ECE 445-ZJUI-2022: Lecture 1

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Introduction

- Welcome to ECE445/ME470-ZJUI, Multi-disciplinary Senior Design Laboratory, a projects-based course held on the ZJUI campus.
- It is a self-contained section of ECE 445, Senior Design Laboratory, that has been the capstone course for EE and CE students at UIUC for many years
- I have been an instructor for ECE 445 since 2017 (for 10 semesters) and look forward to teaching the course at ZJUI again.
- I am joined again by Profs. Mark Butala (ECE) and Timothy Lee (ME) who will be working in-person with you. Prof. Rakesh Kumar, Course Director for the UIUC section of ECE 445, will be serving in an advisory capacity.
- Compared to the UIUC section, the ZJUI section will be more interdisciplinary and have larger teams.
- We believe this is appropriate because many engineering problems have a significant mechanical aspect.
- There is a growing recognition that a team-based, multidisciplinary approach is the fastest way of making technological advances.
- This course is designed to help you become an effective team member.

Project formation

- To get you started on projects quickly, the ZJUI faculty have generously volunteered to provide project ideas and serve as project advisors.
- We will be presenting these project ideas to you after this introduction and indicate the expected mix of EE, CE, and ME students for each project.
- You will be asked to choose among these project ideas and list them in order of preference.
- You will be assigned to a project team consisting of four EE, CE, and ME students according to your preferences and the needs of the project.
- We hope to have the project assignment process completed by the next lecture.
- Each project team will be assigned a Teaching Assistant (TA) who will meet with the team on a weekly basis.
- You will carry out your project using using a methodology developed for the course.
- We will present this methodology to you in these first three lectures.

Course Overview

- **Project Identification** (February)
  - Students are assigned to a project team and TA and the team meets to develop an idea to solve a specific problem during the course.
  - This idea submitted on the course **Web Board** where it is critiqued by the course staff and other students.
  - When the idea seems ready, the team prepares an **RFA** (Request for Approval) that is submitted on the course web site.
  - RFA's will be critiqued by the course staff who may request changes.
  - When they seem ready, RFAs are approved by course staff.
- **Project design process** (complete by the end of March)
  - Teams with approved projects meet with TA and advisor and prepare a more detailed **Project Proposal** that will be critiqued.
  - Teams then prepare a detailed **Design Document** with guidance from TA and advisor
  - The Design Document is an instruction manual for your project.
  - The Design Document is given a final review in the **Design Review** (held last week of March)
- **Project fabrication, testing and analysis** (Complete by end of April)
- **Pre-Demo, Demo**, **Final Presentation** and **Final Report** (May)

Project Request for Approval (RFA) [February]

- All projects start with a posting on the Web Board
  - Student propose specific projects based on assigned faculty project idea
  - Professors, TAs, and students critique and discuss student project ideas on the web board
  - After sufficient discussion, a project idea is submitted for approval as an RFA.
- Projects must meet our criteria for uniqueness, complexity, and scope
  - Scope must be consistent with course time constraints
  - Tasks must be distributed equally among team members

Project Design (March)

- The sooner your project is approved, the sooner you can begin the design process
- The design process begins with the **Project Proposal** due March 14. It includes
  - Objective and Background
  - High-level requirements
  - Description of design - block diagram, component requirements
  - Ethics and safety
- The **Design Document** is an instruction manual for your project
  - Includes design equations, circuit schematics, physical design, flowcharts, test procedures, and component requirements
  - Another ECE/ME student not familiar with your project should be able to follow this document and make a working version of your project
- The **Design Review** is an in-depth review of your project by the staff and the last opportunity to correct potential problems.
- Project work can start before Design Review

Building and Testing (April)

- The middle weeks of course are devoted to building and testing your project device
- Work in accordance with the schedule laid out in your Design Document along with guidance from TA and advisor
  - Make bread board tests of circuits before finalizing PCB
  - Identify problems early and make adjustments
  - Get your PCB order in early
  - Keep mechanical design within project scope
  - Make sure you are working effectively as a team
- Eagle and Soldering assignments help with understanding PCB design and installation

Demonstration, Final Presentation, and Final Report (May)

- **Demonstration:** Demonstrate a fully functioning prototype to your professor, advisor, TAs, and other students
  - This should be the highlight of your course experience
- **Final Presentation:** Team gives a formal presentation on their project
- **Final Report:** Complete documentation of your project by the project team. Final report meets Advanced Composition Requirement.

How to succeed in ECE 445

- Get familiar with the course web site and watch the videos
  - RFA, project proposal, lab notebook, modular design, ethics, …
- Use course calendar to anticipate deadlines
- Understand the grading process – 21 grades large and small
  - Design Review, lab book, demo, final presentation, report
  - Eagle and soldering assignments
  - Team evaluation, individual progress report, peer review
- Focus initially on getting your project approved
- Participate in Web Board/WeChat discussions

How to succeed in ECE 445, continued

- Work with your teammates to build a strong team
  - Hold regular meetings
  - Communicate with your teammates and TA
  - Discuss problems as soon as they arise
- Spend time documenting your work in your lab book
- Get help solving problems - a lot of expertise is available
- Keep the project moving during the build and test phases

Course Staff

- Instructors: Professors Arne Fliflet (ECE UIUC), Mark Butala (ECE ZJUI) and Timothy Lee (ME ZJUI)
- Teaching Assistants: Dean Biskup (UIUC) and from ZJUI Xinyi Xu, Xiaoyue Li, Ronghui Zheng, Yuchuan Zhu, and Chunzeng Luo
- Each project will have an instructor and TA assigned to it
- Projects teams will meet weekly with their TA
- Project teams meet with their faculty advisor as needed

Closing Remarks

- This has been a quick overview – a lot more information is coming
- This course is like an express train that is now leaving the station
- Expect to work hard
- Course grading includes many assignments with deadlines
  – always pay attention to the course calendar
- Each project includes some risk
- Expect to encounter obstacles
- Don't be afraid to seek help from staff and other students