

Spring 2021 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	Class Room	Fabrication Area
1	MR	10:10 AM-Noon	JEC 3232/3332	JEC 2332
2	MR	12:20 PM-02:10 PM	JEC 3232/3332	JEC 2332
3	TF	10:10AM - Noon	JEC 3232/3332	JEC 2332
4	TF	12:00 PM-12:10 PM	JEC 3232/3332	JEC 2332

- Note: Use the JEC3332 door to enter and the JEC 3232 door to leave.

Instruction Method:

- Hybrid (Online/In-Person) Course
- All instructions and lectures for all students will be available at Webex Cloud.
- Teams are required to take and share the minutes of each team meeting (breakout sessions). Each team will decide if breakout sessions will be recorded and shared with their teammates participating virtually.
- 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 and Senior Standing
- MTLE-4920 also requires MTLE-4910

Team Advisors (Instructors) and Teaching Assistant(s)

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 in an open-ended engineering design problem in preparation for professional practice. With the guidance of a multidisciplinary team of faculty members and instructional support staff, students apply knowledge and skills from prior coursework. This is a communication-intensive course.

Course Text

No required textbook is assigned to this course. You must research and collect information relevant to assigned projects. The textbooks used in previous courses are often useful as references. An example is *Design & Development Custom* by Ulrich-Eppinger used in IED.

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

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

Online Resources

The table below lists the online resources needed for this course. Please be sure that you are signed into each resource. If you are unable 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.

Tool	URL
Electronic Design Notebook (EDN)	https://designlab.eng.rpi.edu/edn/
Webex Teams - Spaces	You will receive an invitation(s).
Box at RPI for document preparation	You will receive an invitation
iPeer for Peer Evaluations and Self-Reflections	http://mdl-vm3.eng.rpi.edu/
Online Safety Training (optional)	https://rpi.percipio.com

Student Learning Outcomes

Students 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 but not always, related to their discipline. As responsible engineers, students need to show how their designs properly function in the context of the overall system. The 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 progress
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 collaborative team environment
6. An ability to acquire and apply new knowledge to solve technical problems

Project Process (Course Content)

The following table summarizes a recommended design process. These activities help you properly scope the project and design, build, test, and deliver your proposed design solutions on time. Since each project is unique, the order of these activities may change. You should discuss your project's needs with your advisors. (See Attachment-A.)

Week	Recommended Tasks
1	Team formation Online safety training
1~4	Researching and gathering customer needs and engineering requirements Scoping the project Project planning, including risk analyses
4~7	Concept generation, evaluation, and selection Defining engineering specifications System design Engineering analyses of critical issues and product risks
8~15	Detailed design System integration System test (evaluation)
15~16	Technology Transfer and Clean Up

Week	Recommended Tasks
On-going	Team meetings both in class and out of class
	Status update presentations

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 and experiments as needed. Note that students can use simulation and analytical methods, instead of physical prototyping and tests, to show their solutions' feasibility.

Your safety is very important. Persons violating safety rules or operational policies are subject to appropriate disciplinary action and/or immediate dismissal from the fabrication area by student lab supervisors, faculty, or staff. For more information, see the [Safety web page](#).

The following list shows the necessary procedure for facility access/use.

- Complete the online safety training.
- Obtain approval to use the facility from your Project Engineer (PE)
- Bring your safety glasses
- Follow RPI's safety and clean-up guidelines

Designated times for students to use the fabrication facility.

Time Slots	Mon	Tue	Thu	Fri
10:10-Noon	Section 1	Section 3	Section 1	Section 3
12:20-14:10	Section 2	Section 4	Section 2	Section 4
14:10-15:25	Sections 1 & 2	Sections 1 & 2	Sections 3 & 4	Sections 3 & 4
15:35-16:50	Sections 3 & 4	Sections 3 & 4	Sections 1 & 2	Sections 1 & 2

Course Assessment (Grading)

This project-based course uses a holistic approach (vs. assignments and tests) to evaluate students' performance. **Show all of your work using the online collaboration tool called Electronic Design Notebook (EDN).**

- <https://designlab.eng.rpi.edu/edn>

The following tables show graded tasks. Your final grade is determined as:

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

Team Tasks	% of Team Grade	% of Final Grade	Due Date
Statement of Work	7%	5%	2/11 (2/12)
Preliminary Design Review Presentation including a Poster	14%	10%	3/4 (3/5)
Preliminary Design Report	21%	15%	3/8 (3/9)
Final Design Review Presentation	21%	15%	Final Exam Week
Final Design Document	36%	25%	12/3
Weighted Total - Team	100%	70%	

Individual Tasks	% of Individ. Grade	% of Final Grade	Due Date
Risk Analysis Memo	17%	5%	2/22 (2/19)
Preliminary Design Review Presentation	17%	5%	3/4 (3/5)
Communicating with teammates, sponsor, and advisors	17%	5%	On-going
Project Management Using EDN	17%	5%	On-going
Documented Technical Contribution Quality, Quantity, and Timeliness	33%	10%	On-going
Weighted Total - Individual	100%	30%	

For more information, see the following wiki page.

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

Attendance Policy

Active participation is required for a meaningful capstone experience. You are expected to join meetings in real-time whenever possible and participate in meetings with your project team, faculty advisor, and sponsor mentor. You are also expected to make relevant technical and project management contributions outside of regularly scheduled class time.

You are expected to communicate with your team, faculty advisor, and PE any absence from classes ahead of time. You are required to make up your work for a missed class(es), even for an Excused Absence. 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 student's awareness of the need to protect confidential technical information. The Sponsorship Agreement describes the rules for handling information provided by the sponsor that is explicitly marked "confidential." Guidelines are also given for 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. 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 collaborative team environment. Each team must accommodate the needs (e.g., scheduling team meetings) of teammates who live in a distant time zone.

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 at 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, substitution. For details, see the [Academic Integrity web page](#).

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

COVID-19 Policy

RPI 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.

Masks/Shields: We know from existing data that wearing a mask in public can help prevent the spread of COVID-19 in the community. Rensselaer Polytechnic Institute has determined that everyone will be required to wear a face mask in all public spaces, including classrooms. You **MUST** wear a mask appropriately (i.e., covering both your mouth and nose) in the building if you are attending class in person. Masks have been provided for students, instructors, and staff, and everyone is expected to wear one. Students who choose not to wear a mask may not attend class in person. This is to protect their health and safety as well as the health and safety of their classmates, instructor, and the university community. Anyone attending class in person without a mask will be asked to put one on or leave.

Instructors will end class if anyone present refuses to appropriately wear a mask for the duration of the class. Students who refuse to wear masks appropriately or adhere to other stated requirements may face disciplinary action for Code of Conduct violations. Students who violate not wearing a mask will be reported to the Dean of Students and will be requested to leave a classroom of building and return to their living quarters. The Dean of Students will provide the appropriate sanctions for the students per the code of conduct signed by the students.

Traffic Flow and Social Distancing: *Students and faculty will respect the need for social distancing to the degree possible by the setting.* Please maintain six feet of space while walking into and out of classes and enter and exiting the building.

Faculty and students will move in and out of the classroom as per the appropriate instructions of the faculty/administration. They are expected to follow printed traffic flow statements posted in all rooms and buildings.

In-Class Seating: Faculty are asked to ensure that students sit in the appropriate designated seating in the classroom, using social distancing. Students are not allowed to move furniture or sit in seats not designated by the Institute.

Cleaning of Spaces: Students are encouraged to clean the surfaces of the chairs/tables/desks they occupy before they sit down and as they prepare to leave. Faculty should advise students to clean with wipes or clothes their own personal before and after class.

Student Health: On a case-by-case basis, students may consult with Student Disability Resources for accommodations if they cannot wear a mask. Students requiring such accommodations may be advised to take advantage of and participate in the course through remote learning.

Students who are experiencing COVID-19 related symptoms should not attend class in person and are encouraged to contact a health care provider. *Students who are ill, under quarantine for COVID-19, or suspect they are ill will report that to Student Life. Student Life will verify and notify all faculty who have that student. Once notification is made, all faculty will make every reasonable effort to accommodate the student's absence and will communicate that accommodation directly to the student. Failure to make appropriate accommodation for a verified or reasonably suspected case of illness may be appealable under the student grade appeal process. Students who need to report an illness should contact [Office of the Dean of Student](#). They may also call: 518-276-6266.*

Refusal: Refusal to comply with any appropriate request will be treated as would any classroom disruption (request to change the behavior; request to leave the class; dismissal of the class and referral to Student Affairs.)

Food and Beverage: Food and beverages are not permitted in the Design Lab or Fabrication Facility.

Attachment-A: Team Advisors and Teaching Assistants

Faculty/Chief Engineers

Office hours are shown in [Chief Engineers](#).

Section(s)	Chief Engineer	Office	Email
4	Prof. Bharat Bagepalli (MANE)	JEC 4020	bagepb@rpi.edu
4	Prof. Ishwara Bhat (ECSE)	JEC 6032	bhati@rpi.edu
1	Prof. Kathryn Dannemann (MTLE)	JEC 3332	Dannek2@rpi.edu
2	Prof. David Duquette (MTLE)	MRC 104	duqued@rpi.edu
4	Prof. Mark Embrechts (ISYE)	CII 5129	embrem@rpi.edu
3, 4	Prof. Sarah Felix (MANE)		felixs2@rpi.edu
1	Prof. Agung Julius (ECSE)	JEC 6027	agung@ecse.rpi.edu
2, 3	Prof. Junichi Kanai (ECSE)	JEC 3330A	kanaij@rpi.edu
3	Prof. Sandipan Mishra (MANE)	JEC2049	Mishrs2@rpi.edu
2	Prof. Karthikeyan Panneerselvam		pannek2@rpi.edu
2, 3	Prof. Dylan Rees (ECSE)		Reesj3@rpi.edu
1	Prof. William (Al) Wallace (ISYE)	CII 5015	wallaw@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, 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)	Project Engineer	Office	Email
	Jim Olson		olsonj5@rpi.edu