

MET 304 Mechanical Design-I

(Required)

Course **MET 304: Mechanical Design I. LT:2 LB: 3 CR: 3**

Description: This course introduces the student to Mechanical design methodology. It covers in detail all the stages of the design process, and the methods of obtaining alternative solutions and decision-making. The course also with the design for strength and related concepts of factor of safety and stress concentration, and introduces the student to the design of shafts, keys, mechanical joints, and selection of standard mechanical components. Laboratory activities will be conducted to enhance the understanding of the subject.

Prerequisite: MET 301,MET 302.

Co-requisite: MET 305.

Textbook Mechanical Engineering Design, , Joseph E. Shigley, Charles R. Mischke and Richard G. Budyans
McGraw Hill , International editions, Seventh edition, 2004

References Fundamentals of machine Component Design, Robert C. Juvinall, Kurt M.
1. Marshek, John Wiley & Sons, Forth edition, 2005
ISBN 10: 04716611775
2. Machinery's Handbook, , Eric Oberg, Franklin D. Jones and Holbrook L. Horton.
Industrial Press Inc., 27th edition, 2004
ISBN -10:0831127007

Objectives

1. To integrate knowledge learned in the mechanics, structures, materials, and manufacturing courses.
2. Systematically analyze an engineering problem and obtain a suitable solution
3. Understand the concepts of factor of safety and stress concentration
4. To obtain a working knowledge in the use of the proper failure theories under steady and variable loadings.
5. Design shafts and keys under various types of loading.
6. Select standard V-belts.
7. Select standard anti friction bearings
8. Design mechanical joints, mainly; welded, riveted and screw fastened joints.

**Pre/Co-
Requisites**

1. Kinematics of a particle: force and acceleration (ME 301)
2. Kinematics of a particle: Work and energy (ME 301)

by Topic

3. Concepts of stress (MET302)
4. Pure bending(MET302)
5. Torsion (MET302)
6. Mechanisms (ME 305)
7. Toothed gearing (ME 305)

Course Outline

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|-----------------------------|---------|
| 1. Design Methodology | 2 weeks |
| 2. Load, Stress and Failure | 3 weeks |
| 3. Shafts and Keys | 3 weeks |
| 4. Belt Drives | 2 weeks |
| 5. Bearings | 2 weeks |
| 6. Mechanical Joints | 2 weeks |

Design Activities/Projects

One term project is assigned.

Computer Usage

CAD software and spread sheet (Excel) will be used in solving design problems.

Evaluation Methods

1. Assignments (Home work)
2. Quizzes
3. Major Examinations
4. Final Examination

Student Learning Outcome

Course Objective 1

1. Students will demonstrate ability to analyse engineering problems and obtain possible solutions
2. Students will demonstrate ability to write design specifications for engineering systems

Course Objective 2

1. Student will demonstrate ability to design shafts and keys under various types of loading

Course Objective 3

1. Students will demonstrate ability to select standard components: belts and bearings for various applications.

Course Objective 4

1. Students will demonstrate ability to design different types of mechanical joints.

ABET Category

Engineering Science	1 Credit
Engineering Design	2 Credits

Prepared by:

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