



COURSE / MODULE / BLOCK DETAILS

ACADEMIC YEAR / SEMESTER

Offered by: Metalurji ve Malzeme Mühendisliği			
Course Title: MATERIALS CHARACTERIZATION		Course Org. Title: MATERIALS CHARACTERIZATION	
Course Level: Lisans		Course Code: MME 2408	
Language of Instruction: İngilizce		Form Submitting/Renewal Date 14/05/2014	
Weekly Course Hours: 5		Course Coordinator: DOÇENT ALİ BÜLENT ÖNAY	
Theory	Application	Laboratory	National Credit: 4
3	2	0	ECTS Credit: 6



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FACULTY OF ENGINEERING OFFICE OF THE DEAN



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Offered to:	Course Status: Compulsory/Elective
Name of the Department:	
Metallurgical And Materials Engineering	Required Course

Wire: 0 232 301 72 15

Fax: 0 232 301 72 10

Access: <http://www.eng.deu.edu.tr>

Address: Dokuz Eylül Üniversitesi Tınaztepe Yerleşkesi 35160 Buca/İZMİR E-mail: muhendislik@deu.edu.tr



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Instructor/s:

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Course Objective:

To introduce equipments and techniques used to determine the internal structure as well as the physical and chemical properties (characterization) of engineering materials, while at the same time conduct related applications.

Learning Outcomes:

- 1 To be able to understand and gain experience on the use of optical microscopy and metallographic preparation of metallurgical samples
- 2 To be able to explain the structure, operating techniques and applications of the Scanning Electron Microscope
- 3 To be able to explain the production, properties and use of X-rays in materials characterization
- 4 To be able to explain the working principals of the thermal analysis equipment and interpret the application results
- 5 To be able to recognize the techniques used for chemical characterization of materials and interpret the application results
- 6 To be able to conduct the applications and report their results as teams
- 7 To be able to identify the use of the characterization equipment in solving materials problems as well in developing new materials

Learning and Teaching Strategies:

Lectures + Applications + Report writing + Group studies +Midterm exams + Final exam

Assessment Methods:

Name	Code	Calculation formula
1.Vize	VZ1	
2.Vize	VZ2	
Lab	LB	
Final	FN	
Bütünleme Notu	BUT	
BNS	BNS	$VZ1 * 015 + VZ2 * 015 + LB * 020 + FN * 050$
Bütünleme Sonu Başarı Notu	BBN	$VZ1 * 015 + VZ2 * 015 + LB * 020 + BUT * 050$



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Further Notes about Assessment Methods:

Application studies and report writing are conducted by groups. These activities have a total weight of 20% in grading. Nonparticipation in these activities is graded individually.

Assessment Criteria:

Learning Outcomes

Assessment

1 - 7
exam Midterm exams, applications, report writing, Final exam

Textbook(s)/References/Materials:

Textbook(s):

1. Encyclopedia of Materials Characterizations, Lee E. Fitzpatrick, Butterworth-Heinemann, Butterworth-Hei, USA, 1992,
2. Scanning Electron Microscopy and X-ray Microanalysis, J. Goldstein, D. E. Newbury, D.C. Joy, Springer Verlag, 0306472929 ,USA
3. Elements of X-Ray Diffraction, B.D. Cullity, Addison Wesley Publishing Company, 0201 01230 8, USA, 1967

References: Journals related to materials characterization studies

1. ASM Handbook, Metallography and Microstructures, vol.9.
2. Microscopy Techniques for Materials Science, AR Clarke, CN Eberhard, Woodhead Publishing Ltd., 1-85573-587-3, England, 2002
3. Fundamentals of Light Microscopy and Electronic Imaging, Douglas B Murphy, Wiley&Sons, 0-471-25391-X, Canada, 2001

Other references:

1. Reports and regular publications on materials characterization
2. Manuals and other written or visual material published by the equipment makers

Course Policies and Rules:



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Contact Details for the Instructor:

Ali Bülent ÖNAY (bulent.onay@deu.edu.tr) , Ahmet ÇAKIR (ahmet.cakir@deu.edu.tr)

Office Hours:

Monday 9:30 - 10:30

Course Outline:

Week	Topics:	Notes:
1	Introduction to metallographic sample preparation(SP): Cutting, molding and mold materials, grinding and polishing	Selection of materials for applications
2	Introduction to metallographic sample preparation: Electrolytical polishing principles and etching techniques	Indentification of characterization methods
3	Microstructure analysis of materials by an optical microscope (OM): Parts of the microscope, investigation of lenses and lens defects.	1.Application SP ve OM
4	Microstructure analyses of materials by an optical microscope: illumination systems, magnification and working principles of the microscope	2. SP and OM
5	Investigation by an optical microscope, of the microstructures of materials produced by different methods	3. SP and OM
6	Preparation of heat treated samples and their optical microscope analyses	4. SP and OM
7	1st midterm	
8	Material-electron interactions and material characterization by Scanning Electron Microscope (SEM)	5. SEM
9	Material characterization by XRD	6. XRD
10	Material characterization by XRF	7. XRF
11	2nd midterm	
12	Characterization of thermal properties by TGA / DTA	8.TGA and DTA
13	Characterization of materials by the FTIR method	9.FTIR



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14	Introduction to OES and some other characterization methods	10. Related applications
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ECTS Table

Course Activities	Number	Duration (hour)	Total Work Load (hour)
In Class Activities			
Lectures	12	3	36
Applications (Lab)	10	2	20

Exams

Midterm	2	2	4
Final	1	2	2

Out Class activities

Preparations before/after weekly lectures	12	3	36
Preparation for midterm exam	2	4	8
Preparation for final exam	1	5	5
Preparing the application reports	10	5	50
Total Work Load (hour)			161
ECTS Credits of the Course= Total Work Load (hour) / 25			6