ENGR2050 Syllabus
Spring 2024
<u>Sections 06, 07, 08, 09, 10</u>

Course Information:
Course Title: Introduction to Engineering Design
Course Number: ENGR2050
Credit Hours: 4
Prerequisites: ENGR1100, ENGR1200/ENGR1400
Corequisites: PHYS1200

Instructors:

Section	Time	Classroom	Name/Email
06	MR 12PM-1:50PM	JEC3207	Daniel Lander (landed2@rpi.edu), Judith Obiero (obierj@rpi.edu)
07	TF 10AM-11:50AM	JEC3207	Julia Carroll (carroj7@rpi.edu), Glen Gross (grossg4@rpi.edu)
08	TF 12PM-1:50PM	JEC3207	Semih Akin (akins@rpi.edu), Glen Gross (grossg4@rpi.edu)
09	TF 2PM-3:50PM	JEC3232	George Lee (leeg11@rpi.edu), Judith Obiero (obierj@rpi.edu)
10	TF 10AM-11:50AM	JEC4304	Sergei Shenogin (shenos3@rpi.edu), Tracy Sullivan (SCHIET@rpi.edu)

Course Description and Course Structure:
Introduction to Engineering Design is an introductory course that allows students to experience the engineering design process in a team setting. Students will learn about understanding user needs, defining design specifications, concept ideation, design refinement, fabricating a proof-of-concept prototype, working in a team, and other design related topics. This course is project and team based and encourages students to apply knowledge they have learned in other classes combined with additional research to understand a problem area and develop solutions. Students are expected to come to every class and work as a part of a team.

Course Goals/Objectives:
The goal of this course is for students to learn about the design process and how to work in teams. Understanding the design process, starting from finding a problem area and understanding user needs to creating a final design will allow students to understand the practicality of their engineering skills and how they can use their skills to improve peoples' lives.

The course also includes the professional development objectives to provide students with an introduction to a simulated professional work environment where they can be exposed to the current body of knowledge relating to effective teams and interpersonal communication in a culturally competent environment. Coursework is delivered in an experiential manner and consists of competency based learning designed to foster effective teamwork and communication skills. Coursework and assignments are designed for students to gain content specific knowledge as well as to provide them with opportunities to analyze and apply basic concepts in a simulated professional environment. Professional Development content material meets specific ABET accreditation requirements and is integral to the course.

Student Learning Objectives:
1. Students will demonstrate an understanding and ability to implement the engineering design process and engineering principles to solve complex problems
2. Students will demonstrate the ability to identify engineering problems, determine stakeholders, and assess user needs
3. Students will demonstrate the ability to develop design specifications based on user needs
4. Students will demonstrate the ability to integrate professional, societal, and ethical considerations and the role diversity, equity, and inclusion as part of the engineering design process
5. Students will demonstrate ability to communicate engineering concepts with a variety of audiences using different forms of communication
6. Students will demonstrate the ability to work as part of a team and assume various leadership roles within the team
7. Students will demonstrate the ability to perform background research to acquire and apply new knowledge relevant to their project area

Academic Integrity:
Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Acts that violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. All assignments outside of class must be completed individually and without aid from Artificial Intelligence (AI) software/programs unless prior approval is granted by the instructor.

Diversity, Equity, and Inclusion:
We will strive to provide an environment that is equitable and conducive to achievement and learning for all students. We ask that we all be respectful of diverse opinions and of all class members, regardless of personal attribute. We ask that we all use inclusive language in written and oral work, and in the classroom. School of Engineering (SoE) policy is that no students, faculty and staff shall be excluded on the grounds of gender, race, class, religion, sexuality, disability, etc. The free exchange of ideas, as well as diversity of background, experience, and views contributes to the learning experience, and further broadens and adds strength to our learning community. All participants in this course are encouraged to recognize the diversity around them and are expected to treat their classmates, TAs, and instructor with respect. Disrespectful, harmful, offensive, bigoted, or violent language or behavior will not be tolerated. We are committed to ensuring full participation of all students in this course. If you have a documented disability (or think you may have a disability) and, as a result, need a reasonable accommodation to participate in this class, complete the course requirements, or benefit from the Institute's programs or services, contact the Office of Disability Services for Students (DSS) as soon as possible. To receive any academic accommodation, you must be appropriately registered with DSS. After registration, contact me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. DSS contact information: dss@rpi.edu; 518-276-2231, 4226 Academy Hall.

Disability Services:
Rensselaer Polytechnic Institute strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on a disability, please let me know immediately so that we can discuss your options. To establish reasonable accommodations, please register with The Office of Disability Services for Students. After registration, make arrangements with the Director of Disability Services as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. DSS contact information: dss@rpi.edu; +1-518-276-8197; 4226 Academy Hall.

Support Services:

RPInfo - contains various resource links for students, academic resources, support services, and safety & emergency preparedness.

Academic Assistance	ALAC—Advising and Learning Assistance Center	518.276.6269	https://info.rpi.edu/advising-learning-assistance/
Student Health and Wellness	Counseling Center	518.276.6479	https://studenthealth.rpi.edu/list-services/counseling-center
	Student Health Center	518.276.6287	https://studenthealth.rpi.edu/list-services/student-health-center
Student Support Services	Class Deans, Undergraduate Dean, Graduate Experience Dean, Student Success Dean, First Year Experience	518.276.8022	https://success.studentlife.rpi.edu/
RPI Info	Central Information Hub for the campus		https://info.rpi.edu
DOTCIO (IT Services)	Help Desk	518.276.7777	
	Submit a ticket to IT Services and Support Center		https://itssc.rpi.edu/hc/en-us

Course Grading Criteria:

Assessment	% of total grade
MS1 (Team Grade)	10
MS2 (Individual/Sub-team Grade)	10
MS3 (Team Grade)	10
MS4 (Individual/Sub-team Grade)	10
MS5 (Team/Sub-team Grade)	10
MS6 (Individual/Team Grade)	20
Showcase Presentation (Team Grade)	10
Quizzes (Individual Grade)	5
Mid-Semester Peer Evaluation (Individual Grade)	5
Graded Activities (Individual/Team Grade)	5
Sketchbook (Individual Grade)	5

Letter Grade	Range
A	**92 ≤ grade**
A-	**90 ≤ grade < 92**
B+	**87 ≤ grade < 90**
B	**84 ≤ grade < 87**
B-	**80 ≤ grade < 84**
C+	**77 ≤ grade < 80**
C	**74 ≤ grade < 77**
C-	**70 ≤ grade < 74**
D+	**67 ≤ grade < 70**
D	**60 ≤ grade < 67**
F	**grade < 60**

Milestone Overview (see rubrics and guidance documents for greater detail):

- **Milestone 1 (Problem Definition Presentation)** – Students will give a presentation that describes the problem they are designing a solution for, as well as the associated user needs and specifications.
- **Milestone 2 (Ideation Derby Presentation)** – Students will give a presentation that summarizes their design concept generation and selection process.
- **Milestone 3 (Concept Report)** – Students will write a report that describes the problem they are designing to solve, user needs and specifications, and details on their selected design concept.
- **Milestone 4 (Sub-system Demos)** – Students will demonstrate proof-of-concept for the key subsystems within their design.
- **Milestone 5 (System Integration Demo)** – Students will demonstrate proof-of-concept of how their subsystems will integrate to create a cohesive design.
- **Milestone 6 (Final Design Report and Reflection)** – Students will write a report that summarizes previous milestones and discusses design for manufacture. Students will also reflect on their personal and team growth throughout the semester.

Course Calendar (Section 06 [Monday/Thursday]):

Week	Monday Date	Monday Topic	Thursday Date	Thursday Topic
1	1/8	Class 1 – Introductions, *Community Agreements, Team Assignments*	1/11	Class 2 –*Team Development*, Problem Identification Introduction
2	1/15	NO CLASS	1/18	Class 3 –*Team and Community Development Follow-up*, Problem Identification **Quiz 1**
3	1/22	Class 4 – Brainstorming, *DEI Discussion*	1/25	Class 5 – Professional and Societal Considerations, Why DEI Matters, User Needs and Specifications
4	1/29	Class 6 – User Research, Planning Tools, *Public Speaking* and Technical Presentations	2/1	Class 7 – Design Criteria and Problem Definition, Consultations **Quiz 2**
5	2/5	Class 8 – Design Criteria and Problem Definition, Consultations	2/8	Class 9 – **MS1 Problem Definition Presentation (Team)**
6	2/12	Class 10 – Ideation Derby Overview	2/15	Class 11 – *MBTI*, Concept Selection
7	2/20 (TUESDAY)	Class 12 – Technical Writing, Consultations	2/22	Class 13 – *Feedback and Conflict*, Consultations **Quiz 3**
8	2/26	Class 14 – **MS2: Ideation Derby Presentations (Sub-Team)**	2/29	Class 15 – Review user needs, specifications, problem definition
9	3/4	NO CLASS	3/7	NO CLASS
10	3/11	Class 16 – Subsystem definition, team work allocations, planning **MS3 – Concept Reports Due Wed (3/13) (Team)** *Sketchbook check 1*	3/14	Class 17 – Proof of concept and "engineering design", DFM
11	3/18	Class 18 – Consultations (Critical path, planning, *mid-semester feedback*)	3/21	Class 19 – Consultations (testing plan, testing for specifications) **Quiz 4**
12	3/25	Class 20 – MS4 review, team time	3/28	Class 21 – MS4 review, team time
13	4/1	Class 22 – **MS4 Subsystem Demos (Sub-Team)**	4/4	Class 23 – Review of MS4 and Planning for MS5
14	4/8	Class 24 – Team time	4/11	Class 25 – Culminating Reflection, *Assessing Team and Personal Performance*, and Preparation for MS6 Final Design **Quiz 5**
15	4/15	Class 26 – **MS5 System Integration Demo (Team/Sub-team)** *Sketchbook check 2*	4/18	Class 27 – Team time
16	4/22	Class 28 – Team time	4/24 (WEDNESDAY)	**SHOWCASE PRESENTATION (Team), MS6 Final Design Report Due (Team) and Reflection Due (Individual)** 9:30AM-11:30AM Location: TBD

Course Calendar (Sections 07, 08, 09, 10 [Tuesday/Friday]):

Week	Date	Topic (Tuesday)	Date	Topic (Friday)
		Tuesday		**Friday**
Week	**Date**	**Topic**	**Date**	**Topic**
1	1/9	Class 1 – Introductions, *Community Agreements, Team Assignments*	1/12	Class 2 –*Team Development*, Problem Identification Introduction
2	1/16	Class 3 –*Team and Community Development Follow-up*, Problem Identification **Quiz 1**	1/19	Class 4 – Brainstorming, *DEI Discussion*
3	1/23	Class 5 – Professional and Societal Considerations, Why DEI Matters, User Needs and Specifications	1/26	Class 6 – User Research, Planning Tools, *Public Speaking* and Technical Presentations
4	1/30	Class 7 – Design Criteria and Problem Definition, Consultations **Quiz 2**	2/2	Class 8 – Design Criteria and Problem Definition, Consultations
5	2/6	Class 9 – **MS1 Problem Definition Presentation (Team)**	2/9	Class 10 – Ideation Derby Overview
6	2/13	Class 11 – *MBTI*, Concept Selection	2/16	Class 12 – Technical Writing, Consultations
7	2/20	NO CLASS	2/23	Class 13 – *Feedback and Conflict*, Consultations **Quiz 3**
8	2/27	Class 14 – **MS2: Ideation Derby Presentations (Sub-Team)**	3/1	Class 15 – Review user needs, specifications, problem definition
9	3/5	NO CLASS	3/8	NO CLASS
10	3/12	Class 16 – Subsystem definition, team work allocations, planning **MS3 – Concept Reports Due Wed (3/13) (Team)** *Sketchbook check 1*	3/15	Class 17 – Proof of concept and "engineering design", DFM
11	3/19	Class 18 – Consultations (Critical path, planning, *mid-semester feedback*)	3/22	Class 19 – Consultations (testing plan, testing for specifications) **Quiz 4**
12	3/26	Class 20 – MS4 review, team time	3/29	Class 21 – MS4 review, team time
13	4/2	Class 22 – **MS4 Subsystem Demos (Sub-Team)**	4/5	Class 23 – Review of MS4 and Planning for MS5
14	4/9	Class 24 – Team time	4/12	Class 25 – Culminating Reflection, *Assessing Team and Personal Performance*, and Preparation for MS6 Final Design **Quiz 5**
15	4/16	Class 26 – **MS5 System Integration Demo (Team/Sub-team)** *Sketchbook check 2*	4/19	Class 27 – Team time
16	4/23	Class 28 – Team time	4/24 (WEDNESDAY)	**SHOWCASE PRESENTATION (Team), MS6 Final Design Report Due (Team) and Reflection Due (Individual)** 9:30AM-11:30AM Location: TBD