

1. *Course number and name*

ENGR 464: Mechanical Design

2. *Credits and contact hours*

3 credit hours: two 50-minute lecture sessions/week and one 2-hour-45-minute laboratory session/week

3. *Instructor's or course coordinator's name*

Instructor: Kwok Siong Teh, Associate Professor of Mechanical Engineering

Course coordinator: Kwok Siong Teh, Associate Professor of Mechanical Engineering

4. *Text book, title, author, and year*

Richard Budynas and Keith Nisbett, Shigley's Mechanical Engineering Design (9th Ed), McGraw-Hill, 2010.

a. *other supplemental materials*

Robert Mott, Machine Elements in Mechanical Design (5th Ed), Pearson, 2013.

5. *Specific course information*

a. *brief description of the content of the course (catalog description)*

Application of principles of mechanics, materials science, and stress analysis to design components and machines. Mechanical behavior of materials. Synthesis and analysis of major machine design project.

b. *prerequisites or co-requisites*

ENGR 364: Materials and Manufacturing

c. *indicate whether a required, elective, or selected elective course in the program*

Required for Mechanical Engineering.

6. *Specific goals for the course*

a. *specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*

- Students will demonstrate the ability to quantify the mechanical behavior of materials under elastic, elastoplastic, and plastic deformation
- Students will demonstrate the ability to predict materials failures under static and dynamic loading using appropriate choice of failure theories
- Students will demonstrate they can perform stress analysis on simple mechanical components in order to obtain the correct geometry

- Students are able to design common mechanical components and systems, including but not limited to fasteners, shafts, bearings, springs, weldment, and gears
- Students are able to design and produce a working system using common mechanical components and mechanisms
- Students will demonstrate the ability to perform in a team environment via engaging in team-based and scenario-based in-class design activities and mini design projects

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcome(s): a, b, c, d, e, g, h, i, j, k.

7. Brief list of topics to be covered

- Design of shafts and shaft components
- Design and selection of screws, fasteners and non-permanent joints
- Understanding of welding, bonding, and design of permanent joints
- Design and selection of mechanical springs
- Design and selection of rolling contact bearings and journal bearings
- Design and selection of gears – spur, helical, bevel, worm gears
- Design and selection of couplings and flexible mechanical elements