FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

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	5
Teaching Assistant	Mostafa Mahmoud Sabry Sadek	
Teaching Assistant	Osama Ahmed Ibrahim Mohamed Montaser	

Area Of Study :

Prepare students to describe the principal forms of mechanical tests and the mechanical properties of materials.
Develop the students' knowledge about the outline the influence of structure on the deformation mechanism of metal materials.
Train students to analyze the meaning of equilibrium phase diagrams and heat treatment processes.

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, load-stress 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 -	describe the influence of both atomic structure and microstructure on the deformation mechanism of metal materials& equilibrium phase diagrams
2 -	describe 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 -	Analyse the uniaxial tensile test and the role of it.
2 -	Classify the meaning of hardness, strength, and toughness, and their significance for engineering performance
3 -	Modify different types of phase diagram, solid defects and heat treatment
c.Professional and Practical Skills: :	
1 -	Apply the basics of engineering material classification

2 -	present the material properties and heat treatment
3 -	Practice the basics of phase diagram and engineering material selection
d.General and Transferable Skills: :	
1 -	Manage tasks, time, and resources.
2 -	Communicate 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
materials and their applications	12	6	6
Generalized concepts of stress, strain and material relations	10	6	4
Introduction to materials	8	4	4
load-stress relations	4	2	2
Elastic-plastic behavior of beams	6	4	2
Stress concentrations	6	2	4
phase diagrams	4	2	2
Iron- carbon phase diagrams	4	2	2
Heat treatment	6	2	4

Teaching And Learning Methodologies :

Interactive Lecturing
Discussion
Problem-based Learning
Report

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignment	5.00		
Final Exam	40.00		
Lab Exper.	5.00		
Mid- Exam I	20.00		
Mid- Exam II	20.00		
Oral Exam	5.00		
Quizzes	5.00		

Course Notes :

Lecture notes on the course moodle page, FUE website

Recommended books :

Text Book: Fundamentals of modern manufacturing: materials, processes, and systems / Groover, Mikell P, 1939-., 7th ed., Hoboken, NJ : J. Wiley and Sons, [2014]