

1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

ME 414 MACHINE DESIGN II

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Design of unit assemblies and machines: materials, safety, lubrication, and construction.

4. Prerequisites: ME 323, Machine Design I

5. Text and Materials: "Machine Design, An Integrated Approach" (2nd ed.) Robert L. Norton, Prentice Hall, 2000.

6. Course Objectives: Students will learn current engineering methods used in the design and selection of machine components.

Course Outcomes

- The ability to calculate surface stresses, to predict surface failure under various loading conditions, and to design machine components against surface failure.
- the ability to size and select fasteners for systems with both static and dynamic forces both static.
- the ability to design and select material for mechanical springs.
- an appreciation for the variety of ways rotating machine components can be mounted in machines with rolling contact bearings.
- the ability to select and size ball and roller bearings given the loading and life requirements.
- the ability to design and select materials for spur, helical and worm gear systems.
- an appreciation of how various machine components and engineering methods have evolved.

7. Topics Covered: (in Order of Presentation)

- Surface stresses, surface failure prediction and design Chapter 7
- Design of shafts, keys and couplings Chapter 9
- Bearings and lubrications Chapter 10
- Gear stress and strength analysis, gear design Chapter 11
- Spring design Chapter 13
- Screws and fasteners Chapter 14

8. Class Schedule: Number of Sessions per week: 2
Duration of each session: 1 hour 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the 24 units of technical electives required for the mechanical engineering program.

Engineering Science 1 units
Engineering Design 3 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)

Skill outcomes:

- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (abet c)
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

(abet k)

- an ability to think in a logical sequential process

Attitudes Outcome:

- an understanding of responsibility and accountability

11. Prepared by: Adel A. Sharif

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