

1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	CHEM211 ANALYTICAL CHEMISTRY
Course Semester	3
Catalog Description (Content) of the Course	Errors in chemical analysis, gravimetric analysis, titrimetric analysis, aqueous solution chemistry, electrolyte effects on ionic equilibrium, calculations in complex equilibria, acid-base neutralization titrations, precipitation titrations, complex formation titrations, electrochemistry.
Main Textbook	Analitik Kimya” Ç. Editörü Esmâ KILIÇ ve HAMZA YILMAZ: - Fundamentals of analytical chemistry; D. A. Skoog, D. M. West, F. J. Holler. Saunders College publishing, 8th Edition.
Supporting Textbooks	Nicel Kimyasal Analiz”- Çeviri Editörü: Ali Rehber TÜRKER- Quantitative Chemical Analysis; Daniel C. Harris, 8th edition.
Course Credit (ECTS)	5
Prerequisites of the Course (Compulsory attendance should be indicated here.)	Attendance at classes is at least 70% for each semester according to the regulations. There is no other prerequisite or co-requisite for the course
Type of the Course	compulsory
Instruction Language of the Course	English
Object and Target of the Course	To give basic informations on errors in chemical analysis, gravimetric analysis, titrimetric analysis, an queous solution chemistry, ionic equilibrium, calculations in complex equilibrium, acid-base neutralization titrations, precipitation titrations, complex formation titrations and electrochemistry and some examples on engineering applications.
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. Classification of analytical methods in quantitative and qualitative analysis, Calculations in Analytical chemistry. Week 2. Errors in chemical analysis, Systematic errors, random errors. Week 3. Statistical evaluation of data, standard deviation, confidence interval, variance and validation. Week 4. Chemical equilibrium, chemical equilibrium in aqueous solutions, definition of acids and bases, amphiprotic species, equilibrium types, solubility and common ion effect, weak acids and bases, buffer solutions and properties. Week 5. Effect of electrolytes on chemical equilibrium, activity coefficients. Week 6. Equilibrium problems in complex systems, solubility calculations with systematic method. Week 7. Gravimetric analysis methods and applications, titrimetric methods, precipitation titrimetry, argentometric titrations, standard solutions, volumetric calculations. Week 8. Principles of neutralization titrations, indicators in acid base titrations, strong acid-strong base titration curves, titration curves of weak acids and weak bases. Week 9. Titration curves for complex acids and bases, titrations of strong and weak acid mixtures and weak base mixtures, Week 10. Titration curves for polyprotic acid or bases, pH calculations of amphiprotic species. Week 11. Application of neutralization titrations, elemental analysis and Kjeldahl method, titration of carbonate and mixtures. Week 12. Complexation reactions and complexometric titrations, EDTA titrations, determination hardness of water. Week 13. Electrochemical methods in chemical analysis, oxidation-reduction reactions, electrochemical cells and electrode potentials, applications of standard electrode potentials. Week 14. Redox equilibrium constants, Nernst equation, redox titrations and redox indicators, iodometric titrations.		
Educative Activities <i>(Credit will be determined based on the time given for these activities. Should be filled carefully.)</i>	Theoretical Study Hours of Course Per Week Reading 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		14	2	28			
	Searching in Internet and Library		0	0	0			
	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	15	15			
	Other		0	0	0			
	Total work load		31	36	129			
	Total work load/25				5,2			
	ECTS of the course				5,0			
Course's Contribution To Program	Number	Program Outcomes		1	2	3	4	5
	1	Adequate knowledge in mathematics pertaining to the relevant discipline and information in these areas to model					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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