DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**
   ME 205, Engineering materials

2. **Credits and contact hours**
   (3+0) 3 credit hours, 3 contact hours

3. **Course type**
   Onsite learning course

4. **Instructor's or course coordinator's name**
   Dr. Sinan Faouri

5. **Textbook information**

   Materials Science and Engineering: An Introduction,7th edition, 2007. By William D.Callister, with special contributions by David G.Rethwisch ISBN: 978-00069701182

   a. **Other supplemental materials**
      Instructor's notes

6. **Specific course information**
   a. **Catalog description**
      To introduce the students with the fundamentals of atomic bonding, crystal structure and crystal defects, diffusion in solids and solid solutions, equilibrium phase diagrams in binary alloys, Iron-carbon phase diagram, and principles of heat treatment of alloys

   b. **Prerequisites or co-requisites**
      Prerequisite: Second year level

   c. **The course is:**
   Required in the Mechanical and Industrial Engineering program

7. **Specific goals for the course**
   a. **Course outcomes:**
   After completion of the course, students are expected to be able to:

DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

1. Identify atomic bonding in materials
2. Identify crystal structure of materials
3. Identify crystal defects usually found in crystal structures
4. Understand diffusion in solids and solid solutions
5. Use equilibrium phase diagrams in binary alloys for alloying
6. Use equilibrium phase diagrams in binary alloys for heat treatment purposes

a. The following student outcomes are addressed by the course:

SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.

SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.

7. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Identify atomic bonding in materials	-	Lectures (Example and Problems)	Assignment
CO-(2): Identify crystal structure of materials	-	Lectures (Example and Problems)	Project
CO-(3): Identify crystal defects usually found in crystal structures	-	Lectures (Example and Problems)	Assignment

CO-(4): Understand diffusion in solids and solid solutions	-	Lectures (Example and Problems)	Assignment
CO-(5): Use equilibrium phase diagrams in binary alloys for alloying	-	Lectures (Example and Problems)	Assignment
CO-(6): Use equilibrium phase diagrams in binary alloys for heat treatment purposes	-	Lectures (Example and Problems)	Assignment
Student Outcomes			
SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	2	Lectures (Example and Problems)	Midterm Exam
SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.	1, 3	Term Project	Term Project-Part 2
SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.	1	Term Project	Term Project-Part 1

8. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	Chapter 1: Introduction to materials	Lecture
	Tue (9-10)	Chapter 1+ Chapter 2: Atomic structure and interatomic bonding	Lecture
	Thu (9-10)	Chapter 2: Atomic structure and interatomic bonding	Lecture
2	Sun (9-10)	Chapter 2: Atomic structure and interatomic bonding	Lecture
	Tue (9-10)	Chapter 3: The structure of crystalline solids	Lecture

DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

	Thu (9-10)	Chapter 3: The structure of crystalline solids	Lecture
3	Sun (9-10)	Chapter 3: The structure of crystalline solids	Lecture
	Tue (9-10)	Chapter 3: The structure of crystalline solids	Lecture
	Thu (9-10)	Chapter 3: The structure of crystalline solids	Tutorial/synchronous lecture
4	Sun (9-10)	Chapter 4: Imperfections in solids	Lecture
	Tue (9-10)	Chapter 4: Imperfections in solids	Lecture
	Thu (9-10)	Chapter 4: Imperfections in solids	Lecture
5	Sun (9-10)	Chapter 4: Imperfections in solids	Lecture
	Tue (9-10)	Chapter 4: Imperfections in solids	Lecture
	Thu (9-10)	Chapter 4: Imperfections in solids	Lecture
6	Sun (9-10)	Chapter 4: Imperfections in solids	Lecture
	Tue (9-10)	Chapter 4: Imperfections in solids	Lecture
	Thu (9-10)	Chapter 4: Imperfections in solids	Lecture
7	Sun (9-10)	Chapter 5: Diffusion	Lecture
	Tue (9-10)	Chapter 5: Diffusion	Lecture
	Thu (9-10)	Chapter 5: Diffusion	Lecture
8	Sun (9-10)	Chapter 5: Diffusion	Lecture
	Tue (9-10)	Chapter 5: Diffusion	Lecture
	Thu (9-10)	Chapter 5: Diffusion	Lecture
9	Sun (9-10)	Chapter 5: Diffusion	Lecture
	Tue (9-10)	Chapter 5: Diffusion	Lecture

DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

	Thu (9-10)	Chapter 5: Diffusion	Lecture
10	Sun (9-10)	Chapter 9: Phase diagrams	Lecture
	Tue (9-10)	Chapter 9: Phase diagrams	Lecture
	Thu (9-10)	Chapter 9: Phase diagrams	Lecture
11	Sun (9-10)	Chapter 9: Phase diagrams	Lecture
	Tue (9-10)	Chapter 9: Phase diagrams	Lecture
	Thu (9-10)	Chapter 9: Phase diagrams	Lecture
12	Sun (9-10)	Chapter 9: Phase diagrams	Lecture
	Tue (9-10)	Chapter 9: Phase diagrams	Lecture
	Thu (9-10)	Chapter 9: Phase diagrams	Lecture
13	Sun (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
	Tue (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
	Thu (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
14	Sun (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
	Tue (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
	Thu (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
15	Sun (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture

	Tue (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture
	Thu (9-10)	Chapter 10: Phase transformations in metals: development of microstructure and alteration of mechanical properties	Lecture

9. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works ….)	20%	1-16th Week
- Final Examination	50%	16th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.