



Dumlupınar University

Faculty of Engineering
Materials Science and Engineering

131915503 Malzeme Biliminde Elektron Mikroskopları					
Semester	Course Code	Course Name	L+P	Credit	ECTS
5	131915503	Malzeme Biliminde Elektron Mikroskopları	3	3	5

Language of Instruction:

Turkish

Course Level:

Faculty

Work Placement(s):

No

Department / Program:

Materials Science and Engineering

Course Type:

Seçmeli

Goals:

The aim of the course is to pull the attention of the students to scanning electron microscopy and combined microanalysis techniques works and to inform recently developments about microstructural characterization and microchemical analysis of ceramic materials.

Teaching Methods and Techniques:

With this course, the students will be informed about scanning electron microscopy and combined microanalysis techniques, sample preparation procedures, microstructure-property of ceramic materials and its applications.

Prerequisites:

Course Coordinator:

Associate Prof.Dr. Hilmi YURDAKUL

Instructors:

Associate Prof.Dr. Hilmi YURDAKUL

Assistants:

Recommended Sources

Textbook	:	1.	Electron Microscopy and Analysis, Peter J. Goodhew, John Humphreys and Richard Beanland, Taylor and Francis, London and New Y
Resources	:	2.	Ceramography, R.E. Chinn, ASM international, Ohio, 2002.
Documents	:		
Assignments	:	1.	A Guide to Scanning Microscope Observation, Electron Optics Resources, http://www.jeolusa.com
Exams	:		Web sayfasına PDF formatında yüklenecektir Ders sırasında verilecektir

Course Category

Mathematics and Basic Sciences	:	25	Education	:	
Engineering	:	25	Science	:	25
Engineering Design	:	25	Health	:	
Social Sciences	:		Field	:	

Course Content

Week	Topics	Study Materials	Materials
1	The importance of microscopy and microanalysis for ceramic materials		
2	Sample preparation techniques		
3	Electron-specimen interactions		
4	Basic components of a scanning electron microscope		
5	Imaging with secondary and backscattered electrons		
6	Energy dispersive X-ray spectrometry (EDX) for SEM		
7	Wavelength dispersive X-ray spectrometry (WDX) for SEM		
8	Parameters effecting the quality of SEM images		
9	Midterm exam		
10	Parameters effecting the reliability of microchemical analysis combined with SEM		
11	Examples of SEM investigations		
12	Examples of EDX/WDX analysis		
13	Other microscopy techniques		
14	Recently developments in scanning electron microscopy and microanalysis		

Recommended Optional Programme Components

131915125 Crystallography and X-Ray

Course Learning Outcomes

No	Learning Outcomes
C01	At the end of this course, the student; 1. understands importance of microstructural characterization and microchemical analysis in field of ceramic engineering.
C02	2. defines microstructural and microchemical properties of ceramic materials.
C03	3. has general information about scanning electron microscopy and combined microanalysis techniques.
C04	4. exhibits procedures for sample preparation of specimens.
C05	5. learns basic components of a scanning electron microscope.
C06	6. has information recently developments about microstructural characterization and microchemical analysis
C07	7. defines electron-specimen interactions.
C08	8. explains microstructure-property of ceramic materials.

Program Learning Outcomes

No	Learning Outcome
P01	Engineering graduates with sufficient theoretical and practical background for a successful profession and with application skills of fundamental scientific knowledge in the engineering practiced
P03	Engineering graduates with the necessary technical, academic and practical knowledge and application confidence in the design and assessment of machines or mechanical systems or industrial pro
P02	Engineering graduates with skills and professional background in describing, formulating, modeling and analyzing the engineering problem, with a consideration for appropriate analytical solutions in
P05	Ability of designing and conducting experiments, conduction data acquisition and analysis and making conclusions
P06	Ability of identifying the potential resources for information or knowledge regarding a given engineering issue
P04	Engineering graduates with the practice of selecting and using appropriate technical and engineering tools in engineering problems, and ability of effective usage of information science Technologie
P10	Engineering graduates with well-structured responsibilities in profession and ethics
P08	Ability for effective oral and official communication skills in Turkish Language and, at minimum, one foreign language
P07	The abilities and performance to participate multi-disciplinary groups together with the effective oral and official communication skills and personal confidence
P13	Having enough level of general culture (Mother language, foreign languages, history etc)
P12	Consciousness for the results and effects of engineering solutions on the society and universe, awareness for the developmental considerations with contemporary problems of humanity
P11	Engineering graduates who are aware of the importance of safety and healthiness in the project management, workshop environment as well as related legal issues
P09	Engineering graduates with motivation to life-long learning and having known significance of continuous education beyond undergraduate studies for science and technology

Assessment		
In-Term Studies	Quantity	Percentage
Mid-terms	0	%20
Quizzes	0	%0
Assignment	0	%20
Attendance	0	%0
Practice	0	%0
Project	0	%0
Final examination	0	%60
Total		%100

ECTS Allocated Based on Student Workload			
Activities	Quantity	Duration	Total Work Load
Course Duration	16	3	48
Hours for off-the-c.r.stud	16	3	48
Assignments	0	0	0
Presentation	1	1	1
Mid-terms	1	30	30
Practice	0	0	0
Laboratory	0	0	0
Project	0	0	0
Final examination	1	30	30
Total Work Load			157
ECTS Credit of the Course			5

Course Contribution To Program														
Contribution: 1: Very Slight 2:Slight 3:Moderate 4:Significant 5:Very Significant														
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	P13	
All	5	4	5	4	5	5	4	3	4	5	3	5	4	
C01	5	4	5	4	5	4	4	3	4	5	3	5	4	
C02	5	5	5	4	5	5	4	5	5	4	3	5	4	
C03	4	4	4	5	4	5	4	5	5	4	3	4	4	
C04	4	3	4	5	4	4	4	4	4	3	3	4	5	
C05	3	5	4	5	4	4	4	4	4	4	3	4	5	
C06	4	4	3	4	3	4	4	5	5	4	3	4	5	
C07	3	3	4	3	3	5	4	5	3	5	3	5	5	
C08	5	5	3	3	5	5	4	5	5	5	3	5	5	