هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Mechanics of Materials
Course Code:	213-MEC-3
Program:	Bachelor of Science in Engineering
Department:	Mechanical Engineering
College:	College of Engineering
Institution:	Najran University
Version:	1.0
Last Revision Date:	02/27/2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:3					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Third Year \ Level 6					
4. Course general Description:					
Concept of Stress at a Point, Principal Stress and Strain due to Combination of Stresses, Torsion: Stress and Strains due to Pure Torsion of Circular Shafts and Hollow Shafts, Power Transmitted by Shafts, Combined Bending & Torsion, Composite Shaft Series Connection. Materials Properties and Testing: Properties in Tension, Shear and Compression, Tension Test, Impact Test, Fatigue Test, Creep test, Hardness Test. Shear Force and Bending Moment, Types of Beams, SF and BM Diagrams for Cantilever, Simply Supported and Overhanging Beams with Point Load, UDL and UVL and their combinations. Deflection of Beams, Simply Supported and Indeterminate Beams, Energy Method, Strain Energy of Beams for Bending and Shearing Stresses, Castigliano's Theorem and calculations of deflection of beams under different conditions. Columns and Struts: Stability, Critical Loads under different end conditions, Euler's and Secant Formulae, Rankine Formula, Design of Columns under Centric and Eccentric Loading					
5. Pre-requirements for this course (if any)**:**					
211-MEC-3					
6. Co-requisites for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
1. Illustrate the concept of point stress due to different types of forces. 2. Illustrate the properties of the materials under different working conditions. 3. Draw the shear force and bending moment diagrams of different beams under different loading conditions and know its behaviour.					

4. Determine the deflection of beams under different loading conditions and its different governing relations.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Illustrate different types of stress, strain, & load and Draw bending moment and normal diagrams for shaft and beams,**	**1**	**TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based**	**-Test performance evaluation -Evaluation of participation in discussion and**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	group assignments
1.2	Develop the skills of idealization of Stress & shaft design and Draw the stress distribution on the thick cylinder (radial, hoop, and tangential stress),	7	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Giving more assignment from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	-Test performance evaluation -Evaluation of participation in discussion and group assignments
...				
2.0	Skills			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Illustrate steps for problems solving reasoning for each problem solved	2	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	•Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes
2.2	Review equations and principles	6	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting quizzes from each chapter TS:5 – Giving more example programs in the lecture	•Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			TS: 6 – Discussion with the students in the class hours	
...				
3.0	Values, autonomy, and responsibility			
3.1	Solve the problem by asking questions during the office hour	5	TS:1-Interactive lectures using PowerPoint slides TS:2- Engaging the students in problem-based learning through tutorials TS: 3 – Associating the topics in each chapter with the CLO. TS:4 – Conducting midterm and Final Exam from each chapter TS:5 – Giving more example programs in the lecture TS: 6 – Discussion with the students in the class hours	Locally Developed Exams such as Quiz, Mid & Final Exams with scoring rubrics •Assignments involving critical and logical thinking questions •Quizzes

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction – Concept of Stress	8
2.	Stress and Strain – Axial Loading	8
3.	Torsion and Pure Bending	8
4.	Analysis and Design of Beams for Bending	8
5.	Shearing Stresses in Beams and Thin-Walled Members	8
6.	Transformations of Stress and Strain	6
7.	Principle Stresses Under a Given Loading	6

8.	Deflection of Beams	8
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	1-10	10%
2.	Quizzes	1-10	10%
3.	Mid-term	4 & 8	30%
3.	labs	-	-
4.	Final exam	15	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Mechanics of Materials, 10th Edition, Russell C. Hibbeler, Pearson, 2017
Supportive References	Mechanics of Materials 7th Beer Johnston, McGraw-Hill Education, 2015 2.Mechanics of Materials 2nd Ed Andrew Pytel, Cengage Learning, 2012
Electronic Materials	Online custom books
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms and laboratories
Technology equipment (projector, smart board, software)	--
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders and Peer Reviewer	Direct, Indirect
Effectiveness of Students assessment	Students & Faculty	Direct and Indirect
Quality of learning resources	Students & Faculty	Direct and Indirect
The extent to which CLOs have been achieved	Students & Faculty	Direct and Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT OF MECHANICAL ENGINEERING
REFERENCE NO.	
DATE	02/27/2024