

ECE4873 MD1 (studio) / LMA (lab): Interdisciplinary Capstone Design
2020 Fall Single-Semester Multidisciplinary Senior Design

Remote students are to be accommodated. Facilitating COVID-19 realities, 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

Contact information and office hours: TBD

Prerequisites (same as the former GT 4823) (ECE3872 ECE Design Fundamentals [min C]) and ((ECE 3025 and ECE 3040 and ECE 3043 and ECE 3072 and ECE 3084) [all min C] or (ECE 3020 and ECE 3030 and ECE 3056) [all min C]) and ECE 3005 and (ECON 2100 or ECON 2101 or ECON 2105 or ECON 2106) and (CEE 3770 or ISYE 3770 or MATH 3770 or MATH 3670 or ECE 3077)

Studios TBD – Advisor and team will meet informed by remote status of participants and may be coordinated with studios of ECE 4873 D2A (equivalent to ECE 4012) and ECE 4873 D1A (ECE Single-Semester Capstone Design). There will be no synchronous lecture with content to be provided online.

Laboratory Section TBD

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

ECE 4873 MD1 Grading

Report 1 Proposal & Advisor Acceptance	10%
Report 2 Design Review	15%
Report 3 Final & Supporting Documents	25%
Final Demonstration	10%
Final Presentation	10%
Professionalism	10%
Weekly Reports & Electronic Deliverables	10%
Design Notebooks (if required)	10%

Materials - Course materials and announcements may be distributed online or as otherwise specified in the ECE4873 MD1 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 ECE4873 MD1.

Professionalism - This grade component is based on your professional behavior during ECE4873 MD1. 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 ECE4873 MD1 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 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 – ECE4873 MD1 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 ECE4873 D1A students as listed below. 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 is 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•
Your name, projects name, contact info, and team members contact info are recorded on the
- 4 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
Detailed meeting notes (if project has software component this includes documenting coding
- 2 progress and source code locations)

- Document information resources accessed (websites, books, scientific papers, professors, industry professionals, etc...)
- 1 Record design ideas in the form of block diagrams, sketches, etc.
- Documentation of Engineering Results and Data (test plans, raw data, analysis and discussion of results)
- 3 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 (asynchronously placed online during COVID-19 constraints):

- Course overview and expectations specific to ECE students on multidisciplinary teams
- Discussion of communications & technical resources and predictable challenges
- Final deliverables support & instructions

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 potential presentation
- Project Final Demonstration, Presentation, & Documentation