

COURSE IDENTIFICATION FORM

Course Code and Name: IM5014 MATERIAL CHARACTERIZATION METHODS

Department of : CIVIL ENGINEERING / MASTER PROGRAMME

Semester	Theoretic Hour	Practice Hour	Total Hour	Credits	ECTS	Education Language	Type: Compulsory Elective
Autumn/Spring	3	0	3	3	5	Turkish	Optional

Prerequisite (s)

Instructor

Assoc. Prof. Dr. Nihan GÜLMEZ

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Course Assistant

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Groups / Classes

Course Aim

The course aims to provide the student with an overview of the current techniques used for the physicochemical characterisation of materials with special reference to the principles, practice and applications of X-ray diffraction, spectroscopic, microscopic, thermal and electroanalytical techniques.

Course Goals

An overview of both established and new materials characterization techniques, including mechanical characterization (e.g., hardness measurements, tensile test, Charpy impact test, fatigue test), X-ray diffraction, X-ray fluorescence, optical microscopy, electron microscopy (e.g., TEM, SEM, EDS, WDS), and thermal analysis (e.g., DTA, DSC, TGA, TMA).

Course Learning Outcomes and Proficiencies

- Material characterization techniques X-ray methods (Crystal structure analysis. Phase and elemental analysis with X-ray methods)
- Optical microscope
- Electron microscopes (TEM, SEM) and material characterization
- Basic principles of FTIR analysis, working principle, examination of its components
- Obtaining and properties of X-rays, X-Ray diffraction analysis

Course Basic and Auxiliary Contexts

- George F. Vander Voort , Metallography Principles and Practice , McGrack-Hill Book Company , 1984. Metals Hand book .

Methods of Give a Lecture

Face to Face

Assessment Criteria		If Available, to Sign (x)	General Average Percentage (%) Rate
	Midterm Exam	X	50
	1. Quiz		
	2. Quiz		
	3. Quiz		
	4. Quiz		
	Oral Examination		
	Practice Examination (Laboratory, Project etc.)		
	Final Exam	X	50
Semester Course Plan			
Week	Subjects		
1	Classify Material Characterization techniques		
2	Macro Examination, Sample Preparation for Macro Examination,		
3	Examination of Breaking and Fractured Surfaces,		
4	Optical Microscope		
5	Micro-inspection, Sampling, Cutting, Embedding,		
6	Sanding, Polishing and Etching,		
7	Midterm Exam		
8	Optical microscope examination		
9	Structural Analysis of Single and Dual Phase Materials,		
10	Metal and Alloy Microstructures and Equilibrium Diagram Relationships,		
11	Electron microscopes (TEM, SEM) and Material Characterization		
12	Basic principles of FTIR analysis, working principle, examination of its components		
13	Obtaining and Properties of X-rays, X-Ray Diffraction Analysis		
14	Final Exam		