Course Description Form

1. Course Name:
Mechanics of materials II
2. Course Code:
WBM-32-02
3. Semester / Year:
Semester
4. Description Preparation Date:
19/3/2024
5. Available Attendance Forms:
Presence in the classroom
6. Number of Credit Hours (Total) / Number of Units (Total)
45 h/ 2 units
7. Course administrator's name (mention all, if more than one name)
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8. Course Objectives

Course Objectives	The aim of teaching the curriculum for this subject is to learn the basics of the resistance of materials to external forces and pressures and how to calculate loads, stresses and other mechanical issues and their effect on the materials of objects internally. Materials force field, also known as materials mechanics, refers to various methods for calculating stresses and strains in structural members, such as beams and columns. Methods used to predict the response of a structure under loading and its susceptibility to different failure modes take into account material properties such as yield strength, ultimate strength, Young's modulus, and Poisson's ratio.

9. Teaching and Learning Strategies

Strategy	1- Making the student able to demonstrate real knowledge of engineering concepts related to materials mechanics during the academic level and their applications in the fields of biomedical engineering. 2- Learn and understand the basic definitions used in materials mechanics, such as stresses, ductility, bending moments, cutting force, and other concept 3- Learn and understand solution methods and mathematical applications in solving applications industry problems in the field of biomedicine.

	4- Learn and apply the laws and formulas that the student learns from numerc examples, which make him able to understand the future problems that will faced in medical engineering industries and applications.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Units and common principles And Analysis of Internal Forces and Stresses	Units and common principles, SI Units (System International Units), Types of Support in Structure, Types of Loads in Structures, Types of Beams in Structures, Determinate and Indeterminate Problems. Analysis of Internal Forces and Stresses, Introduction, Analysis of Internal Forces (Three-dimensional system (3D), Two-dimensional system (2D)).	Presented the lectures and explain it.	Daily exams + classwork
2	3	Normal stress And Shear stress and safety Factor	Normal stress, Simple Normal Stress, Tensile Stress, Compressive Stress, Beam Stress. Shear stress and safety Factor, Simple Shear Stress, Direct shear stress, Double shear stress, Punching shear stress, Allowable and Factor of Safety.	Presented the lectures and explain it.	Daily exams + classwork

3+4	3	Torsion of Circular Shaft And Torsion of non-circular section	Torsion of Circular Shaft, Introduction, Torsion, Torsional shear stress, Angle of Twist, Polar Moment of Inertia, Composite Shaft, Power Transmitted by Shaft. Torsion of circular shaft 2, Examples and Solutions. Torsion of non-circular sections, Shear Stress and Angle of Rotation.	Presented the lectures and explain it.	Daily exams + classwork
5-7	3	Thin walled pressure vessels	Thin walled pressure vessels, Types of stresses in Cylindrical thin-walled pressure vessels, Cylindrical Thin-Walled Pressure Vessels, Tangential (Hoop or Circumferential) Stress, Longitudinal Stress, Spherical Shell.	Presented the lectures and explain it.	Daily exams + classwork
8	3	Simple Strain and Deformations of Axially Loaded Members	Simple Strain and Deformations of Axially Loaded Members, Simple Strain, Sign Convention, Stress-Strain Diagram, Hooke's Law, Poisson' s Ratio, Cases of Poisson's Ratio.	Presented the lectures and explain it.	Daily exams + classwork
9+10	3	Deformation of axially loaded members	Deformation of axially loaded members, Case 1: prismatic bar, Case 2: Non-prismatic bar, Case 3: Bar	Presented the lectures and explain it.	Daily exams + classwork

			with varying cross-sectional and varying axial force		
11+12	3	Statically indeterminate problems	Statically indeterminate problems, Examples and Solutions.	Presented the lectures and explain it.	Daily exams + classwork
13	3	Thermal stresses and strains	Thermal stresses and strains, Thermal strain, Thermal Deformation.	Presented the lectures and explain it.	Daily exams + classwork
14-15	3	The Columns	The Columns, Definition, The Critical load of column, Radius of Gyration.	Presented the lectures and explain it.	Daily exams + classwork

11. Course Evaluation

1- Theoretical lectures.
2- Discussion Tutorials.
3- Application in group to activate the team spirit at work

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	MECHANICS OF MATERIALS/ R. C. HIBBELER
Main references (sources)	MECHANICS OF MATERIALS, E. J. HEARN
Recommended books and references (scientific journals, reports…)	Strength of material/schaums outline/William Nash
Electronic References, Websites	