

MECH2040 Solid Mechanics I

Course Code: MECH2040	Course Title: Solid Mechanics I
Required Course Or Elective Course: required	Terms Offered (Credits): Spring (3 credits)
Faculty In Charge: Yangyang CHEN	Pre-Requisites: MECH2020 Exclusion: CIVL2120
Course Structure: Lecture: 2 sessions/week, 80 minutes/session	
Textbook/Required Material: Textbook: F. P. Beer, E. R. Johnston, J. DeWolf and D. Mazurek, Mechanics of Materials, 7th ed. in SI units, McGraw-Hill Book Company, 2015.	
Bulletin Course Description: Stress and strain, analysis of structure members subject to axially loading, torsion and bending, Columns, Energy Method	
Course Topics: <ol style="list-style-type: none"> 1. Stress and Strain and Their Relationship 2. Axially Loaded Members - Stress, Displacement and Statically Indeterminate Problems 3. Torsion – Torsional Diagram, Shear Strain and Stress, Displacement 4. Transformation of Stress and Strain – Mohr Circle 5. Pure Bending Beam 6. Beam – Transverse loading and shear Stress 7. Deflection and Statically Indeterminate Problems 8. Columns – stability, buckling 9. Energy method 	
Course Objectives: (correlated program objectives)	<ol style="list-style-type: none"> 1. To teach students the basics and applications of stress, strain and material properties. (P-O3) 2. To teach students the determination of stresses in structures under common loading. (P-O3) 3. To teach students the determination of deformation of structures under common loading. (P-O3) 4. To teach students how to formulate and solve a structural engineering problem. (P-O1, P-O3, P-O4)
Course Outcomes: (correlated course objectives and program outcomes)	<p>On successful completion of this course, students are expected to be able to:</p> <ol style="list-style-type: none"> A. Describe the basics of and relationship between stress and, strain, and distinguish normal and shear stress, extension and shear strain, and the corresponding material properties. (1) (POC1) B. Identify the qualitative features of the stresses, strains, material properties and area properties associated with axial loading, torsion and bending. (1,2) (POC1) C. Solve for stresses in a structural component due to axial load, torsion, and bending, acting individually or in combination. (2) (POC3,POC6, POC7, POC9)

	<p>D. Solve for the deformation of a structural component due to axial load, torsion, and bend loads, acting individually or in combination. (3) (POC3, POC6, POC7, POC9)</p> <p>E. Solve for the principal stresses in structural components subjected to a combined state of loading. (1,2) (POC1, POC3, POC6)</p> <p>F. Identify, formulate and solve statically indeterminate structural components. (4) (POC1, POC3, POC6, POC7, POC9)</p>						
Assessment Tools: (correlated course outcomes)	<table> <tr> <td>Homework</td> <td>20%</td> </tr> <tr> <td>Midterm Exam</td> <td>35%</td> </tr> <tr> <td>Final Exam</td> <td>45%</td> </tr> </table>	Homework	20%	Midterm Exam	35%	Final Exam	45%
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BEng in Mechanical Engineering (4-year program)

Program Objectives:

- P-O1. Be able to communicate and perform as an effective engineering professional in both individual and team-based project environments,
- P-O2. Have an international outlook with clear perspectives on the Pearl river Delta and Greater China,
- P-O3. Be able to research, design, develop, test, evaluate and implement engineering solutions to problems that are of complexity encountered in professional practice and leadership,
- P-O4. Clearly Consider the ethical implications and societal impacts of engineering solutions,
- P-O5. Continuously improve through lifelong learning.

Program Outcomes:

- POC1. ability to identify and formulate problems in multidisciplinary environment with an understanding of engineering issues and constraints;
- POC2. ability to design and conduct experiments as well as analyze and interpret data;
- POC3. ability to apply knowledge of mathematics, science, and engineering for problem solving in mechanical engineering and related sectors or for further education in a research career;
- POC4. ability to develop specification and to design system, component, or process to meet needs;
- POC5. ability to understand the manufacturability, maintainability, and recyclability of engineering system and components;
- POC6. ability to use modern engineering tools, techniques, and skills in engineering practice;
- POC7. ability to communicate effectively;
- POC8. ability to function in multi-disciplinary teams and provide leadership;
- POC9. broadly educated with an understanding of the impact of engineering solutions on issues such as economics, business, politics, environment, health and safety, sustainability, and societal context;
- POC10. clear understanding of professional and ethical responsibilities;
- POC11. recognition of the need for life-long learning and continuing education;
- POC12. international outlook with knowledge of contemporary issues.