ECE 480 Course Syllabus  
Spring 2018

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(In the subject line start with “ECE 480 …”)

Course Web Pages: http://www.egr.msu.edu/classes/ece480/capstone/
CHECK THIS FREQUENTLY!
Office Hours: MW 11:15-noon (after class time) – for both Dr. Albrecht and Dr. Udpa

ACCOMMODATION AVAILABLE: Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Accommodations for persons with disabilities, with documentation from RCPD, may be requested by contacting Dr. Udpa at the start of the term and/or two weeks prior to the accommodation date (test, project, etc). Requests received after this date will be honored whenever possible.

A. Purpose of the course and course learning objectives

One of the major purposes of the course is a major design experience. In particular, this is one key requirement for ABET accreditation of the EE and CPE programs. The ABET criteria calls for “Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.”

For this major engineering design experience, each student in this course should have actively participated as a member of an engineering design team and made significant contributions to achieving the team's stated goal and objectives. Each design project should involve the collaborative development and evaluation of a "product.”

Specific team activities will include:
Preparing an engineering design proposal that has clearly stated specifications and design criteria, including realistic constraints, based on the problem area presented to the group.
Sharing in the day-to-day design activities and management of the project.
Sharing in the presentation of oral and written reports.
Sharing in the demonstration of results at key milestones during the life of the project.
Evaluating the project's progress and outcomes against a clearly articulated set of criteria.

At the completion of this course, each student will be able to:
1) describe various forms of technical communication and the reasons for using them;
2) write well-organized technical reports;
3) write a team proposal for a major design project and obtain approval;
4) comprehend appropriate content and style of oral presentations;
5) access relevant standards and interpret their meaning and application;
6) delineate the principal design criteria and constraints for an electrical or computer engineering design project—e.g., cost, size, power, environmental factors, reliability, safety, maintainability, and reusability;
7) describe and understand the overall engineering design process—e.g., project justification, identification of constraints, establishment of design criteria, establishment of timetables, identification/scheduling of critical path, the partitioning of work, project monitoring, and project evaluation;
8) describe and understand contemporary industry practices and trends with respect to electrical and computer engineering;
9) describe, understand, and apply key tools used in the overall electrical and computer engineering design process;
10) understand the benefits and potential problems of teaming, describe qualities and processes of effective teams, and describe the role of teamwork in system design;
11) acquire and understand information contained in contemporary technical literature—e.g., trade journals, magazines, books, conference proceedings, and supplier literature—about hardware components, software, design tools, third-party suppliers, etc.; and
12) browse the web to acquire information about electrical and computer engineering, software, design tools, third-party suppliers, etc.

B. Overview of the course format
The course is structured around four key activities, including (1) the completion of a team-based major engineering design project, (2) individual development of design skills and additional lab skill, as necessary, (3) lectures and assignments on contemporary issues in engineering, and (4) lectures and activities on electrical and computer engineering design.

The course places only minor emphasis on lectures by the professor. Instead, there is a strong emphasis on guiding the experiential learning of students, and on students teaching one another. The first 4-6 weeks of the course focus on formation of design teams and formulation of projects and project plans, and the last 9-11 weeks focus on design project work. Lectures focus on technical issues, on teaming/professionalism issues and on learning about contemporary engineering issues.

Students will:
1. Attend lectures
2. Participate in class discussions
3. Give demonstrations and oral presentations about their team’s project
4. Write proposals, progress reports and a final report
5. Write individual papers – engineering design paper and professional self-assessment paper
6. Build and test devices and systems, and deliver a completed prototype to their sponsor
7. Search for information and apply it
8. Extend their problem-solving skills
9. Maintain an "Engineering Project Notebook" of their design project activities
10. Work in teams to share in the learning and to share in the work
11. Be responsible for "taskwork" and "teamwork"
12. Use knowledge and skills acquired in earlier course work for their major design experience.
Because of the nature of the class, calculators or computers are not required during the lectures and should not be open or in use. It MAY be appropriate to write notes in the student’s lab notebook during class; that should be used rather than a computer to record any necessary information.

**Cell phones, iPads should be turned off.**
**Students busy with iPads and cell phones will be marked ABSENT**

**C. Design Team Composition**

Design Teams:
1. Teams will be formed by the third lecture and exist for the duration of the semester.
2. Each design team will be responsible for the design and completion of a design project. There will typically be 4-6 members per design team. Projects involve an array of applications, technologies, and strategies. Short descriptions of the projects to be worked on this semester can found on the class web page.
3. A member of the ECE 480 faculty team will facilitate and evaluate the work of each design team.
4. Occasionally, some design teams (identified at the beginning of the semester) will also contain students from another department or university (multidisciplinary design teams).

Design Team “Non-Technical” Roles: (These roles are in addition to the technical responsibility you will have on your design team.)

Individuals on a design team will have one of the following roles:
1. Manager (manages project, including calling meetings, seeing that deadlines are met, revising project plan in response to changing circumstances, etc.).
2. Document preparation (coordinates the preparation of documents including proposals, reports, posters, etc.).
3. Presentation preparation (coordinates the preparation of presentations using PowerPoint, posts on web site).
4. Lab coordinator (manages the physical lab equipment, interfaces with ECE shop and part ordering personnel).

Prizes: ECE 480 design teams compete for various prizes awarded on Design Day. Judging is done by a panel from industry who attend the final presentations, ask questions of the teams, and view the posters and demonstrations.

**D. Travel policy for students**

Some teams may wish to travel out of the greater Lansing area to the site(s) of their sponsors for meetings/tours, etc. That will be permitted subject to the University’s travel policy. **In advance of each trip each student MUST file a travel authorization form** with the Dept. of Electrical and Computer Engineering. These forms are available at the ECE office in room 2120 EB. Some students may travel as passengers with other team members who drive, but all must file a travel authorization. If the trip is outside the greater Lansing area, the driver may turn in mileage after the trip and be reimbursed by university check. Note that is the only travel expense that will be paid by the department unless other arrangements are made.
E. Ordering parts for your design team projects

Typically each design team is given a budget of $500 for the semester. You will not be reimbursed for any parts ordered or purchased from any source except through the ECE Shop, unless you have in advance the WRITTEN permission of the ECE Shop staff to do so.

F. Course Grading Policy

1. Grades are based on both team performance and individual performance. Often, not all team members receive the same grade, based on differences in their contributions to the team and on differences in their performance on non-team-based activities in the course.

2. What affects your grade? You lose points:
   - By not attending class or by arriving late to class
   - By not attending team meetings
   - By not participating in class activities
   - By not participating in team activities
   - By not developing and documenting an identifiable and appropriate "intellectual property/technical contribution" on your team’s project
   - By not completing class deliverables with a high standard of quality
   - By not completing scheduled lab deliverables
   - By not having a positive impact on team outcomes or course outcomes, as demonstrated by your own reporting and by evaluations of your work by faculty facilitator and fellow team members
   - By failing to demonstrate that you have fulfilled the course learning objectives
     Please note that an identifiable "intellectual property/technical contribution" by each individual is required. The teams, as they plan their projects, will be asked to clearly divide the technical tasks and identify individual responsibilities for the technical portions of the team design project (not “project management,” etc., roles, but technical responsibilities). Each individual will be required to submit an engineering design paper documenting his/her intellectual property/technical contribution to the project. In addition, all such technical contributions should be documented in each student’s engineering notebook – that means that the notebook should contain the drawings/schematics/etc., not words like “designed xyz circuit today.” The engineering notebook is NOT a “meeting log,” but rather the place where the student performs and thereby documents the technical work he/she has performed, signing it after each day’s entries (in industry, it would also be periodically witnessed, to assure its usefulness in documenting time of first creation/discovery of intellectual property). The Professional Self-Assessment paper turned in by each individual must also describe the student’s technical contributions to the project. Also, the facilitator should be briefed by each person at the meeting each week, so that the facilitator can clearly identify the technical contributions made by each individual during the semester.

3. Class and team meeting attendance are required. Since this course has no exams, the participation of each student in lecture is important to the learn process. Unexcused absences will result in a reduction in your grade. Repeated tardiness will be treated as unexcused absences. An absence is excused if you notify the instructor prior to the class session (by leaving an email message), or if you notify the team leader in advance of the team meeting.

In both cases, a legitimate reason is required (for example, “In Cleveland for job interview with XYZ Company,” not “Out of town” or “Need to work that day.”) You are responsible for the information discussed in the class or at the meeting. The overall grade is reduced by
unexcused absences or tardy arrivals beyond 3. Attendance and participation amounts to 10% of the grade (see table below). Unexcused absences of 4-8 results in a loss of half of the attendance grade and more than 8 absences results in the full loss of the attendance portion of the final grade. Each team will develop its own policy for governing excused absences from any team meeting.

4. You will be evaluated through the following graded activities:
   • Design team outcomes, reports, presentations, web pages, brochure page, demonstrations (progress and final), and final report
   • Other assignments as assigned
   • Individual engineering design notebook and professional self-assessment report
   • Final evaluations of your contributions to the project by your fellow team members
   • Participation in meetings with facilitator (documenting and demonstrating your technical and other contributions)

5. Your reports, technical lecture, presentations, and demonstrations will be reviewed for individual technical accomplishments and contributions, as well as for teamwork. Your personal engineering design notebook and in-class assignments will be key documents, recording your ideas and efforts as well as supporting other reporting requirements (such as the professional self-assessment and team progress reports). Although you will assess team members’ performances as part of group processing, final assignment of grades is the responsibility of the instructor.

6. Communication Skills Practice: Each student will:
   • talk three times in an oral presentation.
   • write 1 papers individually (professional self-assessment).
   • be involved in a team.
   • participate in writing team reports during the semester.

7. A breakdown of the grading is:

<table>
<thead>
<tr>
<th>Task, Outcome</th>
<th>Individual Or Team</th>
<th>% of grade</th>
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<tbody>
<tr>
<td>1. Use knowledge from previous courses- simulations, calculations, prototype, final packaged design, etc. (Individual)- Define what will be done in Week 5- Design Review. Complete your part of the project (simulations, design, prototype, final design) Write design paper. (Each person needs to do a time schedule with milestones)</td>
<td>Individual</td>
<td>15</td>
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<tr>
<td>2. Work as part of a team- evidence you worked to facilitate the successful operation of your team (attend meetings, complete your part- technical and non-technical, helped others) (Every two week meeting report- who attended, did you meet with facilitator, what was discussed/worked on) one paragraph max for each team. Each person updates their personal plan/task/schedule.</td>
<td>Team &amp; Individual</td>
<td>10</td>
</tr>
<tr>
<td>3. Organize/plan a project so that each person has a major contribution. GANTT and Design Review</td>
<td>Team</td>
<td>5</td>
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</table>
Each team member has a one page milestone, schedule and task list.

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<tr>
<td></td>
<td>Team and Individual 15</td>
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<tr>
<td>5.</td>
<td>Technical talks (Engineering Design Review, Proposal, Final Project)</td>
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<td></td>
<td>Team and Individual 15</td>
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<td></td>
<td>Team 15</td>
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<td>7.</td>
<td>Have a working packaged final product/prototype.</td>
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<td>Team 15</td>
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<td>8.</td>
<td>Attend all lectures and participate (daily attendance list used)</td>
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<td>Individual 10</td>
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| Total Grade | 100%

Grading Scale

> 90%  4.0
85%-90%  3.5
80%-85%  3.0
75%-80%  2.5
70-75%  2.0
Less than 70%  Do not pass

Note: A portion of your design project grade will be based on completing your project on time. Your working prototype is scheduled for demonstration to Drs. Albrecht & Udpa and your facilitator during week 8 and week 15 (Exact dates are in the schedule). Design Day this semester is Friday April 27, 2018. So you are expected to have your working design completed and demonstrated approximately one week before Design Day.

Input for overall grade comes from facilitator, teammates, instructor and judges. Overall grade is also reduced by unexcused absences or tardy arrivals beyond 3.

H. Estimated time required per student
Each student should plan on budgeting approximately 12 or more hours/week (3+ hours per credit) for this course on average. (Some weeks may require less time and some more time, particularly toward the end of the semester.) This includes:

• time spent in the classroom
• time spent completing homework/papers
• time spent in design team meetings
• time spent working individually on design project
• time spent on preparing for oral presentations

I. Class Meeting Time
ECE 480 meets on Monday, Wednesday, and Friday, 10:20-11:10
You should make every effort to reserve an evening from 7-10:00 p.m. for special meetings of your team to guarantee a weekly time when all members are available. However, your regular weekly team meetings can be set for other days/times as appropriate. Your weekly meeting time with your facilitator must be scheduled for a time when all team members and the facilitator are available, before 5pm M-F.

**J. Tentative Schedule of Deliverables throughout the Semester**
See class schedule on the main web page.