:	Dr. Raymond K. Yee
:	Engineering Building, room 310B
:	(408) 924-3935
:	Raymond.yee@sjsu.edu
:	Monday 1-2PM, Wednesday 4-5PM
:	MW 10-11:45AM
:	Engineering Building Room 329
:	ME154 with a C- or better, co-requisite: ME110

This is an in-class lecture mode course. Students are expected to be present each class for learning.

Introduction to the mechanical design process: Design specification development, conceptual design, and product design process. Application of the fundamentals from statics, dynamics, strength of materials, static and fatigue failure theories are applied to specific machine components. Emphasis will be placed on the integration of the mechanical engineering disciplines and systematic integrated approach to design of machine elements and systems. Plastics materials in design will be briefly introduced. Also fundamental of fracture mechanics will be covered in this course. The required group design project will increase the students' understanding of the design process. 3 units.

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

By the end of the course, students should be able to:

1. *Select a product to design or modify an existing one, based on market research, and carry it through the design process up to building the CAD prototype and evaluation for function.*
2. *Apply the mechanical design process and learned methodology to the project.*
3. *Determine the location and magnitude of the maximum stress on a component.*
4. *Estimate the value of the stress concentration factor and apply it correctly to the stress component.*
5. *Design a machine component to guard against yielding or fracturing under static load using the appropriate failure criteria and safety factors.*
6. *Design a machine component to guard against fatigue failure, either using the classical approach or the fracture toughness approach.*
7. *Identify factors that have an influence on the design and selection of different machine components.*
8. *Design a spring, given the applied load and desired deflection, and select it from catalogs.*

9. *Select a suitable bearing from catalogs by knowing the bearing loads (radial and thrust), bearing life and reliability.*
10. *Design a gear reducer (planetary or conventional) to obtain a certain output speed and use AGMA code to determine the allowable load and select a suitable gear from catalogs.*
11. *Aware of the choices they have when it comes to material selections: metals as compared to plastics.*
12. *Work as a team to accomplish the project goals.*

(1) Ullman, D.G., "The Mechanical Design Process", 6th Ed., 2018 ISBN 978-0-9993578-0-4
(2) Robert L. Norton, "Machine Design", 5th Edition, Prentice Hall, 2014 (MD) ISBN 978-0-13-335671-7
(3) Handout Notes

1. Juvinall and Marshek, "Fundamentals of Machine Component Design", 5th edition, Wiley, 2012.
2. Shigley, Mischke, and Budynas, "Mechanical Engineering Design", 10th edition, McGrawHill, 2014.
3. Baumeister, Avallon, et al, Marks Handbook for Mechanical Engineers.
4. American Society for Metals, Metals Handbook, Vols. 8 & 10.
5. Young and Budynas, Roark's Formulas for Stress and Strain, 7th ed, McGraw Hill, 2002.
6. Rolfe, Barsom, Fracture and Fatigue Control in Structure, Prentice Hall, 1977.
7. Dudley, W.D., Practical Gear Design, McGraw Hill, 1984
8. Ertas, Atila and Jones, Jesse, The Engineering Design Process, Wiley, 1993

Design project will be required for this course. Students are asked to design either a brand new product/system or improve an existing product/system substantially that is related to human daily life. Refer to project handout for details.

One midterm and one final exam.

Weekly reading of the text and homework problems. Usually due in one week unless notice otherwise.
Note: Late homework assignments will not be accepted unless with valid excuse approved by the University!

: Students are encouraged to actively participate in class discussion and example problem solving.

FINAL Exam: Thursday December 12, 2019 from 9:45 to 12noon (No alternative arrangement)

In the classroom, faculty allow students to use computers only for class-related activities. These include activities such as taking notes on the lecture underway, following the lecture on Web-based PowerPoint slides that the instructor has posted, and finding Web sites to which the instructor directs students at the time of the lecture. Students who use their computers for other activities or who abuse the equipment in any way, at a minimum, will be asked to leave the class and, at a maximum, will be referred to the Judicial Affairs Officer of the University for disrupting the course. (Such referral can lead to suspension from the University.) Students are urged to report to their instructors computer use that they regard as inappropriate (i.e., used for activities that are not class related).

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

This schedule is subject to change with fair notice via announcement in class or notification via Canvas.

1	8/21	Course organization. Introduction to design process (Ch 1, 4 in Ullman)
2	8/26	Project discussion. Introduction to design process (Ch 1, 4 in Ullman)
2	8/28	Planning phase; Identification of a need; Specifications development. (Ch 5, 6 in Ullman)
3	9/2	
3	9/4	Concept generation (Ch 7 in Ullman)
4	9/9	Concept generation (Ch 7 in Ullman) Concept evaluation (Ch 8 in Ullman)

12	11/4	Spur gear design based on bending and surface fatigue strength; AGMA design code (Ch 12 in MD)
12	11/6	Spur gear design based on bending and surface fatigue strength; AGMA design code (Ch 12 in MD)
13	11/11	
13	11/13	Helical gear design (Ch 13 in MD)
14	11/18	Helical gear design (Ch 13 in MD)
14	11/20	Fatigue design using fracture mechanics approach, plastic zone, fracture toughness, stable crack propagation rate. (Notes)
15	11/25	Fatigue design using fracture mechanics approach, plastic zone, fracture toughness, stable crack propagation rate. (Notes)
15	11/27	
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