

ECE 304 Junior Design Project

Spring 2020

Catalog Description

In this course students will: 1) work in small design teams to solve a well-defined ECE problem and then, 2) undertake more practical open-ended engineering problem. The well-defined ECE design project will be chosen from a list of available projects that span the department's core electrical engineering and computer engineering sub-disciplines. For the open-ended design problem, students will experience the steps in engineering design including: 1) developing a problem statement; 2) analyzing system requirements and developing specifications; 3) considering design alternative and 4) implementing a solution. The course reinforces principles of the engineering design process and serves to integrate knowledge obtained in the ECE curriculum. Each student design team is expected to present information related to their project in both written and oral formats. Preliminary paper design is followed by implementation in the lab using digital and analog hardware design techniques and software engineering techniques. It is expected that a complete or partially working system will be demonstrated at the end of the course. (2 credits).

Learning Objectives

During this course students will:

- learn the basics of the design process, from writing and understanding specifications, to considering design alternatives, working in teams, creating and understanding block diagrams, defending a problem statement, designing experiments to test a functioning system, and analyzing data;
- learn how to get a fully functioning prototype of a basic system to work.

Instructors

Bill Leonard

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Office Hours: Any time I am in my office (check my schedule)

Responsibilities: Overall course organization, weekly pre-class surveys, in-class activities, reflection assignments

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Responsibilities: Design Project

Graduate TAs

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Prerequisites

A passing grade in ECE 201, ECE 231, and ECE 303 is required to enroll in this class.

Textbooks

There is no formal text for this course. Written materials will be provided as needed.

Components and Resources

In-class activities. There are 13 lectures, Friday, 2:30-3:45pm. The style will be largely interactive, with a mixture of whole-class discussions and individual and small team worksheets. Each class is worth 5 points. (Max = 65 points)

Pre-class surveys. Before each class, there will be a survey to fill out. This will help prepare yourself for the in-class activities and help the instructors prepare appropriate activities for class. Each is worth 2 points. (Max = 24 points)

After-class reflections. After each lecture, there will be an assignment, typically a short reflection on the in-class activities. Each is worth 2 points. (Max = 26 points)

Design Project. Working in teams of 2 or 3, you will help build a small IoT system. There will most likely be three systems to choose from (yet to be determined). Each system will have a sensor, a processor, cloud computing, and actuation, usually from the cloud. A minimally functioning system is worth 100 points.

Benchmarks. Each project will have specific timelines and benchmarks that must be met to finish the project on time. Some benchmarks will be individual and other will be for the whole team to reach. (Max = 25 points)

Specifications. Each project will have a list of design specifications that must be met in order to reach higher grades. (Max = 100 points)

Grading

There is a total of 340 points possible. To reach a guaranteed grade of C, you must have a minimally functioning system (100 pts), participate in at least 10 classes (50 pts), fill out 10 pre-class surveys (20 pts), and write 10 post-class reflections (20pts). Once you have reached these minimum scores, every 20 points is a grade increment, e.g., C to C+. Thus, 310 points is needed for an A.

Health and Wellbeing

Studying engineering can be stressful and time-consuming, and success often depends on your personal health and wellbeing. Therefore, please don't assume that you need to sacrifice sleep, nutrition, and/or

exercise to be successful. Sometimes, spending more time on schoolwork is not the only solution. Instead, there are ways to be more efficient with your time. There are also multiple resources on campus for dealing with stress, anxiety, personal problems, and more.

Center for Counseling & Psychological Health (umass.edu/counseling, Middlesex House, 413.545.2337)
Single Stop Resources (umass.studentlife/single-stop)
Office of Student Affairs (College of Engineering, Marston 126)
Community, Equity and Inclusion (CEI) Hub (College of Engineering, Marcus 128)

Accommodations

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Disability Services (umass.edu/disability, 161 Whitmore, 413.545.0892)

Inclusivity

The diversity of the participants in this course is a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with me privately. If you wish to communicate anonymously, you may do so in writing. You may also speak with Assistant Dean Paula Rees (rees@umass.edu, 413.545.6324, Marcus 128B which is within the CEI Hub located across from the coffee shop in the Guinness Student Center), or submit your concern through the College of Engineering Climate Concerns and Suggestions on-line form (<http://tinyurl.com/UMassEngineerClimate>). We are all members of an academic community with a shared responsibility to nurture a classroom environment in which all students and individuals are valued and where all ideas are treated with respect.

Pronouns and Names

Everyone will be addressed by the name and pronouns that they use for themselves. Please update yours on SPIRE, so that they will appear on my roster.

The Stonewall Center (umass.edu/stonewall, Crampton Hall, 413.545.4824)
Inclusive Restrooms (umass.edu/stonewall/campus-restrooms, and signs outside each restroom in CoE with the location of the nearest inclusive restroom)
What Are Your Pronouns? (umass.edu/stonewall/sites/default/files/pronouns_intro.pdf)

Title IX

Any conduct that has the purpose or effect of unreasonably interfering with an individual's performance by creating an intimidating, hostile, or sexually offensive academic environment is considered sexual harassment.

Title IX at UMass Amherst (umass.edu/titleix)
William Brady, Interim Title IX Coordinator (wdb Brady@umass.edu, 413.545.6204)
Confidential Resources: Center for Women & Community, UHS, CCPH, UMPD