

ELECTRICAL, COMPUTER, AND SYSTEMS ENGINEERING DEPARTMENT

ABET COURSE SYLLABUS

ECSE-4900: ECSE Design

Course Catalog Description: A capstone design course. Provides all ECSE majors senior design experience by engaging them in client-sponsored projects. The students work in multi-disciplinary teams, jointly responsible to the faculty, the client liaison, and to each other for project management, execution and reporting. Contemporary design tools and practices are emphasized.

Pre-Requisite Courses: Senior standing

Co-Requisite Courses: ENGR-4010 Professional Development III

Prerequisites by Topic:

1. Circuits and systems analysis – time and frequency domain
2. Basic Electronics
3. Microprocessors and embedded control
4. Computer programming and simulation methods
5. Basic engineering design process

Textbook: None
(and/or other required material)

References:

1. J.E. Salt and R. Rothery, Design for Electrical and Computer Engineers, John Wiley & Sons, Inc., 2002.
2. Other references are project dependent. They include material provided by project sponsor, past reports for a continuing project, etc.

Course Coordinators: Junichi Kanai and Syed Murtuza

Overall Educational Objective: To bring together many of the topics taught in prior courses in an application oriented multidisciplinary design experience.

Course Learning Outcomes: Students will:

1. Demonstrate synthesis and innovation in the engineering design context.
2. Apply analytical skills in support of the design process
3. Acquire interpersonal skills to work productively as a member of a team
4. Recognize the practical nature of engineering design
5. Develop good written and oral communication skills.
6. Develop sensitivity to economic, environmental, sustainability, manufacturability, ethical, health and safety, social, and political considerations in engineering practice

How Course Outcomes are Assessed: Course outcomes are assessed both at team and individual levels. Team grade is based on semester proposal, midterm design and final design reviews and reports. Individual grade is determined according to the individual’s contribution to the team grade as judged by faculty, project sponsor (if applicable), and peers in the team. Numerical grades given during the semester are used as a guide in assigning the final grade. Strict numerical formula is not applied for assigning final individual grade.

Relation to EE/CSE/EPE Outcomes

Outcome	Level	Demonstrate Proficiency
	N, M, H	e.g. Exams, projects, HW
Mathematics, science and engineering	M	Ind. memos, reports
Basic disciplines in Electrical Engineering	Depends on student’s specialization and the nature of assigned project.	
Depth in Electrical Engineering		
Basic disciplines in Computer & Sys. Eng.		

N = none
M = moderate
H = high

Depth in Computer and Systems Eng.		
Electromagnetics, electromechanics, power semiconductors		
Power system behavior		
Electrical energy conversion		
Conduct experiments and interpret data	M	Ind. memos, reports
Identify, formulate and solve problems	H	Ind. memos, reports
Design a system, component or process	H	Ind. memos, reports
Communicate in written and oral form	H	Ind. memos, reports
Function as part of a multi-disciplinary team	H	Active participation in a design project
Preparation for life-long learning	M	Literature search beyond what was covered in previous courses
Ethical issues; safety, health, public welfare	M	Ind. memos, reports
Humanities and social sciences	N	
Laboratory equipment and software tools	H	Design project
Variety of instruction formats	H	Team meeting, open shop for prototyping, virtual collaboration using a web-based collaboration tool

**Topics Covered:
(number of hours or classes for each)**

There are no formal lectures. However, the students are guided to address the following topics as part of the design process.

1. Defining a problem and identifying requirements
2. Engineering analysis and developing preliminary specification
3. Project planning
4. Concept development and evaluation
5. Safety, intellectual property, human factors, economics, etc
6. System level design
7. Risk analysis and updating the project plan
8. Detailed design
9. Prototyping and Performance Evaluation

Computer Usage:

1. Students use a web-based collaboration tool to manage their projects.
2. Students also use CAD tools, simulation software packages, and programming tools, such as C/C++, Matlab, and LabVIEW, as needed

Laboratory Experiences:

Proof of concept tests and building and testing of prototypes

Design Experiences:

The whole course is predicated on providing close to real life design experience

Independent Learning Experiences:

Each student is responsible for specific elements of the system related to their disciplinary interests. They perform significant amount of individual work, such as bench marking, analysis, design, prototyping, and verification, both inside and outside of scheduled class hours.

Class/Lab Schedule:

Students meet twice a week for two hours each and are allowed using the time for meetings and/or lab (shop) activities.

**Contribution to the
Professional Component:**

- | | |
|---|----------------|
| (a) College-level mathematics and basic sciences: | 0 credit hours |
| (b) Engineering Topics (Science and/or Design): | 3 credit hours |
| (c) General Education: | 0 credit hours |

Prepared by:	Junichi Kanai
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Date: