

ECE 3906: Capstone Design I

Course Description

Fundamentals of the engineering design process. Application of design principles and methodology to conceptual and detailed technical design. Technical writing and communications skills. Project management during design.

Prior Course Number: 3905

Transcript Abbreviation: Capstone Design 1

Grading Plan: Progress - Letter

Course Deliveries: Classroom

Course Levels: Undergrad

Student Ranks: Senior

Course Offerings: Autumn, Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 4.0

Repeatable: No

Time Distribution: 3.0 hr Lec, 1.0 hr Lab

Expected out-of-class hours per week: 8.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: Option 1: Prereq or concur: 3080 or PHILOS 1332; 2560, 3010, 3020, 3027, 3030, 3040, 3050, Credit for a first writing course, and Sr standing, and enrollment in Electrical Engineering Program of Study (EES subplan) of the ECE major.

Option 2: Prereq or concur: 2050 or 2100; 3080 or PHILOS 1332; 3020, 3027, 3090, 3561, 3567, CSE 2231, and 2451, and Sr standing, and enrollment in Computer Engineering Program of Study (CES subplan).

Exclusions: Not open to students with credit for 3900, 3905, 4900, 4900H, 4901, or ENGR 5901.01, 5901.01H, 5902.01 or 5902.01H.

Cross-Listings:

Course Rationale: Existing course being revised to support heavier focus on technical writing and communications skills required as part of a two semester capstone.

The course is required for this unit's degrees, majors, and/or minors: Yes

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: No

Subject/CIP Code: 14.1001

Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

Teams will be formed in ECE3906 and members will be required to stay together and register for the same section (time slot) for ECE4905 to allow team to work on same project start to finish.

Course Goals

Be competent with the principles and issues of engineering design such as problem statements, requirement and objectives analysis, engineering and technical specifications, system models and representation, generation and selection of design concepts
Demonstrate competence with principles and tools for management of a design project
Demonstrate competence in writing technical design and project management documentation
Demonstrate competence in a team-based environment and collaborative development of communication
Be exposed to the purpose, development, and use of engineering standards
Be familiar with the need to consider multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) in engineering design
Be competent with principles of effective technical writing, including citation of sources
Be competent presenting data effectively
Be competent giving an effective technical presentation

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Course introduction, team forming survey and Intellectual Property/ Technology Commercialization Office	1.0							
Group dynamics, effective professional teams and communications	1.0							
Engineering design methodology, requirements, and Writing instructions	5.0							
Project management (Gantt charts, task breakdowns, budgets, etc), problem definitions, preliminary design, and critical design.	3.0							
Engineering standards, systems engineering life cycle process	3.0							
Resources for design and implementation of projects, writing center, purchasing and lab safety	1.0							
Independent laboratory work			12.0					
Instructor guided lab			1.0					
Reports in the Workplace, Report Organization, Presentations in the Workplace, Performance During Presentations, Memorandum and E-mail in the Workplace	3.0							
Editing, polishing and organizing technical reports, Report Format, Writing Conventions in Technical Reports, Cover Sheet, Graphs, Illustrations, Equations, Spreadsheets, Tables, Lists, Significant Digits and Uncertainty	4.0							
Technical descriptions	1.0							
Reporting and presenting of data	2.0							
Technical presentation skills	2.0							

Representative Assignments

Written assignments on: Write instructions for a process or manual, program management, problem definitions, analysis of specifications and requirements, requirements development, design concepts, preliminary design, detail design, task lists, Gantt chart and scheduling, and budget.
Presentations: Problem definition, preliminary design review and critical design review
Quiz covering lecture material.

Grades

Aspect	Percent
Oral Presentations	30%
Written Assignments	45%
Peer Evaluation	10%
Instructor / Advisor Evaluations	10%
In class Quiz	5%

Representative Textbooks and Other Course Materials

Title	Author
<i>Design for Electrical and Computer Engineers: Theory, Concepts and Practice</i>	Ralph M. Ford and Chris S. Coulston
<i>Technical Communication</i>	John Lannon and Laura Gurak

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
*	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences

Course Contribution		Program Outcome
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additional Notes or Comments

Should be scheduled as two 120-minute sessions per week- one for lab, one for lecture

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