	Ministry of Higher Education and Scientific Research - Iraq University of Warith Al_Anbiyaa Engineering College Biomedical Engineering Department	

MODULE DESCRIPTION FORM

Module Information					
Module Title	Mechanics of Material			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	WBM-31-02				
ECTS Credits	3				
SWL (hr/sem)	150				
Module Level			**Semester of Delivery**	1	
Administering Department	BME		**College**	ENG	
Module Leader	Natiq Aziz Omran		**e-mail**	Nataq.az@uowa.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To develop problem solving skills and understanding of the behavior of engineering materials under different loading conditions. 2. To understand stress, strain, and deformation in structural members. 3. This course deals with the basic concepts of strength of materials. 4. This is a fundamental subject for mechanical and biomedical engineering applications. 5. To understand axial, torsional, and bending stress problems. 6. To perform stress and deformation analysis in beams, shafts, and structural elements. 7. To apply basic failure theories and material properties in engineering analysis.
Module Learning Outcomes	After successfully completing this module, students will be able to: 1. Explain the fundamental concepts of stress, strain, and deformation in engineering materials. 2. Identify and classify different types of loads and their effects on structural members. 3. Analyze axial stress and strain in bars subjected to tensile and compressive forces. 4. Evaluate torsional stresses and angles of twist in circular shafts. 5. Determine bending stresses and normal stresses in beams subjected to transverse loading. 6. Analyze shear stresses in beams and thin-walled members. 7. Apply the concepts of elastic behavior, Hooke's law, and material properties such as Young's modulus, shear modulus, and Poisson's ratio. 8. Calculate thermal stresses and strains resulting from temperature changes. 9. Assess combined stresses and determine principal stresses and maximum shear stresses. 10. Use appropriate failure theories to predict material behavior under different loading conditions. 11. Solve engineering problems related to strength and deformation of materials using analytical methods. 12. Demonstrate problem-solving skills relevant to mechanical and biomedical engineering applications.
Indicative Contents	Indicative content includes the following: Strength of Materials Theory Stress and strain concepts, types of stress and strain, mechanical properties of materials. Axial loading of members, elastic deformation and Hooke's law. Torsion of circular shafts, angle of twist and shear stress. Bending of beams, bending stress and flexural formula. Shear stress in beams. Combined stresses, principal stresses and failure theories. Thermal stresses and strains.

Learning and Teaching Strategies	
Strategies	The main strategy adopted in delivering this module is to enhance students' understanding of the fundamental principles of strength of materials through lectures and problem-solving activities. Emphasis is placed on developing analytical skills by applying theoretical concepts to practical engineering problems. Lectures are used to explain key topics such as stress, strain, torsion, bending, and material behavior under different loading conditions. Problem-solving exercises are integrated into the teaching process to improve students' ability to analyze and solve numerical problems. Continuous assessment methods, including quizzes, assignments, and examinations, are used to evaluate students' progress and reinforce learning outcomes. This approach encourages active student participation and supports the development of critical thinking and independent learning skills.

Student Workload (SWL)			
Structured SWL (h/sem)	123	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	150		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	11, 10	LO #1, 2,3 and 4
	Assignments	2	10% (10)	2, 12	LO # 5, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 7, 8 and 10
Summative assessment	**Midterm Exam**	3 hrs.	10% (10)	7	LO # 1-4
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Units and common principles and Analysis of Internal Forces and Stresses
Week 2	Normal stress and Shear stress and safety Factor
Week 3	Torsion of Circular Shaft and Torsion of non- circular section
Week 4	
Week 5	Current divider rule, open and short circuits.
Week 6	Series-Parallel Networks, series-parallel DC networks.
Week 7	Mid-term Exam
Week 8	Thin walled pressure vessels
Week 9	Simple Strain and Deformations of Axially Loaded Members
Week 10	Deformation of axially loaded members
Week 11	Displacement Diagram
Week 12	Statically indeterminate problems
Week 13	Thermal stresses and strains
Week 14	The Columns, Definition, The Critical load of column, Radius of Gyration.
Week 15	Combined Stresses, Combined axial and bending loading, Combined axial and torsional loading, Combined bending and torsional loading
Week 16	Preparatory week before the final Exam
Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: Introduction to mechanics of materials
Week 2	Lab 2: loading effects on material
Week 3	Lab 3: stress
Week 4	Lab 4: strain
Week 5	Lab 5: bending
Week 6	Lab 6: relation between stress and strain
Week 7	Lab 7: torsion

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Strength of Materials, Third and Fourth Edition. Ferdinand and L.Singer Andrew Pytel	Yes
Recommended Texts	An Introduction to the Mechanics of Elastic and Plastic Deformation of Solids and Structural Materials THIRD EDITION E. J. HEARN Ph.D., B.Sc. (Eng.) Hons., C.Eng., F.I.Mech.E., F.I.Prod.E., F.1.Diag.E.	Yes
Websites	http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IITROORKEE	

Grading Scheme			
Group	**Grade**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	(45-49)	More work required but credit awarded
	F – Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			