Capstone Electrical Engineering Design Projects

Electrical and Computer Engineering Department
University of California, Santa Barbara

Course Description and Objectives:

In this course, students work in teams under the direction of a faculty advisor to tackle a challenging engineering design project. Engineering communication, such as reports and oral presentations are covered. The course emphasizes practical, hands-on experience, and integrates analytical and design skills. Students will develop skills in design problem solving, creative thinking, project planning, and teamwork, as well as developing technical and practical skills in the particular area(s) of research covered by their project.

Topics Covered:

- Development of a Project Plan
- Development of Concepts and Designs
- Design Research and Development
- Prototyping
- Design Testing, Analysis, and Evaluation
- Engineering Reporting: Design Reviews, Presentations, and Technical Reports
- Engineering Project Management
- Intellectual Property

Course Format:

In ECE 188, students design, build, and present a challenging engineering design project. ECE 188A primarily focuses on the initial design and development stage. After choosing a project, each group will begin researching the critical elements of their project, develop a preliminary project plan with a set of preliminary design specifications, and give a short preliminary presentation to the class describing their projects. Students then continue to refine their plan and begin prototyping and design testing. At the end of the quarter, each group will finalize their project plan and product design specifications, and give a 30 minute presentation detailing the (1) Project Plan, (2) Product Design Specifications, (3) Budget, (4) Prototyping and Testing, and (5) Division of Labor (individual responsibilities).

In ECE 188B, the second quarter of the sequence, the focus of the projects shifts from the ‘initial design’ phase to ‘project execution’ phase. Groups continue building the products, with the goal of having an initial working prototype completed by the end of the quarter. Each group also undergoes a mid-project review with the instructor and their sponsors/mentors half way through the quarter. Other activities include periodic update meetings with the instructor and product branding/marketing exercises.

In ECE 188C, the final quarter of the sequence, students finalize their designs and product specifications, complete the assembly, and present and demo their products. Final products will be evaluated based on the final specifications that were set out for the product.

Instructor Info:

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Grades in ECE 188A will be assigned approximately as follows:

- Preliminary Project Plan / Design Specifications: 20% of grade
- Initial Prototype: 20% of grade
- Final Presentation: 40% of grade
- Preliminary Presentation: 10% of grade
- Attendance / Individual Contribution: 10% of grade

Grades in ECE 188B will be assigned approximately as follows:

- Winter Quarter Updates/Demos: 30% of grade
- Mid-Project Review: 40% of grade
- Other Assignments (branding/logo, etc): 20% of grade
- Attendance / Individual Contribution: 10% of grade

Grades in ECE 188C will be assigned approximately as follows:

- Final Project Design/Specs: 30% of grade
- Final Presentations/Demonstrations/Reports: 60% of grade
- Attendance / Individual Contribution: 10% of grade

Class Web Page: http://www.ece.ucsb.edu/courses/ECE188/188_F17Ilan/

DAY / DATE	TOPIC / ACTIVITY	TASK / ASSIGNMENT
Week 1		
Mon 10/2	Project Introductions / Course Objectives	Review projects
Wed 10/4	Project Requests	Review projects
Fri 10/6	Project Requests	Projects/teams finalized
Week 2		
Mon 10/9	Project Planning Design Requirements/Specifications	Group meetings with instructor and sponsors/mentors
Week 3		
Mon 10/16	Prototyping Prelim Project Plan / Design Specs	Group meetings with instructor and sponsors/mentors
Week 4		
Mon 10/23	PCB Design, purchase orders	Establish design and specs
Week 5		
Mon 10/30	PCB Design	Continue establishing design and specs
Week 6		
Mon 11/6	**PRELIMINARY PRESENTATIONS**	
Week 7		
Wed 11/15	Spievak Presentation	**Preliminary Project Plan and Preliminary Design Specs** due Nov 15 by 5pm
Week 8		
Mon 11/20	Feedback on Project Plans / Specs	
Week 9		
Mon 11/27	Work on final presentation / prototype	Finalize initial prototype
Week 10		
12/4-12/8	**PROJECT PRESENTATIONS TO SPONSORS**	**Updated Project Plan / Specs** due
Finals Week		
12/11-12/15	**PROTOTYPE DEMOS**	**Group/Individual Evals** due Dec 11 by 5pm

DAY / DATE	TOPIC / ACTIVITY	TASK / ASSIGNMENT
Week 11 1/8-1/12	Winter quarter kick-off	Work on project
Week 12 1/15-1/19	3D Printing	Work on project
Week 13 1/22-1/26	**ELEVATOR PITCHES**	Work on project
Week 14 1/29-2/2	Progress update meetings	Work on project
Week 15 2/5-2/9	Branding / Trademarks	Submit brand / logo 2/9 by 5pm
Week 16 2/12-2/16	Present brand names / logos	Work on project
Week 17 2/19-2/23	**MID PROJECT DESIGN REVIEW**	
Week 18 2/26-3/2	Progress update meetings	Work on project
Week 19 3/5-3/9	Patents and Intellectual Property	Design Packet due 3/9 by midnight
Week 20 3/12-3/16	Progress update meetings	Work on project
Finals Week 3/19-3/21	**PROTOTYPE DEMOS**	**Group/Individual Evaluations** due March 19 by 5pm.

DAY / DATE	TOPIC / ACTIVITY	TASK / ASSIGNMENT
Week 21 4/2-4/6	Spring kick-off, abstracts	Prepare final product design and specs
Week 22 4/9-4/13	Sponsor/mentor meetings	Prepare final product design and specs
Week 23 4/16-4/20	Sponsor/mentor meetings	**FINAL PRODUCT DESIGN / SPECS** due 5pm on 4/20
Week 24 4/23-4/27	**GROUP PRESENTATIONS**	**Website material due by 5pm on 4/27**
Week 25 4/30-5/4	Poster info session	Work on projects!
Week 26 5/7-5/11	Group Meetings (no class)	Group meetings with instructor
Week 27 5/14-5/18	Group Meetings (no class)	Work on projects!
Week 28 5/21-5/25	Progress updates	Group meetings with instructor
Week 29 5/28-6/1	**FINAL PRESENTATIONS**	Complete poster
Week 30 6/4-6/8 Fri 6/8	Practice presentations / set-up **ENGINEERING DESIGN SHOWCASE!**	Poster Presentations / Demos. Individual/group evals due 6/12 by 5pm.