



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

Course Syllabus

1. Course number and name

ME 206, Engineering materials lab

2. Credits and contact hours

(0+3) 1 credit hour, 3 contact hours

3. Course type

Onsite learning course

4. Instructor's or course coordinator's name

Dr. Sinan Faouri

5. Textbook information

Laboratory handouts

a. Other supplemental materials

Instructor's notes

6. Specific course information

a. Catalog description

Identification of ferrous and nonferrous materials. Nondestructive tests. macroscopic examination (Macro etching), preparation of specimens for optical microscopic examinations, mechanical properties tests (hardness test, impact, creep), thermal analysis (construction of Pb-Sn phase diagram). Heat treatment of steel (Annealing, normalizing processes), hardenability test (Jominy end quench test).

b. Prerequisites or co-requisites

Prerequisite: ME 205 Engineering Materials

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:

1. Distinguish between different materials using shop tests
2. Identify internal and external defects of mechanical parts via NDT methods
3. Prepare specimens for macroscopic and metallographic examination



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4. Determine and plot the hardenability curve for any steel

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.

3. 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): Distinguish between different materials using shop tests	-	Lectures (Theoretical and experimental)	Assignment and weekly reports
CO-(2): Identify internal and external defects of mechanical parts via NDT methods	-	Lectures (Theoretical and experimental)	Assignment and weekly reports
CO-(3): Prepare specimens for macroscopic and metallographic examination	-	Lectures (Theoretical and experimental)	Assignment and weekly reports
CO-(4): Determine and plot the hardenability curve for any steel	-	Lectures (Theoretical and experimental)	Assignment and weekly reports



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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

4. Weekly Teaching Plan

Week No.	Topic	Method of Delivery
1	Shop tests for identifying ferrous and non-ferrous metals and alloys	Lecture+ Experimental
2	Non-destructive tests	Lecture +Experimental
3	Macroscopic examination of metal structures (macro-etching and sulfur printing)	Lecture +Experimental
4	Specimen preparation for metallographic examination	Lecture +Experimental
5	Microscopic examination (micro-structure of cast metals and alloys)	Lecture +Experimental
6	Quantitative metallography (grain size measurement and amount of phases)	Lecture +Experimental
7	Hardness test	Lecture +Experimental



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8	Thermal analysis of phase transformation (construction of phase diagrams)	Lecture +Experimental
9	Heat treatment of steel	Lecture +Experimental
10	Hardenability test (jominy end quench test)	Lecture + Experimental

5. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	6 th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works)	30%	1-15 th Week
- Final Examination	40%	15 th Week

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