Department of Electrical and Computer Engineering

New Jersey Institute of Technology

ECE 414: Electrical and Computer Engineering Project I (Senior Project Design I)

Catalog Course Description: Student teams prepare and submit technical proposals for the senior design ("capstone") project to be completed the following semester in ECE 416 or ECE 417. Discussion of issues related to the engineering profession, including such topics as: intellectual property, sources of technical information, engineering codes and standards, professional organizations, professional registration. Required of all ECE students.

Course Description: This course provides the student with background information on the design and management of engineering projects. It presents examples of design for manufacturability, quality, test and evaluation, reliability and ethics, patents and copyrights, etc. The students are encouraged to work in teams on a challenging open-ended electrical and computer engineering project that draws on previous course work. Projects routinely involve standard design facets (such as consideration of alternative solutions, feasibility considerations and detailed system descriptions) and include a number of realistic constraints (such as cost, safety, legal constrains and reliability).

Prerequisite:	In EE program: ECE 321, ECE 341, ECE 372, ECE 392, and ECE 395. In COE: ECE 353, ECE 368, ECE 394 and ECE 395.
Main Text	Fundamentals of Engineering Design, 2nd Edition, Barry Hyman, Prentice Hall, 2002, ISBN No. 978-0130467126.

Specific Course Learning Outcomes (CLO): The student will be able to

1. Work on complex engineering projects; manage teamwork including setting completion schedules, project milestones, and the assignment of responsibilities for each team member.
2. Perform requirements analysis and provide sufficient details in understanding both the functional and non-functional requirements of the system that is to be developed.
3. Produce a written design document that provides sufficient details in understanding how the system is to be developed.
4. Fully understand the ethical issues that arise in the design of the system and the use of the system. Understand societal impact of engineering design.
5. Present and explain details of the designed system at different levels of implementation throughout the course.
6. Continuously perform independent learning of current and new technologies and concepts in order to complete the project.
7. Research, select, learn and utilize the necessary engineering tools and techniques that are needed to complete the project.

Relevant Student Outcomes (ABET criterion 3):

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CLOs 1, 2, 3)
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 (CLOs 2, 4, 5, 6)
3. an ability to communicate effectively with a range of audiences (CLOs 3, 5)
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 (CLOs 3-5)
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 (CLOs 1, 3, 6, 7)

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (CLOs 1, 2, 3)

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies (CLOs 6, 7).

Tentative Course Schedule	Weeks
Understanding of engineering project, preliminary project description and title, formation of the team and division of responsibilities - interim report required.	1-3
Finalized project title and clear definition of the technical goals (requires instructor approval).	4
Understanding and formulation of project constraints (technical, legal, budgetary, etc.) - interim report required.	5
Development of the design methodology: review and discussions - interim report required.	6
Literature review with focus on the project originality and potential marketability; comparison with existing products (at least 3 patents and 1 paper) - interim report required.	7-8
Preparation of technical documentation including design flow chart, block diagram, specification table, etc. - interim report required.	9
Proposal defense	10-12
Preparation and submission of the project proposal report	12-14

Grading policy: Proposal presentation/defense (30%), proposal report (70%). All accumulated penalty points (missing/late interim reports, insufficient information, etc.) will contribute to the grade reduction.
Updates and Assignments to be distributed via e-mail **Office hours**: By appointment
Honor Code: The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students.
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Prepared by: L. Tsybeskov

This course outline serves to provide a big picture of the course. Instructional materials such as textbooks, individual topics, and grading policy are subject to revision and changes by individual instructors.