San José State University
Mechanical Engineering Department
ME 256 Product Design and Development, Spring 2019

Course and Contact Information

Instructor	Dr. Vimal Viswanathan
Office Location	E310A
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Email	vimal.viswanathan@sjsu.edu
Office Hours	MW 3:15 – 4:15pm
Class Days/Time	MW 4:30 -5:45pm
Classroom	Moorehead Hall 162
Prerequisites	Graduate standing with a solid modeling knowledge

Course Format

This is a mixed-mode class, with both in-person and online components. Online components require use of the Canvas learning management system, accessed via https://sjsu.instructure.com/. Successful completion of course requirements necessitates accessing the course website frequently, typically at least twice a week on a regular basis. Technical support for Canvas is available at the SJSU website. Important communications regarding this class may be sent via Canvas or to email addresses listed in MySJSU, and thus each student is expected to maintain up-to-date contact information in both systems.

This is a project-based class. The project activities need to be performed concurrently with the corresponding lectures. In a typical class period, half of the class time will be used for the lecture on a specific technique and during the second half, teams are expected to apply that technique on their design project. Any leftover work should be completed as a homework before the next class period. Attendance is mandatory in all classes. If you miss a class for unforeseen reasons, it is your responsibility to communicate that with your team so that the team's performance in the design project will not suffer.

Course Description

Introduction to the product development process as followed in the industry, latest developments in identifying product opportunities, understanding customer requirements, converting them to technical requirements, functional modeling, concept generation, selection and evaluation, latest trends in product design, patenting and intellectual property rights, group design project.

Course Learning Outcomes

Upon successful completion of this course, student will be able to:

1. Apply robust design techniques for mechanical product development.
2. Apply structured design methods such as customer needs analysis, functional modeling, optimization, and designed experiments on mechanical products.
3. Apply economic analysis for new product design and development.
4. Design a mechanical product with environmental concern.

5. Apply task management techniques for product development project.
6. Work as a team to accomplish a project goal.

Required Text/Readings

Textbook

1. "Product Design: Techniques in Reverse Engineering and New Product Development", by Kevin Otto & Kristin Wood, Pearson Education (ISBN # 9780130212719)

Reference

1. "Product Design and Development" by Karl Ulrich and Steven Eppinger, McGraw Hill Education, 6th Edition (ISBN # 0078029066)

2. "The Mechanical Design Process" by David G. Ullman, 6th Ed., available at https://www.mechdesignprocess.com/

Course Requirements and Assignments

Homework problems will be assigned corresponding to lecture topics and reading assignments from the textbook. Homework is due at the very beginning of class on designated deadline dates and late submission receives zero credit. (See "Exceptions" below regarding petition for extenuating circumstances).

Design Project: Students are responsible for working in a team to design a product, create a virtual model and demonstrate the functionality of their design. Teams will also be responsible for conducting market research as needed. Details are provided via separate documentation.

Throughout the semester there will be several participation tasks to promote active engagement. Specific examples include assigned discussion posts, online quizzes or surveys, and peer review. These will be tallied for credit with strict deadlines and there are no make-up options. Tasks may be in-class or online, so it is important to attend class and to check Canvas regularly.

Final Examination or Evaluation

The final exam will be comprehensive, covering all material presented in class. There will be no make-ups for missed exams, except for medical or other reasons outside the student's control, and such must be documented with a written notice.

Grading Information

The course grade will be weighted as follows:
20% for Homework/classwork
10% for Participation Tasks, reading assignments and quizzes
20% for Midterm Exam
25% for Design Project
25% for Final Exam

Grading Information

A	greater than 93	A-	90 to 92.9		
B+	87 to 89.9	B	83 to 86.9	B-	80 to 82.9
C+	77 to 79.9	C	73 to 76.9	C-	70 to 72.9
D+	67 to 69.9	D	63 to 69.9	D-	60 to 62.9
F	less than 60				

Examinations

One 75-minute midterm and one 75-minute final examination.

Class Protocol

Class participation and attendance are strongly encouraged. Use of cell-phones are not allowed. Laptop computers and tablet are allowed.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page.

Course Schedule

This schedule is subject to change with fair notice via announcement in class or notification via Canvas. Specific reading assignments and deadlines will be communicated in Canvas.

Week of	Topics	Classwork/homework	Notes
January 21	No classes	None	Classes begin on January 24
January 28	Introductions, case study on product design, Team formation	Team formation	
February 4	Identification of market needs, tactics to identify opportunity gaps	Market need identification, creation of project(s)	Deadline to drop classes: Feb 5th
February 11	Presentation of proposed project(s), understanding customer needs	Selection of projects, customer needs collection	Deadline to add classes: Feb 12th
February 18	Product planning and development of mission statement(s)	Mission statement for the project	
February 25	Establishing technical specifications – qualitative function deployment process	House of quality for the project	
March 4	Reverse engineering and benchmarking	Benchmarking for the project	
March 11	Establishing product function – functional modeling	Function structure for the project	
March 18	techniques for concept generation, midterm exam	None	Midterm exam: March 20th
March 25	Concept generation, TRIZ	Concept generation for the project	
April 1	No classes	None	Spring recess
April 8	Bio-inspired design, concept selection	Pugh Chart for the project	
April 15	Product architecture and platform planning	Prototyping for the project	
April 22	Design for X (manufacturability, assembly, environment) consideration	Prototyping for the project (continued)	

April 29	Modeling and experimentation	Experimentation & evaluation data	
May 6	Review, final exam	None	Final exam: May 8th
May 13	Project video presentation	None	Last day of class – May 13

Final project report & peer evaluation document are due on May 17th, 5:00pm (during the scheduled final exam time) – no extensions possible

Each classwork/homework is due on the Monday of the following week unless otherwise specified.