**DEBRE MARKOS UNIVERSITY**

**DEBRE MARKOS INSTITUTE OF TECHNOLOGY**

**SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING**

**Machine Elements - I - Course Outline**

**Lecturer:ARUNDEEP MURUGAN (M.Sc)**

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**Office:** B701 G+1 Mech Office No.1

**Contact Hours:** Monday from 4:30-6:00 AM (Local Time)

Wednesday from 2:00-6:00 AM (Local Time)

**Course Name & Code: MACHINE ELEMENTS - I [MEng2151]**

**Degree Program & Module:** BSc. in Mechanical Engineering [Machine Elements]

**ECTS Credits:** 5 **&** **Credit Hours:** 3

**Contact Hours (per semester):** Lecture 32, Tutorial 48, Practice/Lab 0 and Home Study 55

**COURSE OBJECTIVES**

This course enables the student to understand:

* Identification or selection of proper safety factor to avoid failure before the expected life of the component;
* Fatigue life and fatigue strength of machine elements;
* Causes of stress concentration in machine elements;
* Analysis of the strength of bolted, welded, riveted and interference fitted joints;
* Design of keys, splines and pins;
* Analysis of pressure vessels, valves and sealing mechanisms;
* Design of springs.

**COURSE CONTENTS**

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| **Contents and Evaluations** | **Delivery Period in Weeks** |
| 1. **INTRODUCTION**   1.1.Allowable Stresses  1.2. Engineering Materials  1.3. Safety Factor  1.4. Machine Elements | Week 1 – Week 2 |
| 1. **STRESS CALCULATION**   2.1. Design for Static Load  2.2. Design for Fatigue Load | Week 3 – Week 4 |
| 1. **STRENGTH CALCULATION AND DIMENSIONING OF JOINTS**   3.1. Bolted Joints  3.2. Riveted Joints  3.3. Welded Joints | Week 5 – Week 7 |
| 1. **TORQUE TRANSMITTING JOINTS**   4.1. Keys  4.2. Spline Joints  4.3. Pin Joints  4.4. Interference Fit | Week 8 – Week 10 |
| 1. **PRESSURE VESSELS**   5.1. Role of Processing in Design  5.2. Classification of Manufacturing Process  5.3. Design for Manufacture (DFM)  5.4. Design for Assembly (DFA) | Week 11 – Week 12 |
| 1. **SPRINGS** | Week 13 – Week 14 |

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| **Pre-Requisites** | MEng2141 - Machine Drawing  MEng2082 - Strength of Materials - II |
| **Year / Semester** | II Year / II Semester |
| **Teaching & Learning Methods** | Lectures supported by Tutorials, Demonstration of Machine Elements & Individual Assignments |
| **Evaluation Systems** | * Mid Test – 20% * Assignment - I – 10%, Assignment - II – 10% * Quiz – I - 5%, Quiz – II - 5% * Final Examination 50 %. |
| **Course Policy** | * Minimum 80% of Attendance during Lecture Hours, * 100% attendance during Practical Work Sessions, except   for some unprecedented mishaps and   * Presence during Industrial Visit/Visits. |
| **References** | **Textbook:** Shigley and Mischke , Mechanical Engineering Design, 7th ed., 2003  **References:**   1. 1. Robert C. Juvinall and Kurt M. Marshek, Fundamentals of Machine Component Design, Aug 2, 2005 2. 2. Joseph Shigley, Charles Mischke, and Thomas H.Brown, Standard Handbook of Machine Design, Jun25, 2004. 3. 3. Robert L. Norton, Machine Design: An Integrated Approach (3rd Edition), May 10, 2005. 4. 4. Arthur H. Burr & John B. Cheatham, Mechanical Analysis and Design (2nd Edition), Mar 2, 1995 5. 5. Coulson and Richardson’s , Chemical Engineering Design, Volume 6, Second Edition, Butterworth Heinemann, 1996 6. 6. Juvinal R.C.: Fundamentals of Machine Components Design, John Wiley & Sons, 4th ed., 2005. |

**APPROVED BY;**

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Name Signature Date

***SCHOOL STAMP***