

ECE 3900: Capstone Design I

Course Description

Fundamentals of the engineering design process. Design principles and methodology. Project management during design.

Transcript Abbreviation: Capstone Design 1

Grading Plan: Letter Grade

Course Deliveries: Classroom, Greater or equal to 50% at a distance

Course Levels: Undergrad

Student Ranks: Senior

Course Offerings: Autumn, Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 7 Week

Credits: 1.0

Repeatable: No

Time Distribution: 2.0 hr Lec

Expected out-of-class hours per week: 4.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: Prereq: Sr standing and enrollment in the ECE major. Prereq or concur: 3090.

Exclusions: Not open to students with credit for 4900, 4900H, 4901, or 582, or Engr 4901, 4903, 5901.01 or 5901.02H.

Cross-Listings:

Course Rationale: Split lecture content out of 4900 into previous semester to allow more time for capstone design project completion in 4900.

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

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
Be familiar 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
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 familiar with test and validation planning and execution, debugging of prototypes, and the risks and types of failures

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Engineering design methodology	5.0							
Project management (Gantt charts, task breakdowns, budgets, etc)	4.0							
Engineering standards	1.0							
Test and validation plan development	1.0							
Debugging, failure and risk analysis and management	1.0							
Resources for design and implementation of projects	1.0							
Group dynamics and effective professional teams	1.0							

Representative Assignments

Problem statements, analysis of specifications and requirements, design concepts, test plans, task lists, Gantt chart and scheduling, and budget exercises.
Quizzes covering lecture material.
Case studies and critiques.

Grades

Aspect	Percent
Homeworks	40%
Quizzes	30%
Final project	30%

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

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.

Course Contribution		College Outcome
**	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
*	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
*	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

Course goals updated based on Sp17 review

Add ENGR 5901.01 & 5910.02H to exclusion clause. Remove qtr courses. gjv 6/2/17.

Added course goal on teamwork and contributions to new ABET student outcomes per Sp19 review. 5/23/19.

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