



ÇANKAYA UNIVERSITY
MSE 206-Materials Characterization I
(2016-2017 Spring)



Methods of Instruction	Theor.	Appl.	Lab.	Total	Credit	ECTS Credit
	42	-	42	42	(2 4 4)	6
Semester	Spring 2016 – 2017					
Instructor	Assoc. Prof. Dr. Ziya Esen, Materials Science and Engineering Dept. Room: NB-16, e-mail: ziyaesen@cankaya.edu.tr					
Assistants	Ezgi Bütev, Materials Science and Engineering Dept., NC-09; e-mail: ebutev@cankaya.edu.tr Emre Yılmaz, Materials Science and Engineering Dept., NC-08; e-mail: emreyilmaz@cankaya.edu.tr					
Schedule	Lecture Hours : Wednesday 09:20-11:10 Laboratory Hours : Wednesday 13:20-17:10 (section 01) Thursday 09:20-13:10 (section 02) Thursday 13:20-17:10 (section 03)					

Course Description

The course presents major components of materials characterization essential to the understanding of the physical properties of solids. Different microstructures will be produced by different heat treatment techniques. Samples for metallography will be prepared. Microstructure investigations will be performed mostly using optical microscope. Mechanical tests will be performed; and process-microstructure-property relation will be discussed in detail.

Course Objective

- To show experimentally to the students the subject material they learned theoretically in courses such as materials science
- Provide practical experience in laboratory methods and reporting.
- Provide basic descriptions of a range of common characterization methods for the determination of the structure and composition of solids.

Textbook

There is no recommended specific textbook in metallography so that students are asked to attend the lectures regularly and take notes.

Suggested References

Book	Author	Pub. Inf.
Introduction to Optical Microscopy	Jerome Mertz	Roberts and Company Publishers, 2009
Encyclopedia of Materials Characterization	R. Brundle, C. Evans, S. Wilson	Butterworth-Heinemann, 1992
Experimental Techniques in Materials and Mechanics	C. Suryanarayana	CRC Press, Taylor and Francis Group, 2011
Optical Techniques for Solid State Materials Characterization	Rofit P. Prasankumar and Antoinette J. Taylor	CRC Pres, Taylor and Francis Group, 2011
Fundamentals of Light Microscopy and Electronic Imaging	Douglas B. Murphy	Wiley-Liss; 1st edition, 2001
Microstructural Characterization of Materials	David Brandon, Wayne D. Kaplan	Wiley, 2008
Physical Principles of Electron Microscopy: An Introduction to TEM, SEM, and AEM	R.F. Egerton	Springer, 2010
Fractography: Observing, Measuring and Interpreting Fracture Surface Topography	Derek Hull	Cambridge University Press, 1999



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Attendance

70% attendance of all lecture hours and 80% attendance of all laboratory hours is required by the university's regulations. Absence from a quiz, lab. or an examination will result in zero grade.

Grading Policy

Laboratory work(Quiz+ HW) & Lab exam.....	20%
Term Project.....	10%
Midterms (I&II).....	40%
Final.....	30%

Tentative Course Outline

<u>Week</u>	<u>Topics covered</u>
1 (13-17 Feb)	Introduction
2 (20-24 Feb)	Fundamentals of Materials Characterization
3 (27 Feb-03 Mar)	Basic Concepts in Light Optical Microscopy
4 (6- 10 Mar)	Macro and Micro Examination
5 (9-13 Mar)	Ferrous Metallography-I (steels)
6 (13-17 Mar)	Ferrous Metallography-II (steels)
7 (20-24 Mar)	Ferrous Metallography-III (cast irons)
8 (27-31 Mar)	Plastically deformed, thermally processed, surface treated structures and welded specimens
9 (3-7 Apr)	Quantitative Metallography
10 (10-14 Apr)	Scanning Electron Microscope- I
11 (17-21 Apr)	Scanning Electron Microscope- II (23th April-No Lecture)
12 (24-28 Apr)	EDS Analysis
13 (1-5 May)	Transmission Electron Microscopy
14 (8-19 May)	Overview