JOHN CABOT UNIVERSITY

COURSE CODE: **"ENGR 211"**
COURSE NAME: **" Mechanics of Materials"**
Summer Sample Syllabus

SYLLABUS
TOTAL NO. OF CONTACT HOURS: 45
CREDITS: 3
PREREQUISITES: Prerequisite: ENGR 210 Statics

COURSE DESCRIPTION:
The course provides a study of the fundamentals of solid mechanics of deformable bodies. The engineering structures covered in this course are determinate and indeterminate assemblies of tension members, columns (including buckling), beams (flexural members), shafts (torsional members), and thin-walled pressure vessels (tanks). The course also contains an introduction to common categories and types of engineering materials and their failure mechanisms. The importance of safety factors and their application in the Allowable Stress Design philosophy is emphasized throughout the course, leading to an enhanced awareness of the professional and ethical responsibilities inherent to the role of the engineer.

SUMMARY OF COURSE CONTENT:

Fundamentals of stresses and strains; material properties; axial, torsional, bending, and combined loadings; determinate and indeterminate analysis; stress at a point; stress transformations and Mohr's Circle for stress; beam deflections; thin-walled pressure vessels; columns and buckling; stress concentrations.

LEARNING OUTCOMES:

Upon successful completion of this course, the student will be able to:

1.Memorize and apply the various sign conventions that comprise the basic language of solid mechanics.

2.Analyze engineering structures and create appropriate free-body diagrams as required to solve problems.

3.Analyze members by statically determinate or indeterminate methods as required to solve problems.

4.Interpret and correctly apply the stress and strain equations for axial, flexural, and torsional members.

5.Interpret and apply the deformation equations for axial and torsional members; derive and apply the deformation equations for flexural members.

6.Label correct stress magnitudes and senses on the 2D stress element and the 3D stress cube.

7.Employ Mohr's Circle to transform a state of stress to any angular rotation; determine principal stresses, maximum in-plane shear stress, and absolute maximum shear stress.

8.Interpret stress-strain diagrams for a given material and describe its behavior using proper terminology (yield stress, fracture stress, Young's modulus, ductility, etc.).

9.Design engineering structures and/or members using the Allowable Stress Design philosophy.

TEXTBOOK:

Book Title	Author	Publisher	ISBN number	Library Call Number	Comments
Mechanics of Materials	Hibbler, R. C.	Pearson	978-0-13-432526-2		Be sure to get the 10th Edition! All homework will be completed online using Mastering Engineering. CourseID=ENGR211su19 The ISBN listed is for the e-text bundled with Mastering Engineering. Students who prefer to use a hardcopy of the text may purchase the textbook (ISBN=9780134319650) and Mastering Engineering (9780134321752) separately.

GRADING POLICY
-ASSESSMENT METHODS:

Assignment	Guidelines	Weight
Homework	Homework will be assigned and graded online using Mastering Engineering (ME). Be sure to purchase ME access with your electronic or hardcopy textbook. Homework will count for 15% of the course grade.	15%
Exams	In-class exams will be given weekly. The exam average will count for 60% of the course grade.	60%
Final Exam	The Final Exam is comprehensive and optional. For those who choose to take the Final Exam, it will count for 25% of the course grade.	25%

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SCHEDULE			
Session	**Session Focus**	**Reading Assignment / Other Assignment**	**Meeting Place/Exam Dates**
Week 1	Chapter 1: Stress Equilibrium of a Deformable Body; Internal Loading (Axial and Shear Forces, Bending Moment and Torque) Stress; Average Normal Stress in an Axially-Loaded Bar; Average Shear Stress; Allowable Stress Design Chapter 2: Strain Deformation; Strain Sections 3.1-3.2: Mechanical Properties of Materials The Tension and Compression Test;	Online HW	Quiz 1

	The Stress-Strain Diagram		
Week 2	Sections 3.3-3.7: Mechanical Properties of Materials (cont'd) Stress-Strain Behavior of Ductile and Brittle Materials; Strain Energy; Poisson's Ratio; The Shear Stress-Strain Diagram; Failure of Materials Due to Creep and Fatigue Sections 4.1-4.4, 4.6-4.7: Axial Load Saint-Venant's Principle; Elastic Deformation in an Axially-Loaded Member; Principle of Superposition; Statically-Indeterminate Axially-Loaded Members; Thermal Stress; Stress Concentrations	Online HW	Quiz 2
Week 3	Sections 5.1-5.2,5.4-5.5: Torsion Torsional Deformation of a Circular Shaft; The Torsion Formula; Angle of Twist; Statically Indeterminate Torque-Loaded Members Sections 6.1-6.5,6.9 Bending Shear and Moment Diagrams; Graphical Method for Constructing Shear and Moment Diagrams; Bending Deformation of a Straight Member; The Flexure Formula; Unsymmetric Bending; Stress Concentrations Sections 7.1-7.2: Transverse Shear Shear in Straight Members; The Shear Formula	Online HW	Quiz 3
Week 4	Sections 8.1-8.2: Combined Loadings Thin-Walled Vessels; State of Stress due to Combined Loadings Chapter 9: Stress Transformation Plane Stress Transformation; General Equations of Plane-Stress Transformation; Principle Stresses and Maximum In-Plane Stress; Mohr's Circle--Plane Stress; Absolute Maximum Shear	Online HW	Quiz 4

	Stress Sections 12.1-12.3,12.4-12.4: Deflection of Beams and Shafts The Elastic Curve; Discontinuity Functions, Slope and Displacement by Integration.		
Week 5	Sections 12.5-12.7,12-9: Deflection of Beams and Shafts (cont'd) Slope and Displacement by Method of Superposition. Statically Indeterminate Beams and Shafts: (a) Method of Integration; (b) Method of Superposition Sections 13.1-13.3: Buckling of Columns Critical Load; Ideal Column with Pin Supports; Columns Having Various Types of Supports	Online HW	Quiz 5 Final Exam COMPREHENSIVE