ECE4723 Interdisciplinary Capstone Design
2023 Spring Single-Semester Multidisciplinary Senior Design

Although this course is considered residential, your choice of project & needed resources is managed by the team & Advisor and should be informed by the remote versus residential availability of team members and their fabrication & instrumentation access (whether or not Georgia Tech's) particularly should you find that a team member or Advisor becomes a remote participant due to COVID quarantine.

Contact information and office hours: TBD

Prerequisites
For CmpE's: ECE3058 [min C]
For EE's: ECE3025 & ECE3040 [min C for both]
For all: ECE3872 (Junior Design) or ECE4871

Studios TBD – Advisor and team will meet informed by remote status of participants. ECE4872 & ECE4873 & ECE4723 may coordinate studios. There will be no live lectures with content to be provided online.

Laboratory Section TBD

Optional Text Hyman, Fundamentals of Engineering Design, Prentice-Hall, 2nd ed., 2003.

Grading

Participation Identification & Survey & Status Submissions	10%
Proposal/Report 1 & Advisor Acceptance & Proposal/Report 1 Presentation	10%
Design Review Report/Report 2 & Design Review/Report 2 Presentation	15%
Capstone Design Expo participation	Required
Final Demonstration	10%
Final Presentation	10%
Final Report/Report 3 and supporting documentation sufficient to continue or reproduce the project	25%
Return of borrowed or Institute-purchased equipment	Required
Individual Design Notebooks	10%
Professionalism	10%

Required elements are mandatory to pass the course.

Grading Scale Your final grade will be assigned as a letter grade according to the following scale

A	90-100%
B	80-90%
C	70-80%
D	60-70%
F	0-60%

Materials - Course materials and announcements may be distributed online or as otherwise specified in the distributed information. Students are expected to read email on a daily basis and responsible for all announcements or materials, regardless of the manner of distribution.

Late Policy All items are expected to be submitted by the specified due date and time. The instructor conforms to the Institute Policy on Student Absence from Class Due to Illness or Personal Emergencies http://www.catalog.gatech.edu/policies/student-absence-regulations/. Late submissions, if not excused under Institute policy, may be subject to a penalty.

Honor Code Students are expected to abide by the Georgia Tech Academic Honor Code https://policylibrary.gatech.edu/student-affairs/academic-honor-code.

Learning Accommodations Whenever needed, the instructor will make accommodations for students with documented disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services https://disabilityservices.gatech.edu/. See above regarding remote student accommodation.

Exams - No exams will be conducted during this course.

Professionalism - This grade component is based on your professional behavior during this course. Points may be deducted for unprofessional behavior by a student during the semester, including:

Resisting team formation
Resisting non-ECE's majors' capstone course constraints
Missing scheduled meetings with your project advisor or other team members
Unprofessional behavior as noted by the instructors or as reported by other team members, the project advisor, or industrial sponsors
Failure to function properly as a member of the design team
Lack of professionalism in submitted assignments, e.g., chronic failure to follow required format
Failure to adhere to the Georgia Tech Academic Honor Code

Attendance is encouraged but not mandatory during all course team meetings and events which will be arranged to facilitate COVID-19 restrictions and to accommodate any remote participants. This will be graded via the professionalism component of the grade.

Report 1/Proposal The first report includes your Project Proposal which is a formal document written by the team that accurately describes the proposed project. As different majors may impose different constraints informed by their provided templates, the team should incorporate the components needed to satisfy the majors of all participating students. But all teams incorporating ECEs should include a table of Technical Specifications and a description of how they will be demonstrated informed by the example

provided. The team is responsible for iterating until acceptance with their faculty advisor which may include a presentation at the advisor's discretion.

Design Notebook – This course's teams are not required to maintain a design notebook unless directed to do so by their primary academic advisor, and the course deliverables weightings will be normalized to compensate. If so directed, participants are encouraged to incorporate the elements required of ECE4872 students as listed below for their individual design notebook. At the advisor's discretion, students are welcome to use physical or electronic notebooks with contents submitted electronically for grading. With goals including the ability to continue or reproduce your project, the criteria below are encouraged.

3	Each page is numbered, dated and signed
1	The notebook does not have removable pages
1	All blank pages/areas are marked Intentionally Left Blank•
4	Your name, projects name, contact info, and team members contact info are recorded on the cover or inside of the cover
1	All Notebook entries are in chronological order
1	All notebook entries are in ink, i.e., no pencil entries allowed
3	Record team meetings dates, those present, and meeting highlights
2	Detailed meeting notes (if project has software component this includes documenting coding progress and source code locations)
1	Document information resources accessed (websites, books, scientific papers, professors, industry professionals, etc…)
3	Record design ideas in the form of block diagrams, sketches, etc.
3	Documentation of Engineering Results and Data (test plans, raw data, analysis and discussion of results)
2	Generate to-do items and place a box in the left hand margin ahead of listed item
3	Include check boxes for your and your team's and list individual responsibilities and deadlines
1	Check off to-do items when they are completed and write in completion date
1	To-do items should run chronologically through the notebook as your design work progresses
3	Professionalism (general organization, neatness, professional language)

Student-Faculty Expectations Agreement - At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of The Institute's basic expectations. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the sought environment. Therefore, you are encouraged to remain committed to the ideals of Georgia Tech while in this class.

Course Outcomes – Upon successful completion of this course, students should be able to:

1. Form multidisciplinary teams
2. Work in teams with advisors and perhaps a sponsor
3. Identify roles, resources, tradeoffs, and constraints
4. Propose a project with demonstrable quantitative Technical Specifications
5. Construct in a bounded time a project appropriate to their technical training
6. Submit cyclical status reports
7. Demonstrate their results before a suitable audience
8. Execute a public presentation

9. Maintain and provide final documentation suitable for project reproduction or continuation

Student Outcomes - In the parentheses for each Student Outcome, "P" for primary indicates the outcome is a major focus of the entire course, “M” for moderate indicates the outcome is the focus of at least one component of the course, but not majority of course material.

1. (P) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. (P) 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
3. (P) an ability to communicate effectively with a range of audiences
4. (M) 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
5. (P) 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
6. (P) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. (P) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topical Outline - Working in teams, students will complete their capstone design project requiring specification, design, implementation, testing, and project demonstrations. Projects must be based on the knowledge and skills acquired in earlier course work, and incorporate appropriate engineering standards and multiple realistic constraints. For teams including CmpE majors, the project must incorporate both hardware and software design elements and trade-offs between the two. Emphasis is placed on the design process, the technical aspects of the design, and on reducing the proposed design to practice.

Topics presented in the common lecture:

Course overview and expectations specific to ECE students on multidisciplinary teams
Discussion of communications & technical resources and predictable challenges
Final deliverables support & instructions
Due to COVID constraints, lecture content will be supplied electronically this semester.

Topics for the scheduled weekly meeting with the team’s faculty advisor include the following

First Report proposal approval & permission to begin the project ‘build’ phase
On-going meetings with team’s faculty advisor
Mid-semester Design Review report and presentation at Advisor’s discretion
Project Final Demonstration, Presentation, & Documentation