ECE441
SENIOR DESIGN PROJECT

Term: Fall 2009
Section: 001
Time: W 4:00 – 5:50 pm
Location: WGND 115
Grading: as listed below
Text:
Design for Electrical and Computer Engineers
- Ralph M. Ford & Chris S. Coulston

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office hours: W11am-1pm

COURSE OVERVIEW

ECE441/2/3 is the Electrical Engineering capstone design sequence. This three-course sequence provides practical experience in new product development and project management through the design, manufacturing, and testing of a new product or process. Course topics include Project Planning and Scheduling, Marketing and Quality Functional Deployment, and Product Development. Specifically the sequence consists of creating a paper describing the complete design by the end of ECE441, construction of a prototype (including design iteration) during ECE442, and presentation of the completed refined and tested project in ECE443. The sequence must be taken in consecutive terms. While attendance of organizational lectures and seminars is mandatory, the majority of the work in this sequence occurs outside of class. Students should expect to spend approximately 240 hours of total time on the project per student.

As well as being the department’s capstone sequence, ECE441/2/3 is also Electrical Engineering’s designated writing-intensive (WIC) sequence. As such, students enrolled in this sequence complete a variety of formal written and oral assignments that support the design process and further their engineering communications skills. In completing these assignments, ECE441/2/3 students are expected to review and respond to one another’s writing, revise individually and collaboratively produced drafts and use informal writing techniques to explore and solve engineering design problems.

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 it 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 (50 POINTS) – GROUP GRADING
Submitted via BeaverSource
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: 50pts. - 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.

ROLES AND RESPONSIBILITIES CONTRACT – GROUP GRADING
Printed copies to Instructor (KEC1117)
Each group must submit a ‘Roles and Responsibilities’ contract signed by all group members and the project mentor/sponsor. This document is due to the instructor by Friday @ 5pm of Week 4. It must be submitted to pass the course.

WEEKLY QUIZZES (100 POINTS) – INDIVIDUAL GRADING
Submitted in class
Each week in lecture, we will have a quiz over the materials covered in the previous week’s lecture and the assigned readings. These are short answer quizzes. Each quiz will be 15 minutes in length and start promptly at 4pm. Quizzes are graded as a whole and are awarded points based on the following scale:

100% - Demonstration of complete understanding
50% - Demonstration of partial understanding
0%  - Demonstration of little to no understanding

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) (100 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) (200 POINTS) – GROUP/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.**

**ETHICS CASE STUDY (50 POINTS) – GROUP GRADING**
Submitted in class
For the ethics case study, we will first talk about ethics in engineering and then each group will discuss several possible case studies. In your groups, you will need to review the material and decide what choices were made and if they were the ‘right ones.’ Groups will be randomly asked to present briefly to the class what they found from their case study.

**FINAL DESIGN PRESENTATIONS (100 POINTS) – INDIVIDUAL GRADING**
Submitted during special time
During times outside of class the groups will be asked to present their final designs. You will be allowed 18 minutes for the presentation with up to 8 minutes for questions. A sign-up sheet will be posted during week 6. The presentation should be based on information already in your design specification. You are simply presenting the work. Each member of the group must present technical information and will be evaluated independently. All group members must be present for all presentations during their chosen section.

The presentations will be held during class weeks 9 and 10 of the term.

**PROJECT KNOWLEDGE QUIZ (100 POINTS) – INDIVIDUAL GRADING**
Submitted in class
During week 8 of the term, each group will be given a short quiz over their project. Questions on the quiz will be derived from the material on each team’s BeaverSource page and questions that contain information that should be known to complete the project. Each group will have a different quiz, but all members of the group will have the same questions. You will be able to retake this quiz (with slight variations to questions) as many times as you would like. Your grade will be the highest of the first two times you take the quiz. To pass ECE441 each student must receive at least 90 points on their project knowledge quiz before **Friday @ 5pm of week 10.**

**BI-WEEKLY TA MEETINGS (20, 40, AND 40 POINTS) – INDIVIDUAL GRADING**
Submitted during special time
During week 6, 8 and 10 of the term, each group will meet with the teaching assistants. The meeting will be 30 minutes in length. During this meeting a to-do list will be created and students will assign tasks from this list. Points are assigned during the following meeting. Points are based upon the number of tasks completed, if the tasks were entered into BeaverSource, if each student brings a list of tasks to the meeting, and if the completion of the tasks was in the spirit of the task. These points are individually assigned.

**PEER REVIEWS TO ACCOMPANY FINAL DESIGN PROPOSAL (100 Points) – INDIVIDUAL GRADING**
Printed copies to Instructor (KEC1117)
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 own work and 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.
Important Information

**BUDGET**

There is not a fixed budget for any project. Instead, we have a budget for the course that will be shared among all projects. This means that you may not receive the maximum budget you request. As a rule of thumb, we should be able to supply $200 for every group but it is not guaranteed. Make intelligent choices when defining your required components. There are multiple opportunities for free/or sample parts, but beware: YOU GET WHAT YOU PAY FOR. For your budgetary analysis section of your specification, you will want to include both your desired parts list, and your minimum parts list as well. 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 you 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.

**ADDITIONAL FUNDING**

**Renzema VC Funding Competition**

A local venture capitalist firm, is willing to increase the budget to an individual group. In order to have access to this additional funding, the group must write an executive summary. This executive summary is not to exceed one page in length and should be submitted to the course instructor by the end of week seven. The venture capitalist firm will review each of these and select a winner. This funding will be in addition to any funding awarded as part of the senior design course. It is recommended that the executive summary focuses on the business possibilities of the project.

**LEGALESE**

All information included on the syllabus is subject to change without notification. Any actions, covert or overt, that are not within the spirit of the course work could be construed to be detrimental to an individual, group, another group, the professor, the university, the state of Oregon, or an industry partner could result in consequences. The consequences could include; reduction of grade, disbanding of the group, or expulsion from the university.
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<thead>
<tr>
<th>Week</th>
<th>In Class Topic</th>
<th>Assignment due</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>4-5pm Review syllabus, present projects</td>
<td>Project Selection Forms (Sat. 5pm)</td>
<td>1, 9</td>
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<td>5-5:50pm Student Discussion about Projects</td>
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<td>2</td>
<td>4-5pm Technology Research Report Discussion</td>
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<td>5-5:50pm Communications (Jed Irvine)</td>
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<td>3</td>
<td>4-5pm Groups and Distributed Communications</td>
<td>Webpage Completed (Monday 5pm)</td>
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<td>5-5:50pm</td>
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<td>4</td>
<td>4-5pm Pending Technology Research (5pm Monday)</td>
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<td>5-5:50pm Group Meetings (All Week)</td>
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<td>5</td>
<td>4-5pm Summary of Reports</td>
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<td>5-5:50pm Group Meetings (All Week)</td>
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<td>6</td>
<td>4-5pm Building Things (Roger Traylor)</td>
<td>Preliminary Design (5pm Monday)</td>
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<td>5-5:50pm</td>
<td>Presentations (All Week)</td>
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<td>7</td>
<td>4-5pm Summary of Preliminary Specifications</td>
<td>Ethics Case Study (in class)</td>
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<td>5-5:50pm Ethics</td>
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<td>8</td>
<td>4-5pm Project Knowledge Quiz</td>
<td>Project Knowledge Quiz (in class)</td>
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<td>9</td>
<td>4-5pm Effective Presentations</td>
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<td>10</td>
<td>4-5pm Project Planning (???)</td>
<td>Presentations (All Week)</td>
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<td>5-5:50pm Preview of next term</td>
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<tr>
<td>Finals week</td>
<td>Final Design and Peer Reviews (5pm Monday)</td>
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- Please note that the schedule above is subject to change. Please refer to the most recent information supplied on the Senior Design Calendar linked to the course webpage.