## WELCOME TO YOUR ENGINEERING DESIGN CLASS!

How does a product go from an initial concept to the final market launch? While the journey from ideation to commercialization may vary for different products, most successful businesses follow a systematic product development process. **Product development** is an interdisciplinary activity that involves marketing, design, and manufacturing functions.
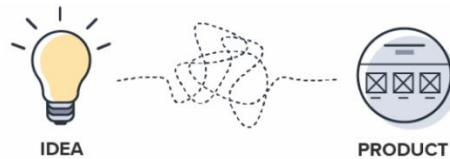
The successful design of a product relies on clearly defining and meeting the needs of the customer (design objectives) under a specified time frame and budget (design constraints). We will use case studies to learn about the process behind-the-scenes in the development of various consumer products – perhaps some that you use every day! You will work in teams to **design and develop an engineered product** of your own, following a systematic product development approach.

COURSE OBJECTIVES

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

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

EXTRA GUIDANCE

Have a question? Start a discussion on Canvas! You can also come to my office hours, or feel free to email me about any questions or concerns. Please include the course number (**ME 322**) in the email subject line.

ME 322: ENGINEERING DESIGN VI

INSTRUCTOR:	CLASS MEETINGS:
Prof. Maxine Fontaine	
Department of Mechanical Engineering	**ME 322B – Lecture/Lab**
Email: maxine.fontaine@stevens.edu	Tues/Thurs 10:00am-11:50am
Office: Carnegie 209	*Howe 303*
Office Hours: Mon/Wed 1-3PM, or by appointment	
	ME 322C – Lecture/Lab
TEACHING ASSISTANTS:	Tues/Thurs 12:30pm-2:20pm
Mohammad Hosseini (shossei3@stevens.edu)	*Howe 102*
Nima Kalantari (mkalanta@stevens.edu)	
Zitao Tang (ztang14@stevens.edu)	

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. *Prerequisites:* E 321

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 <u>daily</u>.**

- **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.

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. <u>It is your responsibility to review these videos BEFORE lecture meetings.</u>

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

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

COURSE SCHEDULE

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

COURSE ASSESSMENT

		Term project breakdown:	
Reading quizzes	10%	Proposal report	(10%)
In-class group activities	5%	Proposal presentation	(10%)
Weekly report sections	5%	Final report	(15%)
Lab assignments	15%	Final presentation	(15%)
Peer assessments	5%	Final prototype	(10%)
Term project	**60%**		
Course	100%		

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

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.

LEARNING ACCOMMODATIONS

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 accommodations on a case-by-case basis. **Please notify me in advance to request academic accommodations.**