1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	CHEM101 GENERAL CHEMISTRY I
Course Semester	1
Catalog Description (Content) of the Course	Properties of matter, atomic theory, chemical compounds and reactions, reactions in aqueous solution, gases, thermochemistry, atomic electron structure, periodic table, chemical bonds, solids, liquids and intermolecular forces.
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. 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. 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, 10 prepare 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 13 Information 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. 16. Knowledge about awareness of the legal consequences of engineering solutions. 17. Knowledge on standards used in engineering practice.
Mode of Delivery	This course will only be given by face-to-face .
Weekly Schedule of the Course	**Week 1:** Properties and Measurement of Matter, Characteristics and Classification of Matter, Scientific Method, Measurement of Matter, Uncertainty in Scientific Method, Significant Figures. **Week 2:** Atoms and Atomic Theory: The first discoveries in chemistry and other discoveries in atomic theory, electrons and atomic physics, atomic nucleus, chemical elements, atomic mass, introduction to periodic table, mole concept and of Avagadro's number, mole concept in calculations. **Week 3:** Chemical Compounds: Types of Chemical compounds and formulas, concept of mole, composition of chemical compounds, oxidation steps, nomenclature and formulas of organic and inorganic compounds. **Week 4:** Chemical Reactions: Chemical reactions and chemical equations, chemical equilibrium and stoichiometry, chemical reactions in solution, limiting component, other topics in reaction stoichiometry. **Week 5:** Introduction to Aqueous Solution Reactions: The nature of aqueous solutions, precipitation reactions, acid-base reactions, oxidation-reduction reactions and equilibrium (Redox), oxidizing and reducing agents, stoichiometry in aqueous solutions (redox titrations). **Week 6:** Gases: Characteristics of gases: Gas pressure, simple gas laws, ideal and general gas equations and applications, gases in chemical reactions, gas mixtures, kinetic theory of gases, ideal gases. **Week 7:** Thermochemistry: Some terms in thermochemistry, heat, reaction heat and calorimetry, work, first law of thermodynamics, reaction heat (ΔU and ΔH) and calculation: Hess law, standard formation enthalpies, fuels. **Week 8:** Electronic Structure od Atoms: Electromagnetic radiation, atomic spectra, quantum theory, Bohr atomic model, two concepts leading to a new quantum mechanics, wave mechanics, quantum numbers and orbitals, electron spins, multiple electrons, electron distributions and periodic table. **Week 9:** Periodic law and periodic table, metals, nonmetals and ions, atom and ionic size, ionization energy, electron affinity, magnetic properties, periodic properties. **Week 9:** Peryodic Chart and Some Atom Properties: Classification of elements. Periodic law and periodic table, metals, nonmetals and ions, atom and ion size, ionization energy, electron affinity, magnetic properties, periodic properties. **Week 10:** Chemical Bonds I: Basic Concepts: Lewis theory, covalent bonding, polar covalent bonds, writing of Lewis structures, resonance, octets and deviations, molecular geometry, bond order and length, bond energies. **Week11**: Chemical Bonds II: Basic Concepts: Valence bond theory, hybridization of atomic orbitals, multiple covalent bonds, **Week 12:** Molecular orbital theory, delocalized electrons, benzene bonding, bonding in metals, electron-charge density. **Week 13:** Liquids, Solids and Intermolecular Forces: Some properties of molecules and interactions between molecules,

	some properties of solids, **Week14:** phase diagrams, network covalent and ionic solids, crystal structures, energy changes in the formation of ionic crystals.
Educative Activities *(Credit will be determined based on the time given for these activities. Should be filled carefully.)*	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

Assessment Criteria

	Quantity	Total Contribution (%)
Midterm	2	60
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			5.92
ECTS of the course			6.0

Course's Contribution To Program

Number	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 interpret results for investigating engineering problems.		X			
	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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