Fall 2022 Common Course Syllabus (Rev. 1.1)

Course Information

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

Credit Hours: 3

Section	Days	Time	Class Room	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 (subject to Rensselaer's COVID 19 policy)
- 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:

- ENGR-2050 and 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 the Electronic Design Notebook (EDN):

https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/Self-learning_Materials

Online Resources

The table below 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).

Tool	URL
Electronic Design Notebook (EDN)	https://designlab.eng.rpi.edu/edn/
Webex Teams – Spaces	Project Engr will send an e-mail 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, usually related to their discipline. As responsible engineers, students must show how their designs function 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 manage a project
4. An ability to provide leadership
5. An ability to create an inclusive and equitable collaborative team environment
6. An ability to acquire and apply new knowledge to solve technical problems

Project Process (Course Content)

A recommended design process is used to scope the project and design, build, test, and deliver your proposed design solutions within schedule. The order of these activities may vary dependent on the goals of each project.

Week	Recommended Tasks
1	Team formation Online safety training
1~4	Research and gather customer needs; translate into engineering requirements Project scoping and planning, including risk analyses
4~7	Design concept generation, evaluation, and selection Define engineering specifications Design the system architecture 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
On-going	Team meetings both in class and out of class
	Status update presentations to the project partnerr (every 2-3 weeks)
	Minutes for each team meeting/breakout session

For more information, see the following wiki page.

https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/Tasks_and_Due_Dates

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 uses a holistic approach (vs. assignments and tests) to evaluate performance. It is required to **show all of your work using the online collaboration tool called Electronic Design Notebook (EDN).** Failure to document your work in the EDN will negatively impact your final grade.

Graded tasks are summarized in the following table, and your grades are posted to LMS. Your final grade is determined as:

Final Grade = (Team Grade * ICF) + Individual Grade where *ICF* is Individual Contribution Factor.

An ICF is holistically determined by your Capstone faculty advisor's observation of student performance, including but not limited to your active participation both in and out of classes, technical contributions, project management, teamwork, and communication, with input from your Project Engineer and peer evaluation.

For more information, see the following wiki page.

https://designlab.eng.rpi.edu/edn/projects/capstone-support-dev/wiki/Tasks_and_Due_Dates

Due Date	Deliverables	Assessment Type	Level of Assessment	% of Final Grade
9/12-9/16	Individual Feedback Session # 1	Feedback	Individual	-
9/15 (9/20)	Statement of Work	Rubric	Team	10
9/22 (9/27)	Background Memo	Rubric	Individual	5
9/26 (9/30) approx.	Status Report 1	Feedback	Team	-
10/6 (10/7)	Preliminary Design Review-Poster Presentation	Rubric	Team	5
			Individual (Oral)	5
10/11	Preliminary Design Report	Rubric	Team	15
10/12	Preliminary Peer Evaluation	Feedback	Individual	-
10/13-10/21	Individual Feedback Session # 2	Feedback	Individual	-
10/17-21 approx	Status Report 2	Feedback	Team	-
10/31-11/4 approx	Status Report 3	Feedback	Team	-
As needed	Individual Feedback Session # 3	Feedback	Individual	-
Week 15 - Final Exam Week	Final Design Review- Presentation & Poster	Rubric	Team	15
12/9	Final Design Report	Rubric	Team	30
12/12	Final Peer Evaluation	Feedback	Individual	-
Weekly (Weeks 4-15)	Project Management Using EDN	Rubric	Individual	5
Weekly (Weeks 2-15)	Documented Technical Contribution in EDN	Rubric	Individual	10
			Total	100

Attendance Policy

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

You are expected to communicate with your team, faculty advisor, and Project Engineer any absence from classes ahead of time. In addition, you are required to make up your work for a missed class(es); this also includes Excused Absences. Missing classes without catching up and being habitually late to classes 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

Mobile Devices - All mobile devices (cell/smartphones, computers/tablets, etc.) must be used appropriately in class. Negative participation (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. The following 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.

https://designlab.eng.rpi.edu/projects/capstone-support-dev/wiki/Confidentiality_Requirements

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.

Inclusive Guidelines: Another educational goal for students is to create an inclusive and equitable collaborative team environment. Each team must accommodate the needs (e.g., scheduling team meetings) of teammates. 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 Service 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.

COVID-19 Policy

Rensselaer is committed to the health and safety of all students. RPI will continue to monitor any new developments with COVID-19 and determine a course of action that will uphold the well-being of students while maintaining a quality educational experience.

Students must follow RPI's COVID-19 guidelines. For more information, see https://covid19.rpi.edu/

Attachment-A: Team Advisors and Teaching Assistants

Faculty/Chief Engineers

Office hours are shown in Chief Engineers.

Section(s)	Chief Engineer (Faculty)	Office	Email
1&2	Prof. Sarah Felix (MANE)	JEC 5044	felixs2@rpi.edu
1	Prof. Rena Huang (ECSE)	CII 6207	huangz3@rpi.edu
1	Prof. Rostyslav (Rosty) Korolov (ISYE)	CII 5223	korolr2@rpi.edu
4	Prof. Prabhakar Neti (ECSE)	JEC 6038	netip@rpi.edu
1	Prof. Edmund Palermo (MTLE)	MRC 206	pattea5@rpi.edu
3	Prof. Alex Patterson (ECSE)	JEC 6020	pattea5@rpi.edu
3	Prof. Indika Perera (MANE)	Gurley Building	pereru2@rpi.edu
2	Prof. Dylan Rees (ECSE)	JEC 6049	reesj3@rpi.edu
3	Prof. Chaitanya Ullal (MTLE)	MRC 112	ullalc@rpi.edu
4	Prof. Fred Willett (MANE)	JEC 5046	willef2@rpi.edu

Project Engineers

Office hours are shown in Project Engineers

Section(s)	Project Engineer	Office	Email
1, 2, 3, 4	Mark Anderson	JEC 2027	anderm8@rpi.edu
1, 2, 3, 4	Brad DeBoer	JEC 3103	deboeb@rpi.edu
1, 2, 3, 4	Prof. Junichi Kanai (ECSE)	JEC 3330A	kanaij@rpi.edu
1, 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
3 & 4	Deanna Ko (MANE)	--	kod@rpi.edu