

## **ME 274 - Materials Science**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

### **COURSE COORDINATOR**

Dr Mostafa Abdeen

### **TEXT BOOK:**

W.D Callister “Materials Science and Engineering - an Introduction”, Wiley, 1997, 4th edition.

### **COURSE DESCRIPTION:**

Classification of engineering materials, metals and non-metals - Crystalline structure Properties of engineering material, mechanical properties, other properties – Testing & inspection of materials, tension test, compression test, bending test, shear test, impact test, hardness test, fatigue test – Non-destructive tests – Solidification of metals and alloys, thermal equilibrium diagrams – Heat treatment of metals and alloy– Corrosion .

### **PREREQUISITE:**

BA114 & BA142

### **RELATION OF COURSE TO PROGRAM:**

Required

### **COURSE INSTRUCTION OUTCOMES:**

The student gains knowledge on the relationship between the structure & properties of engineering materials. The student is able to modify the structure to achieve specific properties with emphasis on some typical applications.

### **TOPICS COVERED:**

- Classification of Engineering Materials – General Introduction
- Atomic Bonding in Solids
- The Crystalline Structure of Materials
- Properties, Testing, and Inspection of Engineering Materials
- Introduction to Thermal Equilibrium Diagrams
- Non-Destructive Testing
- Heat Treatment of Metals
- Corrosion: An Introduction

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional Component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Engineering Design</b>
✓			

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course Outcomes</b>
<b>a.</b>	An ability to apply knowledge of mathematics, science, and engineering.	✓
<b>b.</b>	An ability to design and conduct experiments, analyze and interpret data.	✓
<b>c.</b>	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	
<b>d.</b>	An ability to function on multi-disciplinary teams.	
<b>e.</b>	An ability to identify, formulate, and solve engineering problems.	
<b>f.</b>	An understanding of professional and ethical responsibility.	
<b>g.</b>	An ability to communicate effectively.	
<b>h.</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content	
<b>i.</b>	A recognition of the need for, and an ability to engage in life-long learning.	
<b>j.</b>	A knowledge of contemporary issues within and outside the electrical engineering profession.	
<b>k.</b>	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	