ME 352: MECHANICS OF MATERIALS
Second Semester 1439-1440 (392)

TEXTBOOK: Mechanics of Materials 10th SI Edition, R.C. Hibbeler, Prentice Hall

Chapter	Topic Concepts	Articles	Lecture Problems	Tutorial+H.W Problems
1	**Stress;** Equilibrium of a Deformable Body, Stress, Average Normal and Shear Stress Allowable Stress, Factor of Safety, Design of Simple Connections	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7	1-4, F1-6, Ex 1-4, F1-7, F1-16, 1-47, 1-91	F1-3,1-5,1-27, F1-11,F1-12,1-39,1-40,1-41 ,F1-13,1-90,1-91
2	**Strain;** Deformation, Strain	2.1,2.2	F2-3,2-3,2-8,2-22,2-24	F2-1,2-5, 2-13, 2-25
3	**Mechanical Properties of Materials; Standard Classification;** Hooke's Law, Poisson's Ratio Shear Stress Strain Diagram.	3.1 3.2, 3.3 3.4, 3.6 3.7	F3-14	F3-7, F3-8, F3-9, F3-10
4	**Axial Load;** St. Venant's Principle Deformation of an Axially Loaded Member Principle of Superposition Statically Indeterminant Axially Loaded Member Thermal Stresses	4.1 4.2 4.3 4.4 4.6	4-4,4-12,4-25, 4-33,4-55,4-69 ,4-71,4-85	F4-1, F4-2, 4-9, 4-49,4-84
5	**Torsion;** Torsion of a Circular Elastic Shaft Power Transmission Angle of Twis	5.1, 5.2 5.3 5.4	F5-3, 5-6,5-7,5-26,5-27, F5-9,5-52, 5-60,5-61,5-65	F5-4,F5-5 , F5-7, 5-9,5-10,5-18,5-19, F5-10, F5-12, 5-51,5-59
6	**Bending;** Shear and Moment Diagrams Bending Deformation of a Straight Member Pure Bending, Flexure Formula	6.1 6.3 6.4	6-5,F6-8,6-36,F6-9,6-50, 6-54,6-86, 6-98	F6-3, F6-4, F6-5, F6-6, 6-6, 6-15, F6-11, 6-56,6-57, 6-91,6-92
7	**Transverse Loading;** Shear in Straight Members, Shear Formula Shear Stresses and Shear Flow in Beams	7.1, 7.2 7.3, 7.4	F7-1,F7-3,7-4,7-10,7-11,7-17,F7-6,7-42,7-47	F7-4, 7-3,7-15,7-16, 7-20, 7-26, F7-7, F7-8,7-46
8	**Combined Loadings;** Thin Walled Pressure Vessels, state of Stress caused by combined loadings	8.1 8.2	8-3,8-4,8-5,8-6 ,F8-6,8-38,8-61,8-62	8-1, 8-2, F8-1, F8-3, F8-4, F8-7, F8-8, 8-18,8-31,8-35
9	**Transformation of Stress;** General Equations Principal Stresses and Mohr's Circle,	9.1, 9.2 9.3, 9.4	9-3,9-6,9-23, 9-27,9-37, 9-38,9-59, 9-68,9-73	F9-1, F9-2, F9-5, 9-16, 9-34, 9-35,F9-7, F9-8, 9-71
10	**Transformation od Strain;** General Equations Principal Strains and Mohr's Circle	10.1, 10.2, 10.3	10-2,10-8, 10-20	10-7, 10-9, 10-16

Grade Distribution

Homeworks + Quizzes+attendance	15%
First Mid-term	20%
Second Mid-term	25%
Final Exam	40%

Exams schedule (tentative)

1st Midterm Exam, Thursday 16/6/1440, 21/2/2019
2nd Midterm Exam, Thursday 21/7/1440, 28/3/2019

ME 352 Mechanics of Materials

Instructor Contact Information:
Dr. Hamad F. Alharbi
Mechanical Engineering Department, Bldg. 3, Rm 2C 59
King Saud University
Tel: +966 11 467 6660, Fax: +966 11 467 6652
Email: harbihf@ksu.edu.sa (preferred contact)

Office Hours: (Also by appointment)
Monday: 12:00 pm – 1:30 pm
Wednesday: 11:00 pm – 1:00 pm

Course Description: ME 352 (3, 1, 0)

Study of the mechanical behavior of solid bodies (Rods, shafts, beams, etc.) under various types of loading. Mechanical and thermal stresses and strains; Stress-strain relations; Axial deformation; Statically indeterminate bars and rods; Shear and bending moments in beams; Stresses in beams; Torsion of shafts and thin walled tubes; Combined loadings; Analysis of plane stress and plane strain; Thin walled vessels.

Number of Credit
3

Prerequisites by Course
GE 201 Statics

Prerequisites by Topic
1. Statics of particles and rigid bodies
2. Equilibrium principles
3. Moment of inertia and beams

Textbook(s)/ Required Materials
Mechanics of Materials 10th SI Edition, R.C. Hibbeler, Prentice Hall

Course Topics
1. Stress and strains in solid bodies
2. Axial deformation and statically indeterminate members
3. Generalized Hook's law.
4. Thermal stress-strain relations
5. Torsion of shafts
6. Relations between transverse load, shearing force and bending moment
7. Pure bending of prismatic beams
8. Transverse shearing stress in beams
9. Combined loadings and thin walled pressure vessels
10. Analysis of plane stress
11. Analysis of plane strain

Laboratory Projects
None

Course Objectives

(Entries in brackets are links to program educational objectives)

1. To develop an understanding of the relationship between external loads applied to a deformable body and the internal stress, strain and deformation induced in the body.[1]
2. To show proficiency in mathematics and basic sciences required to solve structural engineering and mechanics problem.[1]
3. To develop analytical and graphical problem solving skills.[1, 2].

Course Outcomes

(Entries in brackets are links to students' outcomes)

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

1. Calculate and define the concepts of stress and strain;[a]
2. Calculate and describe external loadings, including axial load, shear force, bending, and torsional moments, and the resulting deformations and internal stresses associated with these external loadings;[a]
3. Calculate and describe the internal stresses and deformations that result in combined loading conditions;[a]
4. Calculate internal stresses and strains through the application of stress transformation equations and Mohr's circle.[a]
5. Design components to meet desired needs in terms of strength and deflection.[c]

Class/Laboratory Schedule

Three 50 minutes lectures and one 50-minute tutorial per week.

Computer usage

Students are encouraged to practice problems which are given in the text and which require the use of computer basic skills.

Science/Design Contents

Engineering Science: 75%
Engineering Design: 25%

Assessment Tools

Problem Set and Quizzes	15%
Two Midterms	45%
Final	40%