YOZGAT BOZOK UNIVERSITY FACULTY OF ARTS AND SCIENCES

CHEMISTRY DEPARTMENT COURSE PLAN

Course Code	Course Title	Semester	Course Type (C/E)	T+A+L (Time/Week)	Credit	ECTS	Course Language
KİM750	X- Rays Diffraction	1-2	E	2+0+0		4	Turkish

COURSE INFORMATION

Course Catalog Description (Content)	This course covers the electromagnetic spectrum and x-rays, interaction of x-rays with matter, inverse space and diffraction relationship, absorption and refraction of x-rays, monochromators, x-ray diffraction techniques, reflection curves, ideal crystal theory.
The Aim of the Course	The aim of this course is to teach the student what x-rays are, where they are used and how x-rays interact with matter.
Course Level	Bachelor degree
Course Language	Turkish
Teaching method	(X) Formal ( ) Online ( ) Mixed/Hybrid
Teaching Staff of the Course	Prof. Dr. Mustafa SAÇMACI
Prerequisite Course(s) of the Course	
Learning Outcomes from the Course	1. Can learn diffraction techniques. 2. Can learn coherent and non-coherent scattering. 3. Can learn Crystal Structures, inverse space and diffraction concepts. 4. Understand the reflection, absorption and refraction of X-rays. 5. To learn diffraction methods and to learn Fourier method in structure analysis.

COURSE CONTENT

Week	Theory	Practice/Laboratory
1	Electromagnetic Radiation, Generation of X-Rays. Properties of X-Rays, Continuous and Characteristic X-Rays	
2	Absorption, Absorption Coefficients and Absorption Edges, Filters	
3	Crystal structure, crystal systems, Bravais lattices and Miller indices Diffraction, Bragg's Law, Ewald sphere, Inverse space concept	
4	Diffraction of X-rays, Structure Factor, Non-mathematical geometrical approach to Powder Diffraction	
5	Diffraction of X-rays, Mathematical Approach to Powder Diffraction, Integrated intensity calculation and phase problem	
6	Indexing of powder diffraction patterns.	
7	Error sources and types in diffraction data	
8	Crystal reflection curves	
9	Bragg and Laue crystals and their uses.	
10	Laue method, rotating crystal method	
11	X-Ray optics, optical diffraction, Laue and Bragg crystals, Monochromator types	
12	Fourier series in structure determinations	
13	Ideal crystal theory	

14	Ideal crystal theory	
15	Final Exam	

Course Learning Resources

1. Als-Nielsen J. and McMorrow D., (2001), Elements of Modern X-ray Physics, John Wiley & Sons, Ltd.
2. Cullity B.D., (2001), Elements of X-ray Diffraction, Addison-Wesley.
3. Warren B. E., (1990), X-ray Diffraction, Dover Publications, Inc., New York.

ASSESSMENT CRITERIA

Work Activities During the Semester	Number	Contribution
Homework	1	%30
Practice		
Forum/ Discussion Application		
Short Exam (Quiz)	2	%35
Ratio Of Semester Studies To Semester Success (%)		%40
Ratio of Final to Success (%)	1	%60
Total		%100

COURSE WORKLOAD TABLE

Activity	Total Weeks	Duration (Weekly Hours)	Total Workload
Theory	14	2	28
Practice			
Forum/ Discussion Application			
Reading	14	3	42
Internet Scanning, Library Study	14	2	28
Material Design, Application			
Report Preparation			
Presentation Preparation			
Presentation			
Final Exam	1	2	2
Preparation for the Final Exam	4	6	24
Other(s) (Specify: … …. ……..)			
Total Workload			
Total Workload / 25 (s)			124/25
ECTS Credits of the Course			124/25≅5
Note: The workload of the course will be determined by the instructor on a per-course basis.			

PROGRAM LEARNING OUTPUTS CONTRIBUTION LEVELS

No	Program Learning Outputs	1	2	3	4	5
1	Gains extensive knowledge about the basic chemical properties of matter and uses this knowledge in daily life, industrial scale, and practical chemistry and shares them with the society.				**X**	
2	Performs experiments, collects data, interprets, evaluates results, defines problems parallel to current technological developments, produces solutions against problems encountered in the laboratory.		**X**			
3	Calculates and processes chemical information and data.			**X**		
4	Applies her/his knowledge and understanding of chemistry to the solution of unconventional qualitative and quantitative problems.				**X**	

5	Defines and comprehends chemical concepts and theories in Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Analytical Chemistry, Biochemistry.				**X**	
6	Can conduct research in the light of scientific data on any subject in the field of chemistry.					**X**
7	Writes, presents, discusses scientific material, and presents it orally to a knowledgeable audience.			**X**		
8	Brings a chemical approach to the solution of environmental problems, makes environmental analyzes and reports.		**X**			
9	Knows a foreign language at a level to read and understand the basic terms and processes of the chemist profession.			**X**		
10	Can use computer software and information and communication technologies at the level required by the field.				**X**	
11	Adapts and transfers the knowledge gained in the field to secondary education.			**X**		
12	Apart from the field of chemistry, she/he gains knowledge in different branches of science that she feels close to.				**X**	
13	Carries out a study independently, makes group work and gains the awareness of taking responsibility.				**X**	
14	They can develop a positive attitude towards lifelong learning and constantly renew their professional knowledge and skills.				**X**	
15	Have sufficient awareness of the universality of social rights, social justice, quality culture and protection of cultural values, environmental protection, occupational health and safety.			**X**		