ECE 4901: Electrical and Computer Engineering Design I

Credits and contact hours: 2 Credits (Two 50-minute class periods and a team meeting per week)

Instructor: Team-taught (coordinator: John Chandy)

Textbook: none

a. *Other supplemental materials*: PowerPoint slides associated with the lectures will be posted online.

***Specific course information*:**

a. *Catalog Description*: (Also offered as CSE 4950). Discussion of the design process; project statement, specifications, project planning, scheduling and division of responsibility, ethics in engineering design, safety, environmental considerations, economic constraints, liability, manufacturing, and marketing. Projects are carried out using a team-based approach. Selection and analysis of a design project to be undertaken in CSE 4951/ECE 4902 is carried out. Written progress reports, a proposal, an interim project report, a final report, and oral presentations are required.
b. *Prerequisite*: ECE 3201 and a grade of C+ or better in both ECE 2001 and ECE/ENGR 3101; senior standing; open only to students in the School of Engineering and declared Computer Science minors.
c. *Required, elective, or selected elective:* Required

***Specific goals for the course*:**

a. *Specific outcomes of instruction*: Students will be able to
    - apply their engineering knowledge to solve open-ended design problems using a team approach.
    - search for, acquire, and use new knowledge from multiple sources.
    - communicate their engineering solutions in writing and orally.
    - recognize professional, ethical, and societal issues in the context of engineering design.

b. *ABET Criterion 3 Student Outcomes addressed by the course*:

    (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
    Students start the course given a problem statement and from this generate a project statement. They develop specifications followed by a proposal. They select the optimal solution, fully analyze the project to ensure meeting operational goals by applying information learned in mathematics, science and engineering, and develop a time-line for project completion.

(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
The course is based on a systems approach whereby each project is broken into relevant components which are assembled into a whole. Each module is assessed to ascertain whether specifications are met. Non-technical issues such as economics, safety, ethics, sustainability, social and environmental concerns are taken into account as appropriate.

(3) an ability to communicate effectively with a range of audiences
Students write the project statement, specifications, the design proposal and a final report. In addition, students submit written weekly reports on project status. Students give two oral presentations using PowerPoint (design review and final presentation).

(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
Students learn to recognize the issues of professional code of conduct, ethical responsibility, law, and standards.

(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
Students solve open-ended design problems using a collaborative team approach. The teamwork is guided and monitored by a faculty advisor.

(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
In the process of creating a design solution, students test the feasibility of modules within their projects by (as needed) building prototypes, conducting experiments, collecting data, and analyzing results.

(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
Students use the web, library databases, and other resources to study existing designs, decide between alternatives, and specify components.
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Topics covered:

- Introduction to Design: project statements, specifications, planning, reports
- Business issues: engineering economics; marketing
- Professional issues: ethics, lifelong learning, law, patents, teamwork
- Electromechanical design, microcontrollers, PCB design