1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	CHEM102 GENERAL CHEMİSTRY II
Course Semester	2
Catalog Description (Content) of the Course	Chemical kinetics, chemical equilibrium, acids and bases, solubility and complex ion equilibria, Spontaneous change, entropy and Gibbs energy, electrochemistry.
Main Textbook	General Chemistry: Principles and Modern Aplications, R.H. Petrucci, W.S. Harwood, F.G. Herring,Printice Hall Inc., 10. Edition
Supporting Textbooks	Chemistry, R. Chang and K. A. Goldsby. McGraw-Hill, Inc. 11th Edition.
Course Credit (ECTS)	6
Prerequisites of the Course (Compulsory attendance should be indicated here.)	According to the regulation, the requirement of students to attend classes is at least 70% for each semester. There is no other prerequisite or co-requisite for this course.
Type of the Course	Compulsory
Instruction Language of the Course	English
Object and Target of the Course	To teach basic information and calculations about chemistry, to give information about engineering applications, to understand the importance of chemistry in health, environment and industry.
Learning Outcomes of the Course	1.Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems. 2.Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. 3Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. 4.Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively 5.Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems 6.Ability to work efficiently in intra-disciplinary teams. 7.Ability to work efficiently in multi-disciplinary teams; 8.Ability to work individually. 9.Ability to communicate effectively in Turkish/English, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations, 10prepare design and production reports, give and receive clear and intelligible instructions. 11.Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself. 12.Awareness of professional and ethical responsibility 13Information about business life practices such as project management, risk management, and change management. 14.Information about awareness of entrepreneurship, innovation, and sustainable development. 15.Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.

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<tr><td></td><td>16.Knowledge about awareness of the legal consequences of engineering solutions.
17.Knowledge on standards used in engineering practice.</td></tr>
<tr><td>Mode of Delivery</td><td>This course will only be givenby face-to-face .</td></tr>
<tr><td>Weekly Schedule of the Course</td><td>Week 1: SOLVENTS AND THEIR PHYSICAL PROPERTIES, solution types, solution concentration, intermolecular forces and dissolution, solution formation and equilibrium,
Week 2: solubility of gases, vapor pressures of solutions, osmotic pressure, freezing point depression, boiling point elevation, electrolyte solutions, colloidal mixtures.
Week3: CHEMICAL KINETICS: Rate of Chemical Reactions, Measurement of Reaction Rates, effect of Concentration on Reaction Rates: Rate Laws, Zero order reaction rate, First order reaction rate.
Week4: Second Order Reactions, Reaction Kinetics, Theoretical Models in Chemical Kinetic, Effect of Temperature on Reaction Rate, Reaction Mechanisms, Catalysis
Week 5: CHEMICAL EQUILIBRIUM, Dynamic Equilibrium, The Equilibrium Constant Expression, relationship involving equilibrium constant, magnitude of Keq.
Week 6: The reaction Quotient Q: Determination of net Direction, Factors Affecting Equilibrium: Le Châtelier Principle, Equilibrium Calculation: Some Illustrative Examples.
Week 7: ACIDS AND BASES: Arrhenius theory, Brønsted-Lowry acid and base theory, water self-ionization and pH scale, strong acids and strong bases, weak acids and bases
Week 8: Polyproticacids, Ions as acid and bases, Molecular Structure and Acid-Base Behavior, Lewis Acids and Bases.
Week9: ACID-BASE EQUILIBRIUM, Buffer solutions, Acid-Base Indicators, Neutralization Reactions and Titration Curves, Solutions of salts of polyprotic acids, Acid-Base Equilibrium Calculations ..
Week10: SOLUBILITY AND COMPLEX ION EQUILIBRIA: Solubility Product Constant (Ksp), Relationship between Ksp and Solubility, Common Ion Effect on Solubility, Limitations in the Ksp concept, Precipitation and Precipitation Criteria and completeness.
Week 11: Fractional precipitation, solubility and pH, Equilibria involving complex ions, qualitative cation analysis.
Week 12: ENTROPY AND GIBBS ENERGY. Spontaneity, Concept of Entropy, Evaluating of Entropies and Entropy Change, Criteria for spontaneous Change: The Second Law of Thermodynamics.
Week 13: Standard Gibbs Energy Change ΔG^o, Gibbs Energy change and equilibrium, ΔG^o and K as a function of temperature, Coupled Reactions.
Week 14: ELECTROCHEMISTRY: Electrode potentials and Measurement of Electrode Potentials, Standard Electrode Potentials, E °cell, ΔG, and K. E_{cell} as a function of concentration, Batteries: Corrosion, Electrolysis.</td></tr>
<tr><td>Educative Activities
(Credit will be determined based on the time given for these activities. Should be filled carefully.)</td><td>Theoretical Study Hours of Course Per Week
Reading
Searching in Internet and Library
Mid-Term and Studying for Mid-Term
Final and Studying for Final</td></tr>
<tr><td>Assessment Criteria</td><td>
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<tr><th></th><th>Quantity</th><th>Total Contribution (%)</th></tr>
<tr><td>Midterm</td><td>2</td><td>60</td></tr>
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Homework	-	-	
Assignment	-	-	
Projects	-	-	
Practice	-	-	
Quiz	-	-	
Contribution of In-term Studies to Overall Grade		60	
Contribution of Final Examination to Overall Grade		40	
Attendance	-	-	

Workload of the Course

Activity	Total Week Count	Weekly Duration (in hour)	Total Workload in Semester
Theoretical Study Hours of Course Per Week	14	4	56
Practicing Hours of Course Per Week	0	0	0
Reading	7	2	14
Searching in Internet and Library	7	4	28
Designing and Applying Materials	0	0	0
Preparing Reports	0	0	0
Preparing Presentation	0	0	0
Presentation	0	0	0
Mid-Term and Studying for Mid-Term	2	15	30
Final and Studying for Final	1	20	20
Other	0	0	0
Total work load	31	45	148
Total work load/25	1.24	1.8	5.92
ECTS of the course			6.0

Course's Contribution To Program

No	Program Outcomes	1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.				x	
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				x	
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.			x		
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.			x		
5	Ability to design and conduct experiments, gather data, analyze and		X			

		interpret results for investigating engineering problems.					
	6	Ability to work efficiently in intra-disciplinary teams.				x	
	7	Ability to work efficiently in multi-disciplinary teams;				x	
	8	Ability to work individually.					x
	9	Ability to communicate effectively in Turkish/English, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations,					x
	10	prepare design and production reports, give and receive clear and intelligible instructions.		x			
	11	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.				x	
	12	Awareness of professional and ethical responsibility.				x	
	13	Information about business life practices such as project management, risk management, and change management.		x			
	14	Information about awareness of entrepreneurship, innovation, and sustainable development.		x			
	15	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.			x		
	16	Knowledge about awareness of the legal consequences of engineering solutions.	x				
	17	Knowledge on standards used in engineering practice.		X			
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