

Syllabus

CVEEN 2140-301 Strength of Materials

Overview

Course	CVEEN 2140-301 Strength of Materials
Department	Department of Civil and Environmental Engineering
Instructor	Roshina Babu
Class Hours:	10:30 to 11: 50 AM (Tuesdays and Thursdays)
Location	UAC 503
Pre-Requisites	"C" or better in (CVEEN 2010 OR ME EN 2010) AND Full Major Status in (Civil Engineering OR Construction Engineering).
Credit Hours	3
Semester	Spring 2021
Description	Concept of stress, axial stress and strain, torsion, pure bending, transverse loading, transformations of stress and strain, design of beams and shafts for strength, deflection of beams, columns

Role in the Curriculum

Strength of Materials is a foundational study to a deep and broad set of courses in the civil engineering curriculum. It is the second in a sequence of three courses in solid mechanics (Statics, Mechanics of Materials, and Structural Analysis). That sequence is pre-requisite to each of the structural design courses. Strength of Materials is also the pre-requisite to each of the 3000-level civil engineering courses.

The course supports the following student outcomes:

- (a) an ability to apply knowledge of mathematics through differential equations, science and engineering,
- (e) an ability to identify, formulate, and an ability to communicate effectively using verbal, written, and graphical skills, and
- (g) solve engineering problems by applying knowledge of four technical areas appropriate to civil engineering.

Syllabus

Stresses and strains, Mechanical properties, Axially loaded members, Thermal stresses, Torsion, Determinate and Indeterminate systems, Bending stresses, Shear in beams, Beam deflections, Design of beams, Stress transformations, Mohr's circle, Thin-walled pressure vessels, Combined loadings, Buckling of columns.

Course Objectives

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

1. Derive and apply basic models of stress and strain for mechanical and structural components.
2. Model the state of stress at a point and determine maximum normal and shear stresses.
3. Design and assess the adequacy of axially, transversely, and/or torsionally-loaded members.
4. Calculate elastic, plastic, and thermal strains and deflections of a member.
5. Analyze basic statically indeterminate members.

Required Materials

The textbook for this course will be:

- Mechanics of Materials: F Beer, E Johnston, J Dewolf, D Mazurek (8th Edition)

Other materials required:

- Engineering computation paper for hand calculations
- NCEES FE Exam Approved Calculator. (<https://ncees.org/exams/calculator/>)
- Access to structural analysis software of your choice, e.g., Visual Analysis Educational free software (<https://www.iesweb.com/edu/>)
- Webcam & microphone (if classes are moved online)

Ensure you have these ahead of time as they will be required to complete assignments and activities throughout the course.

Schedule

This is the tentative schedule, subject to change as the course progresses.

Week	Date	Module	Pre-Class Work	Post-Class Work		
				Concept Quiz	Assignment	Case Study Discussion
1	23 Feb	Introduction		CQ1		
	25 Feb	Stresses	Video List A	CQ2		
2	2 Mar	Stresses and Strains	Video List B		PS1	CSD1
	4 Mar	Mechanical Properties	Video List C	CQ3		CSD2
3	9 Mar	Axial Members 1	Video List D	CQ4		
	11 Mar	Axial Members 2	Video List E		PS2	CSD3
4	16 Mar	Torsion of Circular Rods 1	Video List F	CQ5		
	18 Mar	Torsion of Circular Rods 2	Video List G		PS3	CSD4
5	23 Mar	Tutorial 1				
	25 Mar	Class Test 1- Axial Stresses and Torsion				
6	30 Mar	Bending Stresses 1	Video List H	CQ6		
	1 Apr	Spring Recess (Holiday)				
7	6 Apr	Bending Stresses 2				CSD5
	8 Apr	Shear Stresses 1	Video List I	CQ7		
8	13 Apr	Shear Stresses 2	Video List J		PS4	CSD6
	15 Apr	Beam Deflections 1	Video List K	CQ8		CSD7
9	20 Apr	Beam Deflections 2			PS5	
	22 Apr	Tutorial 2				
10	27 Apr	Class Test 2 -Bending, Shear and Deflection of Beams				
	29 Apr	Stress Transformations 1	Video List L	CQ9		
11	4 May	Reading Day (No Lecture)				
	6 May	Stress Transformations 2				
12	11 May	Mohr's Circle	Video List M	CQ10	PS6	CSD8
	13 May	Pressure Vessels 1	Video List N	CQ11		
13	18 May	Pressure Vessels 2			PS7	CSD9
	20 May	Project Presentation				
14	25 May	Buckling of Columns 1	Video List O	CQ12		
	27 May	Buckling of Columns 2			PS8	CSD10
15	1 June	Tutorial 3				
	3 June	Course Summary				
	7-10 June	Final Exam				

Evaluation

Your performance in this course will be evaluated by:

Category	Weight
Class Tests	40%
Final Exam	20%
Assignments	10%
Project	10%
Attendance and Participation	20%
Total	100%

Communication

- Email: roshina.babu@utah.edu
- Phone: 6214 (during office hours)
- Office Hours: 2:00 PM to 3:00 PM (Tu, Thu) or by appointment