# ÇANKAYA UNIVERSITY
# MSE 225- Introduction to Materials Science
# (2023-2024 Spring)

| Methods of Instruction | Theor. | Appl. | Lab. | Total | Credit | ECTS Credit |
|---|---|---|---|---|---|---|
| | 42 | 28 | - | 70 | (3 2 4) | 6 |
| **Semester** | 2023 – 2024 Spring | | | | | |
| **Instructor** | Assoc. Prof. Dr. Şeniz Kuşhan Akın, Materials Science and Engineering Dept.<br>Room: NB-17, e-mail: senizakin@ cankaya.edu.tr | | | | | |
| **Schedule** | ***Section 01:***<br>Lecture Hours **:** Monday 09:20-12:10<br><br>Recitation Hours : Thursday 12:20-14:10 | | | ***Section 02:***<br>Lecture Hours **:** Tuesday 09:20-12:10<br><br>Recitation Hours : Thursday 14:20-16:10 | | |

**Course Description**

Classification of materials, atomic structure, periodic table, molecular structure, bonding in solid materials, structure of crystalline solids, mechanical properties and failure of materials, phase diagrams, properties and use of polymers, ceramics, glasses and composites.

**Course Objective**

The properties and characteristics of the materials are important in almost every modern engineering design. The study of solids and relationships between structure and physical properties is therefore an important component of engineering education. This course provides a conceptual framework for understanding the behavior of engineering materials by emphasizing important relationships between internal structure and properties. It also attempts to present a general picture of material nature and mechanisms that act upon, modify and control their properties.

**Textbook**

-William D. Callister, Jr. Materials Science and Engineering: An Introduction, 5$^{th}$ or any other upgrade edition, John Wiley and Sons, 2000.

**Reference Books**

- James F. Shackelford, Introduction to Materials Science for Engineers, 5$^{th}$ Ed., Prentice Hall, 2000,
- William F. Smith, Foundations of Materials Science and Engineering, 3$^{rd}$ Ed., McGraw-Hill, 2004,
- Larry D. Horath, Fundamentals of Material Science, 3$^{rd}$ Ed., Prentice Hall, 2006.

**Grading Policy**

Homework+Quiz……..…….. 15%
Midterms (I&II)……..…… 50%
Final…… 35%

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## Tentative Course Outline

| **Topics covered** |
|---|
| Introduction; Definition and classification of materials |
| Atomic structure, periodic table, molecular structure, bonding |
| Structure of Crystalline Solids |
| Imperfections in Solids |
| Diffusion in Solids |
| Mechanical Properties of Metals I<br>(Test methods; Stress-strain curves) |
| Mechanical Properties of Metals II<br>(Strength, ductility, toughness, resilience) |
| Dislocations and Strengthening Mechanisms |
| Failure I<br>(Fracture, types of fracture, fracture mechanisms, impact test) |
| Failure II<br>(Fatigue and creep) |
| Phase Diagrams |