Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3141	**4**	**0**	**0**	**4**	**4**	**Z**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Fizikokimya I**							
Course Name (English**)**	**Physical Chemistry I**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	Teaching the basic concepts of physical chemistry Explanation of the laws of thermodynamics Definition of ideal gas, real gas and derivation of related relations Explanation of states of matter and some physical properties
Course Outline	1. Introduction to Physical Chemistry; 2. Gas laws and structure of gases, 3. Fundamental laws of thermodynamics, 4. States of matter
Textbook/ Material / Resources	1.Sarıkaya, Yüksel., Fizikokimya, Ankara Üniversitesi Yayınları, ANKARA (***ANA KAYNAK***) 2.Berkem,A.R. 1980 Modern Fizikokimya,720 s. İstanbul Üniversitesi Yayınları, Yayın No:10 İSTANBUL. 3.Atkins, P.W.1978. Physical Chemistry, 1007 s.Oxford University Press, Oxford. Moore, J.W. 1972 Physical Chemistry, 969 s. Longmann Group ltd, LONDON
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Marmara University,	Chemical	Physical chemistry	**4-0-0-7; 7**	essential
Gazi University	Chemical	Physical chemistry	**4-0-0-4; 5**	essential
Eskişehir Osmangazi University	Chemical	Physical chemistry	**4-0-0-4; 5**	essential

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Prof.Dr.Kadir DEMİRELLİ	
Instructors who can teach the course (Title, Name and Surname)	*Signature*

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Understanding the basic subjects of physical chemistry, acquiring theoretical knowledge, ability to identify, define, analyze and solve problems in chemistry and related fields, making students comprehend the basic subjects of physical chemistry specified in the course content and relating them to other branches of chemistry.

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

Face-to-face oral presentation, in exceptional cases, it will be switched to online

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)

Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution

Week	Theory	Application/Laboratory
1	INTRODUCTION TO PHYSICAL CHEMISTRY; Definition of Physical Chemistry, Unit systems	
2	GAS LAWS AND STRUCTURE OF GASES; Properties of Gases	
3	Ideal Gas Laws	
4	Real Gas Laws	
5	FUNDAMENTAL LAWS OF THERMODYNAMICS; 1st law of thermodynamics, Definitions of internal energy, Enthalpy, Work, Heat and necessary mathematical relations	
6	2nd law of thermodynamics Cornot cycle, Entropy, 3rd law of thermodynamics	
7	Basic Thermodynamic Relations	
8	STATES OF MATTER	
9	Interphase balances (p-T phase diagrams of some substances and interphase conditions)	
10	MIDTERM EXAM	
11	Thermodynamics of phase transformations in pure substances	
12	Properties of Liquids	
13	Surface Tension	
14	Viscosity	
15	Melting and Boiling Points and Molecular Structure, Dipole Moment and Molecular Structure	
16	FINAL	

Assessment

	Activity	Custom	Contribution to Success Grade (%)
Evaluation Criteria	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100

Remarks	

Content Design and Subject Weight (%)		
	Mathematics and Basic Sciences	100
	Engineering Sciences	
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	*1*	*2*	*2*
Self-Study (including pre-class and exam preparation)	*2*	*10*	*20*
Make-up Exam	*1*	*2*	*2*
Experiment and Observation			
Class Participation (Theory)	*14*	*4*	*56*
Homework			
Final Exam Practice	*1*	*2*	*3*
Laboratory			
Article Review			
Writing an Article			
Reading	*10*	*1*	*10*
Case Study			
Performance			
Problem Solution	*14*	*1*	*14*
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument			
Application/Practice			
Other			
TOTAL WORKLOAD:			**107**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**4**

	Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Knows the basic concepts and approaches of physical chemistry	**5**	**3**	**2**	**3**	**0**	**3**	**1**	**5**	**3**	**2**	**0**
2	Students will be able to explain the differences between ideal and real gases, understand how gas equations are derived, and calculate the properties of real gases.	**5**	**4**	**2**	**2**	**0**	**3**	**4**	**4**	**3**	**4**	**0**
3	Explain and apply the laws of	**5**	**3**	**4**	**4**	**0**	**3**	**3**	**1**	**4**	**4**	**1**

	thermodynamics.											
4	They will be able to understand the role of thermodynamics and kinetics in chemical equilibrium.	**5**	**4**	**3**	**3**	**1**	**3**	**1**	**4**	**3**	**4**	**1**
5	By understanding physical equilibrium and phase diagrams, they will be able to interpret phase diagrams.	**5**	**3**	**4**	**4**	**1**	**3**	**4**	**5**	**3**	**5**	**0**

Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3121	**4**	**0**	**0**	**4**	**6**	**Z**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Enstrümental Analiz**							
Course Name (English**)**	**Instrumental Analysis**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	Teaching the basic principles of modern analysis methods and their applications in chemistry,
Course Outline	Kimyasal analizin temel esasları, Atoıik ve Moleküler spestroskopi teknikleri, kütle spektroskopi teknikleri, Elekrokimyasal teknikler, kromotografik ve termal analiz teknikleri
Textbook/ Material / Resources	Turgut Gündüz, Enstrümental Analiz, Gazi Kitapevi, 2012 Ankara
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Ege University	Chemical	**Instrumental Analysis**	**3-1-2-0-7**	essential
Ankara University	Chemical	**Instrumental Analysis**	**3-2-4-0-5**	
Gazi University	Chemical	**Instrumental Analysis**	**3-0-3-0-5**	

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Prof. Dr. Sinan SAYDAM	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof. Dr. Memet Şekerci, Prof. Dr. Ayşegül YAZICI, Doç. Dr. Kenan KORAN	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)	
Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution		
Week	**Theory**	**Application/ Laboratory**
1	Basic principles and concepts of instrumental analysis	
2	Calibration in instrumental analysis	
3	Spectroscopic analysis methods UV-Visible spectroscopy	
4	Molecular Spectroscopy, IR and Raman Spectroscopy techniques	
5	Atomic Spectroscopy and Atomic Absorption Spectroscopy	
6	Atomic Spectroscopy and Atomic Emission Spectroscopy	
7	Potentiometry	
8	MIDTERM	
9	Electrochemistry and Voltammetric, polarographic techniques	
10	Separation methods and Chromatography	
11	HPLC Management and applications in chemistry	
12	Gas Chromatography and applications in chemistry	
13	Thermal analysis methods and applications in chemistry	
14	Polarimetry, Refractometry and applications	
15	FINAL	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight (%)	Mathematics and Basic Sciences	100
	Engineering Sciences	

	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	*1*	*3*	*3*
Self-Study (including pre-class and exam preparation)	*2*	*20*	*40*
Make-up Exam	*1*	*3*	*3*
Experiment and Observation			
Class Participation (Theory)	*14*	*4*	*56*
Homework			
Final Exam Practice	*1*	*3*	*3*
Laboratory			
Article Review			
Writing an Article			
Reading	*7*	*1*	*7*
Case Study			
Performance			
Problem Solution	*14*	*1*	*14*
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument	*15*	*1*	*15*
Application/Practice			
Other			
TOTAL WORKLOAD:			**141**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**6**

	Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Knows the basic principles and approaches of modern analysis methods.	**5**	**4**	**3**	**3**	**5**	**4**	**4**	**4**	**4**	**4**	**1**
2	Knows the basic approaches and concepts of instrumental analysis.	**5**	**4**	**3**	**3**	**3**	**5**	**5**	**5**	**5**	**5**	**4**
3	Has knowledge about the applications of instrumental analysis methods in chemistry.	**4**	**5**	**5**	**5**	**4**	**2**	**3**	**3**	**3**	**3**	**1**
4	Has knowledge about the evaluation and validity of data obtained from instrumental analysis methods.	**5**	**5**	**3**	**3**	**3**	**3**	**1**	**2**	**2**	**4**	**1**
5	Has knowledge about which instrumental analysis methods will be used for which types of substances.	**5**	**4**	**4**	**4**	**4**	**4**	**3**	**2**	**4**	**3**	**1**

Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3123	**2**	**0**	**0**	**2**	**3**	**Z**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Analitik Kimya III**							
Course Name (English**)**	**Analytical Chemistry III**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	To apply the separation techniques required to dissolve and separate substances from each other in the chemical analysis stages and to perform accurate analysis.
Course Outline	Solution techniques in analytical chemistry, Introduction to analytical separation methods, Physical separation methods, Chromatographic separation methods, Separation types with planar chromatography, theory and applications, separation types with column chromatography, theory and applications, separation theory and applications with liquid/gas chromatography, separation theory and applications with supercritical fluid chromatography, Capillary Electrophoresis and Capillary Electrochromatography separation, types, theory and applications.
Textbook/ Material / Resources	Analitik Kimya 2 - Temel İlkeler, 8.Baskı; D. A. Skoog, D. M. West, F.J. Holler, S.R. Crouch. Thomson Pub.. US. (2004); Çeviri Editörleri: E.Kılıç ve H. Yılmaz- Bilim Yayıncılık- Ankara
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Yıldız Technical University	Chemical	**Analytical Separation Methods**	**3-0-0-3- 5**	essential

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Prof. Dr. Habibe Özmen	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof. Dr. Ali Ölçücü, Prof. Dr. Mehmet Yaman	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

It is aimed that the dissolution of samples and separation methods, which are not given in Analytical Chemistry I and II courses and which constitute the basis of analytical chemistry, will contribute to other departments as they are very important in the field of chemistry.

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

The course will be taught in the form of theoretical explanation.

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)

Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution		
Week	**Theory**	**Application/ Laboratory**
1	Analytical chemistry solution techniques general concepts and definitions	
2	Solution in acid/base and mixtures	
3	Solution in closed and open environment	
4	Solution with melting and microwave	
5	Introduction to separation methods and basic concepts, physical separation	
6	Chromatographic separation methods	
7	Separation types with planar chromatography, theory and applications	
8	Separation types with column chromatography, theory and applications	
9	Midterm exam	
10	Separation theory and applications with liquid/gas chromatography	
11	Separation theory and applications with liquid/gas chromatography	
12	Separation theory and applications with supercritical fluid chromatography	
13	Separation types, theory and applications with capillary electrophoresis and capillary electrochromatography	
14	Separation types, theory and applications with capillary electrophoresis and capillary electrochromatography	
15	Final	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100

Remarks	

Content Design and Subject Weight (%)		
	Mathematics and Basic Sciences	100
	Engineering Sciences	
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	*1*	*2*	*2*
Self-Study (including pre-class and exam preparation)	*10*	*2*	*20*
Make-up Exam	*1*	*2*	*2*
Experiment and Observation			
Class Participation (Theory)	*14*	*2*	*28*
Homework			
Final Exam Practice	*1*	*2*	*2*
Laboratory			
Article Review			
Writing an Article			
Reading	*10*	*1*	*10*
Case Study			
Performance			
Problem Solution	*14*	*1*	*14*
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument			
Application/Practice			
Other			
TOTAL WORKLOAD:			**78**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**3**

Learning Outcomes (LO) *(Course Outcomes)*		**Program Outcomes (PO)** *1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Gains and applies the necessary information for dissolving solid samples	**5**	**5**	**5**	**4**	**2**	**4**	**4**	**3**	**4**	**2**	**1 1**
2	Gains theoretical information for dissolving organic and inorganic	**5**	**5**	**5**	**4**	**3**	**4**	**4**	**3**	**4**	**2**	**1**

	substances.											
3	Gains theoretical information for separating organic and inorganic substances and mixtures, purifying them and applying them on samples.	**5**	**5**	**5**	**4**	**2**	**4**	**4**	**3**	**4**	**2**	**1**
4	Gains information about Chromatography and Electrophoresis separation methods.	**5**	**5**	**5**	**4**	**2**	**4**	**4**	**3**	**4**	**2**	**1**
5	Gains the necessary knowledge and skills for preparing all samples for analysis in the light of analytical information.	**5**	**5**	**5**	**4**	**2**	**5**	**4**	**3**	**4**	**2**	**1**

Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3131	**4**	**0**	**0**	**4**	**6**	**Z**	**TR**	**3/FALL**
Course Name (Turkish)	**Organik Kimya III**							
Course Name (English)	**Organic Chemistry III**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	Recognition of aromatic compounds, learning the reactions and mechanisms of these compounds.
Course Outline	Introduction to Aromatic Compounds, Aromatic Electrophilic Substitution Reactions, Aromatic Halogen Compounds, Aromatic Nitro Compounds, Aromatic Amines, Aromatic Sulfonic Acids, Aromatic Aldehydes and Ketones, Aromatic Carboxylic Acids, Amalgamated Aromatic Compounds
Textbook/ Material / Resources	Organik Kimya Celal TÜZÜN, Palme Yayıncılık, Ankara. Organik Kimya Ralph J. Fessenden, Joan S. Fessenden, Marshall W. Logue. Çeviri Editörü: Tahsin UYAR, Ankara. Organik Kimya Graham Solomons, Craig Fryhle, Çeviri Editörü: Güral Okay Yılmaz Yıldırır, Literatür Yayıncılık, İstanbul.
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Ege University	Chemical	**Organic Chemistry-II**	**3-1-2-0-7**	essential
Yıldız Technical University	Chemical	**Organic Chemistry-II**	**3-2-4-0-5**	essential
Eskişehir Osmangazi University	Chemical	**Organic Chemistry-II**	**3-0-3-0-5**	essential

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Prof. Dr. Metin KOPARIR	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof. Dr. Hülya TUNCER **Prof. Dr. Ahmet CANSIZ** **Prof. Dr. Süleyman SERVİ** **Doç. Dr. Demet COŞKUN**	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)	
Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution

Week	Theory	Application/ Laboratory
1	Aromaticity and Benzene	
2	Aromatic Electrophilic Substitution Reactions	
3	Aromatic Halogen Compounds	
4	Aromatic Nitro Compounds	
5	Aromatic Amines	
6	Aromatic Amines: Diazonium Salts and Reactions	
7	Aromatic Sulfonic Acids	
8	Aromatic Sulfonic Acids	
9	Midterm	
10	Phenols	
11	Aromatic Aldehydes and Ketones	
12	Aromatic Aldehydes and Ketones	
13	Aromatic Carboxylic Acids	
14	Circular Aromatic Compounds	
15	Final	
16		

Assessment

	Activity	Custom	Contribution to Success Grade (%)
Evaluation Criteria	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight (%)	Mathematics and Basic Sciences	100
	Engineering Sciences	
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	*1*	*3*	*3*
Self-Study (including pre-class and exam preparation)	*2*	*20*	*40*
Make-up Exam	*1*	*3*	*3*
Experiment and Observation			
Class Participation (Theory)	*14*	*3*	*52*
Homework			
Final Exam Practice	*1*	*3*	*3*
Laboratory			
Article Review			
Writing an Article			
Reading	*1*	*10*	*10*
Case Study			
Performance			
Problem Solution	*14*	*2*	*28*
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument	*11*	*1*	*11*
Application/Practice			
Other			
TOTAL WORKLOAD:			**150**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**6**

	Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Learning the subject of Aromaticity and its Properties.	**5**	**5**	**5**	**3**	**2**	**2**	**3**	**1**	**2**	**1**	**3**
2	Learning the mechanism of Aromatic Electrophilic Substitution Reaction	**5**	**5**	**5**	**3**	**2**	**2**	**3**	**1**	**2**	**1**	**3**
3	Learning the effects of substrate activity and inactivity and reaction conditions in reaction mechanisms	**5**	**4**	**5**	**3**	**2**	**2**	**3**	**1**	**2**	**1**	**3**

4	Designing the syntheses of aromatic compounds.	**5**	**3**	**5**	**3**	**2**	**2**	**3**	**1**	**2**	**1**	**3**

Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3133	**0**	**0**	**4**	**2**	**3**	**Z**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Organik Kimya Laboratuvarı-I**							
Course Name (English**)**	**Organic Chemistry Labrotory-I**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	Organic Chemistry Lab. To teach the basic concepts and methods used, To develop students' organic chemistry laboratory skills, To explain the importance of organic chemistry in industry.
Course Outline	Organik Laboratuarı Tekniği, Bazı Organik Preparatların hazırlanması ve Karakterizasyonu
Textbook/ Material / Resources	Prof. Dr. Ender Erdik, Prof. Dr. Metin Obalı, Prof. Dr. Nadire Yüksekışık, Prof. Dr. Atilla Öktemer, Prof.Dr.Tarık Pekel, Prof.Dr.Ekmelettin İnsanoğlu "Denel Organik Kimya" Ankara Üniv.Fen Fak.Yayın No:145.1987
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Istanbul Technical University	Chemical	**Organic Chemistry Labrotory-I**	**0-0-5-2,5-5**	essential
Yıldız Technical University	Chemical	**Organic Chemistry Labrotory-I**	**0-0-4-2-4**	essential
Eskişehir Osmangazi University	Chemical	**Organic Chemistry Labrotory-I**	**0-0-4-2-4**	essential

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Prof. Dr. Metin KOPARIR	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof. Dr. Hülya TUNCER **Prof. Dr. Ahmet CANSIZ** **Prof. Dr. Süleyman SERVİ** **Doç. Dr. Demet COŞKUN**	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of

the course will be specified. Proof documents must be attached to this form.)	
Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution

Week	Theory	Application/Laboratory
1		Laboratory Instruments-Mixing-Heating and Cooling-Drying
2		Purification of Organic Solvents-Preparation of Inorganic Reagents-Yield Calculation
3		Separation and Purification Methods
4		Separation and Purification Methods
5		Iodoform
6		Aspirin
7		Benzalacetophenone
8		Benzalacetophenone
9		Midterm
10		Soap
11		Schiff base
12		Schiff base
13		Ethylacetate
14		Ethylacetate
15		Final
16		

Assessment

	Activity	Custom	Contribution to Success Grade (%)
Evaluation Criteria	Midterm Exams	1	20
	Quizzes	10	20
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight	Mathematics and Basic Sciences	100

(%)	Engineering Sciences	
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	*1*	*2*	*2*
Self-Study (including pre-class and exam preparation)	*14*	*1*	*14*
Make-up Exam	*1*	*2*	*2*
Experiment and Observation			
Class Participation (Theory)			
Homework			
Final Exam Practice	*1*	*2*	*2*
Laboratory	*14*	*4*	*56*
Article Review			
Writing an Article			
Reading			
Case Study			
Performance			
Problem Solution			
Project Preparation			
Project Submission			
Quiz	*10*	*1*	*10*
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument			
Application/Practice			
Other			
TOTAL WORKLOAD:			**86**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**3**

	Learning Outcomes (LO) *(Course Outcomes)*	**Program Outcomes (PO)** *1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	The ability to acquire theoretical knowledge, design and conduct experiments, collect, analyze and interpret data.	**5**	**4**	**3**	**3**	**2**	**4**	**5**	**1**	**3**	**2**	**4**
2	The ability to acquire theoretical knowledge, design and conduct experiments, collect, analyze and interpret data.	**5**	**4**	**3**	**3**	**2**	**4**	**5**	**1**	**3**	**2**	**4**
3	Ability to use information technologies effectively in chemistry applications	**5**	**4**	**3**	**3**	**2**	**4**	**5**	**1**	**3**	**2**	**4**

4	Sensitivity to national and international effects on health, safety and the environment in chemical applications and in solving problems in the field of chemistry	**5**	**4**	**3**	**3**	**2**	**4**	**5**	**1**	**3**	**2**	**4**
5	Ability to conduct single and multidisciplinary teamwork	**5**	**4**	**3**	**3**	**2**	**4**	**5**	**1**	**3**	**2**	**4**

Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3153	**2**	**0**	**0**	**2**	**2**	**Z**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Biyoinorganik Kimya**							
Course Name (English**)**	**Bioinorganic Chemistry**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	To convey to students the importance of inorganic elements in living systems, the binding of metal ions to biomolecules and their functions, toxic effects and applications of bioinorganic chemistry.
Course Outline	Introduction to bioinorganic chemistry and basic topics, inorganic elements and their functions, elements present in biological systems, the role of elements in hemeproteins, biomolecules containing zinc, copper, cobalt, nickel, iron sulfide and molybdenum, toxic effects of metals,
Textbook/ Material / Resources	W. Kaim, B. Schwederkki, A. Klein, Bioinorganic Chemistry, Inorganic Elements in the Chemisty of Life, 2nd ed., Wiley, 2013; Rosette M. Roat-Malone, Bioinorganic Chemistry, A Short Course, 2nd ed., John Wiley & Sons, 2007.
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Ankara University	Chemical	Bioinorganic chemistry	**2-0-0-2-3**	essential
Gebze Technical University	Chemical	Bioinorganic chemistry	**2-0-0-2-3**	essential

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Prof. Dr. Sinan SAYDAM	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof. Dr. Sinan SAYDAM, Prof. Dr. Ayşegül YAZICI, Prof. Dr Memet ŞEKERCİ, Doç. Dr. Kenan KORAN	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Students must have knowledge about electrochemical corrosion and its measurement techniques, and must have knowledge about corrosion protection and prevention methods.

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

Classes will be taught face to face

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)

Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution		
Week	**Theory**	**Application/Laboratory**
1	Bioinorganic chemistry historical development and basic principles	
2	Concentration and physiological effects	
3	Cobalamins	
4	Photosynthesis and metal ions	
5	Oxygen uptake and transport in living systems	
6	Hemoproteins and catalysis	
7	Oxygen activation and electron transfer	
8	Mid-term exam	
9	Iron sulfide and other iron proteins	
10	Uptake, transport and storage of essential elements	
11	Nickel and copper elements and their functions in living organisms	
12	Zinc element and its enzymatic and catalytic importance	
13	Roles of Topark alkali elements in living systems	
14	Trace elements and their importance	
15	Final Exam	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight (%)	Mathematics and Basic Sciences	100
	Engineering Sciences	

	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	*1*	*2*	*2*
Self-Study (including pre-class and exam preparation)	*1*	*10*	*10*
Make-up Exam	*1*	*2*	*2*
Experiment and Observation			
Class Participation (Theory)	*14*	*2*	*28*
Homework			
Final Exam Practice	*1*	*2*	*2*
Laboratory			
Article Review			
Writing an Article			
Reading			
Case Study			
Performance			
Problem Solution	*14*	*1*	*14*
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument			
Application/Practice			
Other			
TOTAL WORKLOAD:			**58**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**2**

	Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Has knowledge about bioinorganic chemistry and its importance	**5**	**5**	**5**	**5**	**4**	**4**	**4**	**4**	**4**	**4**	**1**
2	Has knowledge about the importance of elements in living systems	**5**	**5**	**4**	**3**	**3**	**5**	**4**	**3**	**3**	**3**	**3**
3	Has knowledge about diseases caused by elements and toxic effects of elements	**4**	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**4**	**4**	**1**
4	Students have knowledge about the effects of elements on living systems	**3**	**4**	**4**	**4**	**4**	**2**	**1**	**4**	**4**	**5**	**1**
5	Students have knowledge about the functions	**5**	**5**	**5**	**4**	**4**	**4**	**4**	**3**	**3**	**2**	**1**

	of metals in biological systems											

Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
CHEM 3137	**2**	**0**	**0**	**2**	**3**	**Z**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Spektroorganik Analiz**							
Course Name (English**)**	**Spectroorganic analysis**							

Unit/Program	Chemistry Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	To teach the basics of spectroscopic techniques (UV, IR, 1H NMR, 13C NMR, MS) used in structure analysis, simple spectrum interpretations and to apply this knowledge on spectra of unknown substances.
Course Outline	Ultraviolet and visible spectra; Infrared spectra; sample preparation, characteristic group frequencies of organic compounds, spectrum interpretations. 1H-NMR and 13C-NMR spectra; sample preparation, factors affecting chemical shift, spin-spin coupling, interpretation of first-order spectra. Mass spectra; determination of molecular formula, molecular ion peaks, interpretation of mass spectra. Structure elucidation by evaluating UV, IR, NMR and mass spectra together.
Textbook/ Material / Resources	Erdik, E.. Organik Kimyada Spektroskopik Yöntemler, Ankara: Gazi Büro Kitapevi. Cooper, J. C. (1980) Spectroscopic Tecniques for Organic Chemistry, New York: John Wiley-Interscience Publication.
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Gazi University	Chemical	Spectroscopic Methods in Organic Chemistry	**2-0-0-2; 3**	Elective

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Doç.Dr.Fatih BİRYAN	
Instructors who can teach the course (Title, Name and Surname)	*Signature*
Prof.Dr.Kadir DEMİRELLİ	

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Gain knowledge about spectroscopic techniques used in the structure analysis of organic compounds. In line with the information learned, can choose the methods to be used for organic compounds, interpret the results, and determine the correct structures..

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)

Face-to-face oral presentation will be held online in exceptional cases.

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)

Stakeholder Name	**Opinion** (Should be given as a summary, not exceeding two lines.)

Weekly Course Content Distribution		
Week	**Theory**	**Application/Laboratory**
1	Introduction to spectroscopy, matter and light	
2	UV spectroscopy basics, Organic Chromophores, Spectrum Evaluation	
3	IR's Basis and Basic Vibrations in Molecules	
4	IR spectroscopy regions, vibration types, functional group frequencies of organic compounds	
5	Some of the factors affecting vibration frequencies in IR spectroscopy	
6	Spectrum Evaluation in IR	
7	Introduction to 1H NMR Spectroscopy, sample preparation	
8	1H NMR Spectroscopy chemical shift and affecting factors	
9	MIDTERM EXAM	
10	1H NMR Spectroscopy spin-spin coupling	
11	Double irradiation, deuteration and shift reagents in 1H-NMR	
12	Interpretation of first-order spectra in 1H NMR Spectroscopy	
13	13C NMR Spectroscopy	
14	Evaluation of UV, IR, Mass and NMR spectra together	
15	**Final**	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight (%)	Mathematics and Basic Sciences	100
	Engineering Sciences	
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application			
Self-Study (including pre-class and exam preparation)	*1*	*2*	*2*
Make-up Exam	*3*	*12*	*36*
Experiment and Observation	*1*	*2*	*2*
Class Participation (Theory)			
Homework	*14*	*2*	*28*
Final Exam Practice			
Laboratory	*1*	*2*	*2*
Article Review			
Writing an Article			
Reading			
Case Study			
Performance			
Problem Solution			
Project Preparation	*6*	*1*	*6*
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument			
Application/Practice			
Other			
TOTAL WORKLOAD:			**76**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**3**

	Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Gains knowledge about spectroscopic techniques used in the structure analysis of organic compounds	**5**	**4**	**3**	**2**	**1**	**4**	**3**	**4**	**3**	**4**	**0**
2	Ability to choose the methods to be used for organic compounds, interpret the results, and determine the correct structures in line with the	**5**	**3**	**2**	**3**	**0**	**3**	**5**	**4**	**3**	**3**	**1**

	information learned											
3	Understands the characterization of organic, inorganic, and polymer molecules with UV, FT-IR, and NMR to illuminate their structures	5	3	4	5	0	4	3	3	4	4	1
4	Ability to use the techniques, methods, and modern tools required to identify unknown organic compounds	5	3	3	4	1	4	1	4	3	4	0