our profession to each other and the public in the best light possible. The IEEE has a code of Ethics that should always be considered. It reads:

“We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology, its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics. “
MAJOR ASSIGNMENTS AND PERCENT OF COURSE GRADE

LATE WORK POLICY
All late work will receive no credit. Only pre-discussed exceptions will be accepted.

BEAVERSOURCE SETUP AND PROJECT DESCRIPTION (30 POINTS) – GROUP GRADING
Your group will need to establish a webpage that will act as a permanent repository of your project design. This webpage will be the primary method of showing your project to people both inside and outside of the university. You must use the BeaverSource system for your webpage. Once your group has been assigned, we will add your ONID accounts to the appropriate BeaverSource projects. Your webpage is due 5PM on Monday of Week 3.

Scoring: 30pts. - Satisfactory, 0pts. - Unsatisfactory
If your web page is considered unsatisfactory, you will be given until 5pm on Friday of Week 3 to revise it for full credit.

PROJECT SPECIFICATION (TECHNOLOGY REVIEW) (100 POINTS) – GROUP GRADING
Submitted via BeaverSource
In this review you will explain what your project is (in your own words, do not simply copy the description from class), what design issues are involved, and what’s been done to date in this area. The primary purpose is to review the ‘state of the art’ and find other projects that you can borrow ideas from. To write this report, you will need to conduct library research, patent searches, interview your sponsor, etc. Cite your sources according to IEEE format (see http://standards.ieee.org/guides/style/section7.html for details). The report will be carefully reviewed for technical content and quality of writing by your group’s faculty advisor and project sponsor.

The specification is due 5PM on Monday of Week 4.

PROJECT SPECIFICATION (PRELIMINARY DESIGN) (150 POINTS) – GROUP GRADING
Submitted via BeaverSource
For this submission, you will revise your previous work and will brainstorm together to develop a list of possible design solutions along with a brief technical description of the feasibility of each with supporting calculations and analysis as appropriate. From this list of possible solutions, the group will identify a general approach they feel is most appropriate. This is not necessarily a specific design, but rather a general group of similar designs. You must include a system-level block diagram and explain all inputs or outputs clearly.

The specification is due Monday at 5PM the 6th week of the term.

PROJECT SPECIFICATION (FINAL DESIGN) (250 POINTS) – INDIVIDUAL GRADING
Submitted via BeaverSource
This final project specification submission should completely define the project. Parts and supplies will be ordered from this submission so special attention should be paid to your budgetary analysis. The final design must be fully specified so that construction of a prototype and parts ordering can begin during the winter break.

The specification is due at 5PM on Monday of Finals Week.

DESIGN PRESENTATIONS (100 POINTS) – INDIVIDUAL GRADING
The presentations will be a 10 minute recorded presentation. You are responsible for recording your presentation. We are not expecting master video work, but the audio and video should be of a decent quality. This means that voices should be clear compared to other noises and that the video should be of a high enough quality to see all details. The Library can check out a video camera to your group. This is a good way to ensure nice video and sound.

The presentations are due 5PM on Monday of Week 8.

PROJECT QUIZ (100 POINTS) – INDIVIDUAL GRADING
The project quiz is a custom quiz for each group. Some questions are general and will draw from course material for ANY course required before senior design in the ECE degree. Additionally, some questions will be created based on what was presented in the Presentation videos and questions that have ‘come up’ in the weekly meetings.

The project quiz will be in class, Monday of Week 9.

WEEKLY MEETINGS (120 POINTS) – INDIVIDUAL GRADING
Submitted during special time
Starting week 3 of the term, each group will meet with the teaching assistants during a special time each week. The meeting will be 20 minutes in length. Prior to arriving for a meeting, groups should have created 3 tickets per person on BeaverSource to be completed prior to the next week. These tickets have a specific format, so check out the weekly meeting guide. During some weeks, we will not physically meet. Instead make sure your old tickets are closed (with evidence) and that 3 new tickets have been entered by the usual meeting time. These points are individually assigned.

**DESIGN REVIEWS (100 POINTS) – INDIVIDUAL GRADING**
During week 10 of the term, each individual will be expected to meet with the course instructor for 20 minutes to review their technical design(s) to that point. Scoring will be based on the level of preparedness of the student and the soundness of the design.

**PEER REVIEWS TO ACCOMPANY FINAL DESIGN PROPOSAL (50 Points) – INDIVIDUAL GRADING**
Printed copies to Instructor (KEC1148)
All group members will individually prepare a “peer review,” which will be handed in at the same time as the Final Design Proposal. In these reviews, students will reflect on their peers’ work. This is due on 5PM on Monday of Finals week.

**EXTRA CREDIT (?? Points) – INDIVIDUAL GRADING**
Throughout the term, you will be given opportunities to earn extra credit by attending extra lectures and seminars. Based on the content and length of the seminar, a varying amount of extra credit will be given.
Watch the Google calendar for these opportunities. Be sure to fill out the sign-up sheet at these events.

**COURSE SCHEDULE**
The course schedule and details of each lecture is available on the ‘Google™ calendar.’ While no changes are expected, please review it periodically to double check.

**IMPORTANT INFORMATION**

**BUDGET**
Each group will have access to a budget of $300 starting in November. Projects that have an industry sponsor will be awarded $500. If you need additional funding, you will need to locate that on your own or supply it from your own resources.
There are multiple opportunities for free/or sample parts, but beware: YOU GET WHAT YOU PAY FOR. If you need parts from the vendors below, follow the steps to get parts:

**Analog Devices**
- Go to the link below and fill out the form.
- [https://form.analog.com/Form_Pages/corporate/parts.aspx](https://form.analog.com/Form_Pages/corporate/parts.aspx)

**National Semiconductor**
- Go to the link below.
- Find your part.
- If there is a sample button, send the part number to Donald Heer.
- If there is not a sample button, the part cannot be sampled.

**Texas Instruments**
- Enter the TI Analog University Design Contest at the link below. Follow the steps to sample parts.

**BEAVERSOURCE**
BeaverSource is a university sponsored tool for project management. At a minimum you will use BeaverSource to organize and display your design specification. You are encouraged however to fully utilize the abilities of the tool since it is likely to make your life easier. Some important things you could look into are the SVN abilities for software, and more advanced use of the ticketing/bug tracking systems.