Spring Common Course Syllabus (Rev. 1.0)

Course Information

ECSE 4900, ISYE 4270, MANE 4260, and MTLE 4920 - Multidisciplinary Capstone Design

Credit Hours: 3

Section	Days	Time	Classroom	Fabrication Area
1	MR	10:00 AM-11:50 AM	JEC 3232/3332	JEC 2332
2	MR	12:00 PM-01:50 PM	JEC 3232/3332	JEC 2332
3	TF	10:00 AM-11:50 AM	JEC 3232/3332	JEC 2332
4	TF	12:00 PM-01:50 PM	JEC 3232/3332	JEC 2332

Instruction Method:

- In-Person Course
- All course materials for all students will be available on the course website.
- Students will have access to the Design Lab fabrication facility for prototyping.

Course Website: https://designlab.eng.rpi.edu/edn/

Prerequisites:

- All Courses: ENGR-2050 or MANE-2220; Senior Standing
- MTLE-4920 also requires MTLE-4910

Team Advisors (Instructors) and Teaching Assistants

See Attachment-A.

Course Description

A capstone design experience that engages students from biomedical, computer and systems, electrical, industrial, materials, and mechanical engineering on teams to solve an open-ended engineering design problem in preparation for professional practice. Students apply knowledge and skills from prior coursework with the guidance of a multidisciplinary team of faculty members and instructional support staff. This is a communication-intensive course.

Course Text

No required textbook is assigned to this course. Instead, you must research and collect information relevant to assigned projects. The textbooks used in previous courses are often helpful as references. An example is *Design & Development* by Ulrich-Eppinger used in Intro to Engineering Design (IED).

Self-learning video modules are available in Self-Learning Materials the Electronic Design Notebook (EDN):

Online Resources

Table 1 lists the online resources used for this course. Please be sure that you are signed into each resource. If you require assistance to access any of the online resources, please send an email to your Project Engineer or Prof. Kanai (kanaij@rpi.edu) as soon as possible.

Table 1 Online Resources

Tool	URL
Electronic Design Notebook (EDN)	https://designlab.eng.rpi.edu/edn/
Webex Teams – Spaces	Project Engr will send an email invite
iPeer for Peer Evaluations and Self-Reflections	http://mdl-vm3.eng.rpi.edu/
Online Safety Training	https://rpi.percipio.com

Student Learning Outcomes

Students of diverse backgrounds, skills, and perspectives will work in teams on a one-semester project related to the design of a complex engineering system. Each student will be responsible for specific tasks related to their discipline. As responsible engineers, students must show how their design functions in the context of the overall system. Students, as individuals and teams, will develop and practice the following:

1. 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.
2. An ability to communicate with a range of audiences.
3. An ability to perform ethical and professional behavior.
4. An ability to create an inclusive and equitable collaborative team environment.
5. An ability to acquire and apply new knowledge to solve technical problems.

Project Process (Course Content)

A design process taught in *Introduction to Engineering Design* is used to scope the project and design, build, test, and deliver your proposed design solutions within schedule, as shown in Table 2. The order of these activities may vary depending on the goals of each project.

The first ten classes are scaffolded, and the instructions are provided by the playbook accessible from **the Course Wiki**. For each class, students must complete the required out-of-class tasks and come to the class. For more information, see **Tasks and Due Dates**

Table 2 Design Process in Capstone Design

Week	Recommended Tasks
1	Team formation Online safety training
1~4	Research and gather customer needs; translate them into engineering requirements Project scoping and planning, including risk analyses
4~7	Concept generation, evaluation, and selection Define engineering specifications System architecture design Engineering analyses of critical issues and risks
8~15	Develop/evaluate detailed designs System Integration System Evaluation and Testing
15~16	Technology Transfer and Wrap Up
1~15	Team meetings both in class and out of class
	Status update presentations to the project sponsor (every 2-3 weeks)
	Minutes for each team meeting

Fabrication Facility

Students can use the Design Lab fabrication facility, JEC 2232, for prototyping. For some projects, simulation and analytical methods may be used to demonstrate feasibility instead of physical prototypes and testing.

Safety is critical. Students violating safety rules or operational policies are subject to appropriate disciplinary action and/or immediate dismissal from the fabrication area by lab supervisors, faculty, or staff. For more information, see **the Safety web page**.

Course Assessment (Grading)

This project-based course employs a holistic approach (as opposed to assignments and tests) to evaluate performance. You must **show all your work using EDN.** Failure to document your work in the EDN will negatively impact your final grade.

The following table summarizes graded tasks, and your grades are posted to LMS. For more information, see **Tasks and Due Dates.**

Table 3 Graded Assignments – Sections 3 and 4 due dates are in parentheses.

Due Date	Deliverables	Type	% of Final Grade
1/28 (1/26) @11:59 PM	Benchmarking Memo	Individual	5
Up to 2/2 (1/30) @ 11:59 PM	Technical Progress #1	Individual	5
2/9 (2/6) @11:59 PM	Concept Generation PPT	Team	5
2/10 - 2/17 approximate date	Client Meeting #2	Team	5
Up to 2/23 (2/24) @11:59 PM	Technical Progress and Project Mgmt. #2	Individual	5
3/12-3/17 approximate	Client Meeting #3	Team	5
3/13 @11:59 PM	System Design Report	Team	10
	Appendix Detailed Individual Design	Individual	5
3/13 @11:59 PM	Preliminary Peer Evaluation	Bonus	1
3/23 (10/21) @11:59 PM	Engineering Definition	Team	5
Up to 3/26 (3/27) @11:59 PM	Technical Progress and Project Mgmt. #3	Individual	5
4/13 (4/14) In-class	Individual Technical Demo	Individual	5
4/19 @11:59 PM	Final Poster	Team	5
4/29 @11:59PM	Final Design Report	Team	15
	Appendix - Individual Ethical and Professional Considerations	Individual	2
Up to 4/29 @ 11:59 PM	Technical Progress and Project Mgmt. #4	Individual	5
4/27-5/8 (Scheduled by each team)	Final Design Review Presentation	Team	10
		Individual	3
5/3 @11:59PM	Final Peer Evaluation	Bonus	1
		Total	102

Students who do not make any contribution to a team deliverable **earn zero points**. Students must not read or use notes in an oral presentation. Please refer to **Late Policy** for information regarding deliverables submitted after the due date.

Your final grade is determined as:

Final Grade = (Team Grade * ICF) + Individual Grade

where *ICF* is the Individual Contribution Factor that is holistically determined by your Capstone faculty advisors' observation of a student's performance, including but not limited to your participation both in and out of classes, technical contribution, project management, teamwork, life-long learning, professionalism, and communication, with input from your Project Engineer, and peer evaluation.

Attendance Policy

You must attend all class sessions and participate in meetings with your project team, faculty advisor, project engineer, and sponsor mentor. Active participation is required for a meaningful capstone experience. You must also make relevant technical contributions and complete project management tasks in and outside regularly scheduled class times.

In advance, communicate with your team, faculty advisor, and Project Engineer about any absence from class(es). In addition, you are required to make up your work for all missed class(es), including Excused Absence. Missing classes without catching up and being habitually late will negatively affect your final grade. For more information, see the **Excused Absences web page.**

Students who cannot attend some classes due to religious observance must inform the instructor at the beginning of the semester.

Other Course Policies

Generative AI Tools - In this course, the use of Artificial Intelligence (AI) tools, such as ChatGPT, is permitted. Neglecting to follow the requirements below may be considered academic dishonesty.

- For information search, you must obtain the information sources used by the tool and check the facts. You are required to include a paragraph that explains what AI tool and its version you used, the dates of use, and the prompts you used to obtain the information. Moreover, cite the information sources at appropriate locations in your document.
- For content creation, you must include a paragraph (comment in a program) explaining what AI tool and its version you used, the dates you used it, and the prompts you used to generate the content. Additionally, you must verify the accuracy of the content.

Mobile Devices - All mobile devices (cell/smartphones, computers/tablets, etc.) must be used appropriately in class. Activities not relevant to the capstone course (e.g., gaming, social networking sites) will negatively affect your final grade.

Confidentiality Requirements: One of the educational goals of the Capstone Design course is to increase students' awareness of the need to protect confidential technical information. **Confidentiality Requirements** wiki page describes the rules for handling information provided by the sponsor that is explicitly marked "confidential." Guidelines are also given for the publication of project results.

A specific issue concerns the use of "free" email services, such as Google and Yahoo, to exchange project technical information. The risk for the release of confidential information can be avoided by using RPI email or the Electronic Design Notebook. Therefore, the Capstone course policy is to **NOT** include any **project technical information** in messages to, from, or automatically forwarded to any non-RPI email address. The use of collaboration tools not provided by RPI, such as Google Docs, is not allowed.

Diversity, Equity, and Inclusivity Guidelines: Another educational goal for students is to create an inclusive and equitable collaborative team environment. Each student must embrace the teammates' diverse backgrounds, skills, and perspectives, accommodate their needs, and act professionally and respectfully. See https://info.rpi.edu/diversity also. The standard language in Capstone Design is English.

Students with disabilities should inform their faculty advisor(s) of their needs at the beginning of the semester. Further information about services for students with disabilities and the accommodation process is available on the **Disability Student Services web page.**

Academic Integrity

Cheating and dishonesty will not be tolerated. You must provide an honest effort in solving the assigned problem by yourself and your teammates. You are encouraged to discuss course material and problems with other students and/or RPI faculty as long as you follow the confidentiality agreement. However, your team's solution must be your own. If you are inspired by another's work, or if you are extending an existing approach, **you must explicitly cite this work**. All test results must be honestly reported. Any student found to have participated in academic dishonesty will receive an "F" in the class and may be subject to further disciplinary action.

The University Code of Academic Integrity prohibits students from committing the following acts of academic dishonesty: academic fraud, copying or allowing one's work to be copied, fabrication/falsification, plagiarism, sabotage of others' work, and substitution. For details, see the **Academic Integrity web page.**

If you have any questions concerning this policy, ask for clarification.

Email

This course uses RPI email to provide instructions, feedback, and reminders. It is essential that you check your RPI email account daily.

Attachment-A: Team Advisors and Teaching Assistants

Faculty/Chief Engineers

Office hours are shown in Chief Engineers.

Section(s)	Chief Engineer (Faculty)	Office	Email
3, 4	Prof. Clint Ballinger (MANE)	JEC 5026	ballic2@rpi.edu
2	Prof. Paul Chow (ECSE)		chowt@rpi.edu
3	Prof. Sarah Felix (MANE)	JEC 5044	felixs2@rpi.edu
1, 2	Prof. Asish Ghosh (MANE)	JEC 4012	ghosha4@rpi.edu
2, 4	Prof. Junichi Kanai (ECSE)	JEC 3330A	kanaij@rpi.edu
1	Prof. Koushik Kar (ECSE)		koushik@ecse.rpi.edu
3	Prof. Rostyslav Korolov (ISYE)	CII 5207	ahmadn4@rpi.edu
4	Prof. Prabhakar Neti (ECSE)	JEC 6038	netip@rpi.edu
3	Prof. Kimberly Oakes (ECSE)	JEC 7006	oakesk2@rpi.edu
4	Prof. Chaitania Ullal (MATL)		ullalc@rpi.edu

Project Engineers

Office hours are shown in Project Engineers

Section(s)	Project Engineer	Office	Email
1, 2, 4	Mark Anderson	JEC 3332	anderm8@rpi.edu
1, 2, 3, 4	Brad DeBoer	JEC 3103	deboeb@rpi.edu
3	Prof. Junichi Kanai	JEC 3330A	kanaij@rpi.edu
1, 2, 3, 4	Kannathal Natarajan	JEC 3103	natark2@rpi.edu
2, 3, 4	Aren Paster	JEC 3103	pastea@rpi.edu

Teaching Assistant

Office hours are shown in Teaching Assistant

Section(s)	Teaching Assistant	Office	Email
--	Ahmed Abdelaal	TBD	abdela4@rpi.edu