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 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.

**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