



Dumlupınar University

Faculty of Engineering
Materials Science and Engineering

131917605	Nanoscopic Analysis of Materials				
Semester	Course Code	Course Name	L+P	Credit	ECTS
7	131917605	Nanoscopic Analysis of Materials	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 electron microscopy and combined nanoanalysis techniques works and to inform recently developments about nano level imaging and spectroscopic analysis of materials.

Teaching Methods and Techniques:

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

Prerequisites:

Course Coordinator:

Associate Prof.Dr. Hilmi Yurdakul

Instructors:

Associate Prof.Dr. Hilmi Yurdakul

Assistants:

Recommended Sources	
Textbook	: 1.Handbook of Nanoscopy, 2 Volume Set 1st Edition by Gustaaf van Tendeloo (Editor), Dirk van Dyck (Editor), Stephen J. Pennycook (Editor)
Resources	:
Documents	: Scanning Electron Microscopy and X-ray Microanalysis: Third EditionFeb 2003 by Joseph Goldstein and Dale E. Newbury
Assignments	: Web sayfasına PDF formatında yüklenecektir
Exams	: Ders sırasında verilecektir Dönem başlarında WFR üzerinde değerlendirilecektir

Course Category	
Mathematics and Basic Sciences	: 20
Engineering	: 20
Engineering Design	: 20
Social Sciences	:
Education	:
Science	: 20
Health	:
Field	: 20

Course Content		
Week	Topics	Study Materials
1	What is Nanoscopy? And How does its relationship with Nanotechnology?	
2	Introduction to electron nanoscopy	
3	Electron nanoscopy imaging techniques	
4	Electron nanoscopy spectroscopic techniques	
5	What is Ionography?	
6	Slope-cutting sample preparation route through ion beam	
7	Midterm Exam	
8	Electron transparent sample preparation via ion beam-thinning	
9	Meeting with scanning electron microscope (SEM) in Laboratory	
10	Secondary electron imaging practices in SEM	
11	Backscattered electron imaging practices in SEM	
12	The chemical analysis practice with energy dispersive X-ray (EDX) spectrometer in SEM	
13	The chemical analysis practice with wavelength dispersive X-ray (WDX) spectrometer in SEM	
14	The electron diffraction analysis practice (mapping) with electron backscattered diffraction (EBSD) technique in SEM	
15	Scanning transmission electron microscopy applications in SEM	
16	Final Exam	

Recommended Optional Programme Components	
131915125 Crystallography and X-Ray	
131917133 Nanomaterials	
131918135 Material Characterization	
131915503 Malzeme Biliminde Elektron Mikroskopları	
131918608 2D Nano-Sheets(Tech.Elec. VI)	

Course Learning Outcomes	
No	Learning Outcomes
C01	1. Understands importance of nanoscopic characterization and in field of materials science
C02	2. Defines microstructural and microchemical properties of materials.
C03	3. Learns basic components of a scanning and transmission electron microscopes.
C04	4. Defines electron-specimen interactions.
C05	5. Explains microstructure-property of 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 ir
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	%20
Project	0	%0
Final examination	0	%40
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	1	1	1
Presentation	0	0	0
Mid-terms	1	15	15
Practice	0	0	0
Laboratory	1	30	30
Project	0	0	0
Final examination	1	15	15
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	4	5	4	4	3	4	4	5	5	3	4	5	5	
C01	4	4	4	4	3	4	5	5	4	3	4	5	5	
C02	5	5	4	5	5	4	5	4	4	5	4	3	4	
C03	5	4	5	5	5	5	5	4	4	3	4	3	4	
C04	4	5	5	5	5	5	5	3	4	5	4	3	4	
C05	3	3	5	4	4	5	5	3	5	5	4	3	4	