

Faculty of Engineering & Technology

Properties of Materials

Information :

Course Code : MAN 231

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Department of Mechanical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Samah Elsayed Elmetwally Elkhatib	1
Teaching Assistant	Donia Waheed Mohamed Abdelmonem Saleem	

Area Of Study :

- Describe the principal forms of mechanical tests and calculate the mechanical properties of materials.
- Outline the influence of both atomic structure and microstructure on the deformation mechanism of metal materials.
- Understand the meaning of equilibrium phase diagrams, tie-line constructions.

Description :

Introduction to materials, Crystal structure of solids, Construction and use of phase diagrams in materials systems, Relationship of crystal structure to properties of metallic materials and their applications, Heat treatment of steels, Types of polymers: ceramics, glasses, and semi conducting materials and their applications, Internal reactions, loadstress relations and transformation of stresses for generally loaded rods, Generalized concepts of stress, strain and material relations, Energy methods, Elastic-plastic behavior of beams, Analysis of thin walled beams, Membrane theory of axisymmetric shells, Stress concentrations.

Course outcomes :

a.Knowledge and Understanding: :

1 -	outline the influence of both atomic structure and microstructure on the deformation mechanism of metal materials
2 -	Understand the meaning of stress and strain in describing the mechanical response of engineering materials
3 -	Identify important mechanical properties of some engineering materials

b.Intellectual Skills: :

1 -	Understand how to perform, and the role of, the uniaxial tensile test
2 -	Understand the meaning of hardness, strength, and toughness, and their significance for engineering performance
3 -	Identify different types of heat treatment

c. Professional and Practical Skills: :

1 -	Identify basics of engineering material classification
2 -	Identify important material properties
3 -	Identify basics of engineering material selection

d. General and Transferable Skills: :

1 -	Use digital libraries and/or Learning systems.
2 -	Introduce ideas and solutions for many practical and engineering problems efficiently in predetermined time plan.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to materials	8	4	4
materials and their applications	12	6	6
Generalized concepts of stress, strain and material relations	10	6	4
load-stress relations	4	2	2
Elastic-plastic behavior of beams	8	4	4
Stress concentrations	4	2	2
phase diagrams	4	2	2
Heat treatment	4	2	2
Midterm Exams ,Quizzes	6	2	4

Teaching And Learning Methodologies :

Interactive Lecturing
Problem solving
Discussion
Project

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
1st Assignments, Participation, & Quizzes	10.00		
1st Midterm	15.00	6	
2nd Assignments, Participation, & Quizzes	10.00		
2nd Midterm	15.00	11	
Final Exam	40.00	16	

Books :

Book	Author	Publisher
Foundations of Materials Science and Engineering	William F.Smith	McGraw Hill

Course Notes :

Lecture notes on the course moodle page, FUE website

Recommended books :

Text Book: Fundamentals of Materials Science and Engineering, William D. Callister, fifth edition