ABDULLAH GÜL UIVERSITY
GRADUATE SCHOOL OF ENGİNEERİNG AND SCIENCE
ADVANCED MATERIALS AND NANOTECHNOLOGY MSC. PROGRAM
COURSE DESCRIPTION

Course Name	Code	Semester	T+P Hour	Credit	ECTS
Advanced Instrumental Analysis - I	AMN 515	FALL - SPRING	3 + 2	4	15

Prerequisite Courses	-

Type of the Course	Selective
Language of Instruction	English
Coordinator of the Course	Assist. Prof. İlker ERDEM
Lecturer(s) of the Course	Assist. Prof. İlker ERDEM
Assisting Personnel	Specialist Şeyma DADI
Objective of the Course	Teaching the fundamentals of instrumental analysis methods and introduction of some instruments used for analysis
Learning Outcomes	1. Learning the interaction mechanisms between material-stimulant used in instrumental analysis 2. Learning different types of instrumental analysis 3. Learning the quality criteria for instrumental analysis 4. Gaining personal experience on how to perform instrumental analysis 5. Gaining experience through planning a project including instrumental analysis and performing the necessary analysis
Course Content	• Introduction of stimulants used for signal formation and mechanisms used for signal formation and determination, • Necessary terms (e.g. accuracy, precision and sensitivity) for instrumental analysis • Necessary parameters and terms to decide to type of instrumental analysis, signal/noise ratio, types of noise, minimum detectable/quantifiable limits, calibration curves, dynamic range • Introduction of different physicochemical properties used in different instrumental analysis, • Introduction of necessary parts of analysis instruments, • Light, light-matter interaction, absorbance-transmittance (Beer-Lambert Law), infrared (IR) lights and molecular vibrations, • Light scattering, determination of particle size distribution and surface charge via light, • Chromatography, utilization of chromatography for instrumental analysis

SUBJECTS, PRELIMINARY PREPARATIONS AND POST-LECTURE ACTIVITIES

Week	Subjects	Practice
1	**Introduction:** Senses, sensing limits, instrumental analysis mechanism, qualitative-quantitative analysis	
2	**Instrumental analysis:** Accuracy, precision, sensitivity, signal/noise ratio, types of noise, calibration curve, detectable limits	
3	**Instrumental analysis:** Physicochemical properties and their utilization in instrumental analysis, gravimetric, volumetric, thermal and light-stimulated interactions	
4	**Light-matter interactions:** Light, electromagnetic radiation spectrum, light-matter interaction mechanisms, absorbance-transmittance, molar absorptivity, uv-vis spectrophotometer	Uv-vis spectrophotometer experiment
5	**Light-matter interactions:** Light, electromagnetic radiation spectrum, infrared (IR) radiation, molecular vibrations	FT-IR spectrometer experiment
6	**Light-matter interactions:** Light scattering, types of	Particle size distribution

	light scattering and examples from the nature, interference, Brownian motion, electrophoretic mobility, zeta potential	and zeta potential determination via light scattering
7	**Chromatography:** Types of chromatography, separation mechanisms in chromatography, high performance liquid chromatography (HPLC)	HPLC experiment
8	**Midterm**	
9	**Term project topic determination**	
10	**Term project proposals**	
11	**Term project work**	Laboratory
12	**Term project work**	Laboratory
13	**Term project work**	Laboratory
14	**Term project work**	Laboratory
15	**Term project work**	Laboratory

SOURCES / REFERENCES	
Course Notes	The notes and the slides of the course
Other References	• D. A. Skoog, E. J. Holler, S. R. Crouch. "Principles of Instrumental Analysis", 6th Edition, Brooks/Cole, Cengage Learning, 2007. • Y. Hışıl, "Enstrümental Gıda Analizleri-I", Ege Üniversitesi Basımevi, 1994. • Y.Hışıl, "Enstrümental Gıda Analizleri-II", Ege Üniversitesi Basımevi, 1994. • H. Yetim, M. Çam, "Enstrümental Gıda Analizleri", Erciyes Üniversitesi Matbaası, 2009.

MATERIAL SHARING	
Documents	The lecturing slides of the course are shared on canvas or another online application
Homeworks	
Exams	
Projects	The project reports are shared before the project exam

EVALUATION METHODS		
IN-TERM ACTIVITIES	**QUANTITY**	**WEIGHT, %**
Midterm Exam	1	35
Homework	4	20
Term Project and Exam	1	45
TOTAL		100
Effect of in-term Activities on Success		100
Effect of Final Exam on Success		0
TOTAL		100

Course Category	
Basic Sciences and Mathematics	
Engineering Sciences	X
Social Sciences	

RELATIONSHIP BETWEEN LEARNING OUTCOMES OF THE COURSE WITH THE QUALIFICATIONS OF THE PROGRAM

No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	PQ1. Ability of Working Independently and Taking Responsibility					X
2	PQ2. Lerning Competence					X
3	PQ3. Communication and Social Activity				X	
4	PQ4. Field-specific Competence				X	

*from 1 to 5 the score increases.

ECTS / WORK LOAD TABLE			
Activities	Activities	Duration (Hour)	Total Work Load (Hour)
Lectures (including exam week: 16x total lecture hours)	10	3	30
Repetition of the Topics	10	4	40
Laboratory Practice(Post-lecture Practice)	5	2	10
Research on internet, library usage	14	7	98
Term Project Experiments	1	120	120
Report Preparation after Term Project Experiments	1	50	50
Presentation Preparation after Term Project Experiments	1	40	40
Homeworks	4	5	20
Midterm Exam (Preparation)	1	40	40
Total Work Load			458
Total Work Load / 30			15.26
ECTS Credits			15