University of Engineering and Technology, Peshawar

Faculty of Mechanical, Chemical, and Industrial Engineering

Department of Mechanical Engineering

COURSE OUTLINE DOCUMENT

1. Course and Instructor

Course Title	Mechanics of Materials – I
Course Code	ME – 113
Theory / Laboratory	Theory
Semester	2
Class Room	ME – 123 / Google Classroom
Pre-requisite (if any)	Engineering Statics
Pre-requisite for	▪ *Mechanics of Materials_II, Semester 3* ▪ *Design of Machine Elements - I, Semester 4* ▪ *Design of Machine Elements _ II, Semester 5*
Credit Hours	3
Contact Hours	3
Compulsory/Elective	Compulsory
Instructor 's Name	Prof. Dr. Hamid Ullah
Instructor's Email	hamidullah@uetpeshawar.edu.pk
Teaching Assistant (if any)	Engr. Hamid Masood
Teaching Assistant's Email	hamidmasood@uetpeshawar.edu.pk

2. Aim of Course

Aim of the course is to provide the students of Mechanical Engineering (and Civil Engineering) with the foundation and perquisite knowledge of analyzing and designing load bearing structures (or machine elements). Both the analysis and design of a given structure (or machine element) involve the determination of stresses and strains induced in a structure (or machine element) subjected to known loads. Stress and strain are important concepts in the course on Mechanics of Materials. They permit the mechanical behavior of load-bearing structures (or machine elements) and determine its suitability for a given application.

3. Summary of Contents

- Axial loading
- Stresses and Strains: Tensile, Compressive and Shear
- Hooke's law and Stress-strain relationship, Material's Properties, Elastic Constants, and their Relationships
- Thermal Stresses
- Pure Bending of Beams, Moment of Inertia
- Residual Stresses and Shear Stresses in Beams
- Shearing Force and Bending Moment
- Torsion of Circular Bars
- Thin Walled Pressure Vessels
- Analysis of Statically Indeterminate Problems

4. Course Learning Outcomes (CLOs)

CLO1	Understand the basics of mechanics of materials and their mechanical properties
CLO2	Calculate the stresses and strains in mechanical structures
CLO3	Solve problems related to bending and torsion and in mechanical structures

5. Program Learning Outcomes (PLOs)

PLO 1.	Engineering Knowledge
PLO 2.	Problem Analysis
PLO 3.	Design/Development of Solutions
PLO 4.	Investigation
PLO 5.	Modern Tool Usage
PLO 6.	The Engineer and Society
PLO 7.	Environment and Sustainability
PLO 8.	Ethics
PLO 9.	Individual and Teamwork
PLO 10.	Communication
PLO 11.	Project Management
PLO 12.	Lifelong Learning

6. Contribution to Programme Learning Outcomes

CLO Number	PLOs	Bloom's Taxonomy*
CLO1	1	C1
CLO2	2	C2
CLO3	2	C3

*For cognitive domain of Bloom's taxonomy, please refer to last page of the document.

7. Teaching and Learning Activities (TLAs)

CLO No.	TLAs	Functions	Hours/Week
1 - 3	Lecture	Present and convey critical information, history, background and theories of the course	2
1 - 3	Tutorial**	Help students to practice / solve related problems, in groups, within the classroom	1

**In Tutorial sessions, students are required to practice problems' solution of the relevant topic covered in the class.

8. Assessment Criteria

1.	Final Examination	60 %
2.	Mid-term Examination	20 %
3.	Sessional Marks (Assignments, Quizzes, Mini Project, etc.)	20 %

9. Re-registration / Improvement

A student receiving F (Fail) grade or W (Withdraw) grade in any course shall be required to re-register in that course. A student receiving less than or equal to C grade in a course may also re-register in that course, to improve his/her grade subject to a maximum of one chance within one year of the declaration of final semester result.

10. Attendance Requirement

Students are expected to attend at least 75 % of classes in order to be eligible to appear in the final examination.

11. Grading of Student's Achievement

Marks (%)	Grade	Grade Point
96-100	A	4.00
91-95	A-	3.67
86-90	B+	3.33

81-85	B	3.00
76-80	B -	2.67
71-75	C+	2.33
66-70	C	2.00
61-65	C-	1.67
56-60	D+	1.33
50-55	D	1.00
<50	F	0.00

12. Recommended Books

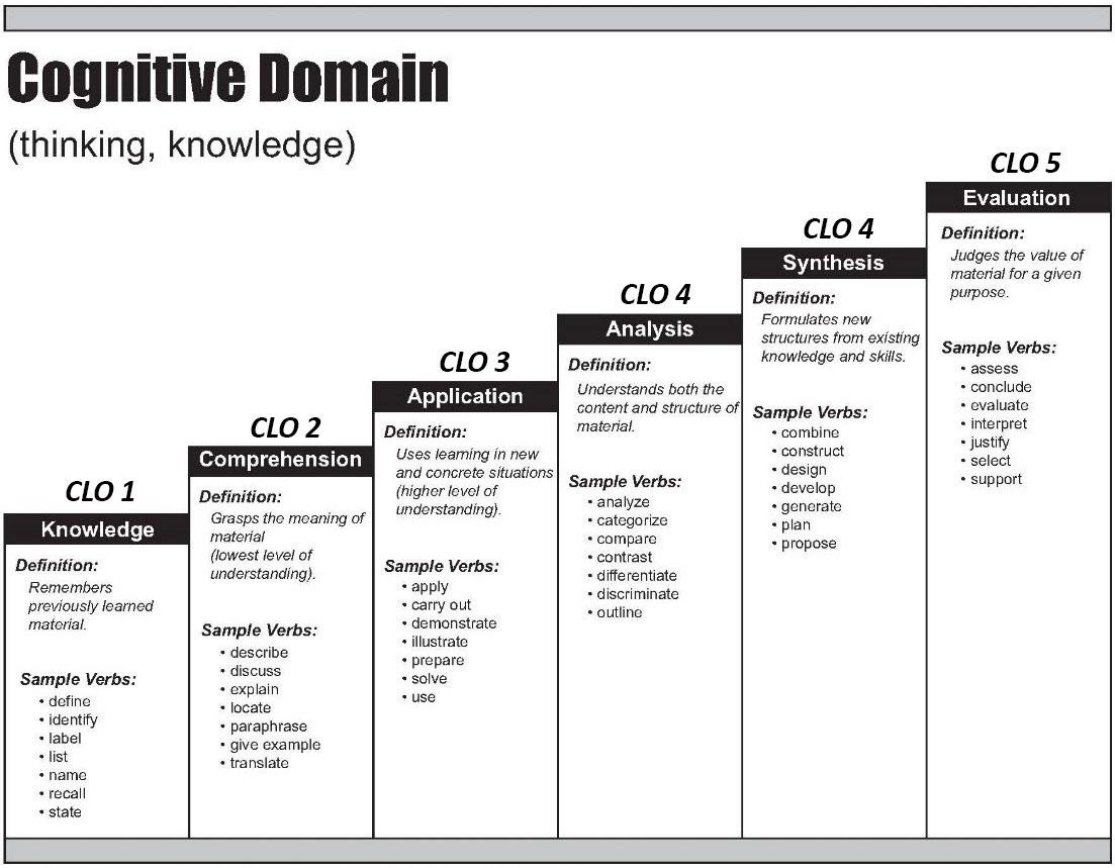
1. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, David F. Mazurek, *Mechanics of Materials*, 6th edition, ISBN: 978-0-07-338028-5, McGraw-Hill, 2012.
2. R.C. Hibbeler, *Mechanics of Materials*, 8th edition, ISBN: 978-0-13-602230-5, Prentice Hall, 2011.
3. M.G. James, *Mechanics of Materials*, 6th edition, Thomson, ISBN: 0-534-41793-0
4. P. P. Benham & R. J. Crawford, *Mechanics of Engineering Materials*, ISBN: 0582251648. Pearson; 2nd edition, 1996.
5. F.L. Singer and A. Pytel, Strength of Materials, 4th edition.
6. W. Nash, Schaum's Outline of Strength of Materials, (Schaum's Outlines), 6th edition, ISBN: 9780071830805, McGraw-Hill Education, 2013.

13. Tentative Weekly Lecture Schedule

Week	Topics	Assignments/Quizzes
01	• Introduction to the Course, Aim and objectives • Recommended books, Marks distribution, CLOs and mapping with PLOs	Mention here Assignments, Quizzes, etc. as per your plan
02	• Loading: Axial loading, Normal loading • Stresses and Strains: Normal stress and Shear stress • Normal stress: Tensile stress and Compressive stress • Real-life Examples • Problems solution / Tutorial session	
03	• Displacement, Deformation, and Strain • Strains: Normal strain and Shear strain • Real-life Examples • Problems solution / Tutorial session	
04	• Stress-Strain Diagram • Properties of Material • Hook's law • Real-life Examples • Problems solution / Tutorial session	
05	• Material's Constants and their relationship • Factor of safety • Problems solution / Tutorial session	
06	• Statically Determinate and Indeterminate Problems • Real-life Examples • Analysis of Statically Indeterminate Problems • Problems solution / Tutorial session	
07	• Thermal Stresses, Strain, Elongation • Real-life Examples • Problems solution / Tutorial session	
Wish You Good Luck For Your Mid-term Examination		
08	• Pure bending of Beams	

	• Real-life Examples • Deformation in Pure Bending • Strain due to Pure Bending • Stress due to Pure Bending • Properties of Plane Areas • Problems solution / Tutorial session	
09	• Bending of Beams (Contd.) • Shear Stresses in Beams • Shape Factor • Residual Stresses • Problems solution / Tutorial session	
10	• Types of Beams and Supports • Real-life Examples • Relationships Between Loads, Shear-force and Bending-moment • Shear Force and Bending Moment in Beams • Limitations of Flexure Formula	
11	• Shear Force Diagram • Bending Moment Diagram • Elastic Curve • Problems solution / Tutorial session	
12	• Torsion in Circular Shafts • Real-life Examples • Shaft Deformation • Shearing Strain in Shaft • Shearing Stress in Shaft	
13	• Maximum Normal Stresses in Shaft • Torsional Failure Modes • Angle of Twist in Elastic Range • Power Transmission by Shaft	
14	• Thin Walled Pressure Vessels • Real-life Examples • Assumptions in TWPV • Stresses in Cylindrical Vessel	
15	• Stresses in Spherical Vessel • Limitations of TWPV • Problems solution / Tutorial session	
Wish You Good Luck For Your Final Examination		

14. Cognitive Domain of Bloom's Taxonomy



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