Mechanical Engineering Department
ME-322 Engineering Design VI
Spring 2025

Course Name: Engineering Design VI, ME322

Instructor: Prof. Sayed Aziz e-mail: eaziz@stevens.edu[1]

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Lab:	ME 322LA	Tue	10:00am-11:50am	Classroom: Burchard 102
Lecture:	ME 322A	Thurs	10:00am-11:50am	

Course Description: Introduction to modern systematic design techniques used in the practice of mechanical engineering. Methodology for the development of design objective(s), literature surveys, base case designs, and design alternatives are given. Integrated product and process design concepts are emphasized with case studies. Design projects and prototypes are required of all students.

Course Materials: Canvas will be used for course-wide messaging, posting lecture videos/slides, in-lecture activities, project materials, assignments, and processing student submissions. **Students are responsible for checking their Canvas inbox and Stevens email daily.**

- **Textbook:** Product Design and Development, 7th ed. / Ulrich, Eppinger & Yang / McGraw-Hill, 2020 / ISBN-13: 9781260043655
- **Software:** SolidWorks and/or Creo. Available for download (Windows OS required) or on Apporto.
- **Equipment:** Arduino Uno kit will be provided to each team.

Course Objectives: *After successful completion of this course, you will be able to:*

- Methodically develop a promising design concept following a systematic product development approach
  - Define a problem statement, establish design constraints, and justify design decisions
  - Generate, evaluate and select design concepts
  - Refine your concept from system-level design to detailed design
- Gather relevant information and conduct appropriate benchmarking of competitive products
- Use the relevant engineering tools necessary to test and analyze your design to inform your redesign
- Create a product alpha-prototype that demonstrates proof-of-concept
- Evaluate the performance of a product design based on technical and non-technical criteria
- Communicate effectively and professionally through written reports and oral presentations
- Recognize your ethical and professional responsibilities when carrying out an engineering design
- Assess the environmental impacts of your design and develop improved designs for sustainability
- Apply design rules for material selection, design for manufacturability, design for assembly
- Support your team members and contribute toward the achievement of team goals
- Plan and manage a practical design project with respect to team member roles, scheduling, budgeting, and deliverables
- Demonstrate an understanding of intellectual property law and procedure

[1] Any email correspondence with the professor(s) and/or TA(s) ****MUST**** include the course number (**ME-322**) in the email subject line. Messages without the course number in the subject line may go unanswered.

Course Assessment:

Pre-reading quizzes	10%
In class group activities	10%
Lab assignments	15%
Peer assessments	5%
Term project	**60%**
Course	100%

Term project breakdown:

Weekly report sections	(10%)
Proposal presentation	(10%)
proposal report	(10%)
Final presentation	(10%)
Final prototype	(10%)
Final report	(10%)

IMPORTANT!

Insufficient contribution to the term project may result in grade reduction and/or failure of the course.

Late submissions policy:

Canvas automatically deducts 0.4% for every hour a submission is late

Class Format: Our lecture class will follow the "Flipped Classroom" paradigm. In a traditional classroom, class time is used to deliver content through lectures, and exercises/problems are completed outside of class as homework. In a flipped classroom, you will review the lecture material BEFORE the next class as homework. This allows us to spend our class time together on interactive activities/discussions and gives you more time to work on your project in teams.

Instructional videos (content delivery) will be posted to Canvas in advance of each lecture class. **It is each student's responsibility to review these videos BEFORE lecture meetings.** In-class lecture time will be spent completing content-specific assignments and discussions in an interactive manner.

Laboratory activities will be more conventional, and feature hands-on experiments, computer-based assignments, and group-based project work time.

Attendance of lectures and lab is required. Please be on time. All students are required to bring their laptop computers to lecture and lab.

Assignments: Assignments should be electronically submitted through Canvas by the designated due date unless otherwise noted. Reports should be professionally organized in a manner consistent with engineering standards and submitted in either PDF or MS Word format. Each report must contain a cover page that includes the assignment title/designation, assigned group number, a list of group members, the course number (ME 322), the submission date, and the Stevens pledge.

ACADEMIC INTEGRITY

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at https://web.stevens.edu/honor.

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"*I pledge my honor that I have abided by the Stevens Honor System.*"

Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at https://web.stevens.edu/honor/ .

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LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodation on a case-by-case basis. **Please notify me in advance to request academic accommodation.**

COURSE SCHEDULE

A tentative course schedule is posted on Canvas. Students will be notified of any changes.

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Week	Tue: Lab	Thurs: Lesson / Lecture	Project Deliverables (Required)
1 1/21 – 1/24	Course overview Intro to Lab (Arduino configuration & Tinkercad)	Intro to product development (PD) Development processes & organizations	Team formation Project Selection (Due: 1/24)
2 1/27 – 1/31	Mechatronics WS 1	Identifying customer needs Product specifications, QFD	Introduction State-of-art review (Due: 1/30)
3 2/3 – 2/7	Mechatronics WS 2	Concept generation Concept selection	Stakeholder needs Target specs using QFD (Due: 2/6)
4 2/10 – 2/14	*Project work time*	Concept testing Project management	Concept generation (min. 3) Concept selection (Due: 2/13)
5 2/17 – 2/21	No Lab (Monday Class Schedule)	Product Architecture	Areas of technical analysis Project plan (Gantt chart) (Due: 2/20)
6 2/24 – 2/28	Mechatronics WS 3	Rapid prototyping – MakerSpace tour workshop	System-level concept design Concept architecture (sys diagram) (Due: 2/27)
7 3/3 – 3/7	Arduino Programming	*Project work time*	**Proposal report** **(Due: 3/11)**
8 3/10 – 3/14	**Proposal presentations**		
3/16 – 3/23	**Spring Recess, No Classes**		
9 3/18 – 3/22	Mechatronics WS 4	Industrial design	Alpha-prototype plan Project management (Due: 3/21)
10 3/24 – 3/28	SolidWorks Sustainability Xpress, DFMXpress	Design for environment	Engineering analysis (Design Calcs) Electrical & software diagrams (Due: 3/27)
11 3/31 – 4/4	*Project work time*	Design for manufacturing and assembly (DFMA)	Design revisions / Updated solid models Prototype BOM (Due: 4/3)
12 4/7 – 4/11	Engineering ethics	Engineering ethics	Ethical implications, Relevant codes/standards (Due: 4/10)
13 4/14 – 4/18	*Project work time*	Codes and Standards	Design overview Relevant IP (Due: 4/17)
14 4/21 – 4/25	*Project work time*	Patents & intellectual property Intro to senior design	
15 4/28 – 5/2	*Project work time*	**Final Presentation / Alpha-Prototype**	**Final Presentation / Alpha-Prototype** (Due: 5/1)
16 5/5 – 5/6	**Final Presentation / Alpha-Prototype Demonstration**		**Final report** (Due: 5/7)

Last revised: 1/17/2025