1. *Course number and name*

**ENGR 464: Mechanical Design**

1. *Credits, contact hours, and categorization of credits in Table 5-1 (math and basic science, engineering topic, and/or other).*

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

session/week; engineering topic

1. *Instructor’s or course coordinator’s name*

Instructor: Parsa Taheri, PhD, lecturer.

Course coordinator: Kwok Siong Teh, Director and Professor, School of Engineering.

1. *Textbook, title, author, and year*

Richard Budynas and Keith Nisbett, Shigley's Mechanical Engineering Design (11th Edition), McGraw-Hill, 2021*.*

* 1. *other supplemental materials*

Robert L. Mott, Edward M. Vavrek, Jyhwen Wang, Machine Elements in Mechanical Design (6th Edition), Pearson, 2013.

1. *Specific course information* 
   1. *brief description of the content of the course (catalog description)*

Application of materials science, mechanics, and stress analysis principles to design mechanical components and machines. Design, analysis, and delivery of major mechanical systems course projects.

* 1. *prerequisites or co-requisites*

ENGR 364: Materials and Manufacturing

* 1. *indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

Required for Mechanical Engineering program.

1. *Specific goals for the course*
   1. *specific outcomes of instruction (e.g. 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 deformation.
      * Students will demonstrate the ability to predict material failures under static and dynamic loading using the appropriate choice of failure theories.
      * Students will demonstrate they can perform stress analysis on simple mechanical components in order to obtain the correct geometry, material, and loadings.
      * 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.
   2. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

The course addresses ABET Student Outcome(s): 1, 2, 3, 4, 5, 7.

1. *A brief list of topics to be covered* 
   * A brief overview of basic product development procedure and steps.
   * 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 gears – spur, helical, bevel, worm gears
   * Design of shafts and shaft components
   * Design and selection of rolling contact bearings and journal bearings
   * Design and selection of couplings and flexible mechanical elements