

نموذج توصيف مقرر
Course Description Form

Name of College\Faculty : Science
Name of Department: Chemistry

اسم الكلية:
اسم القسم العلمي:

Course Name	Analytical Chemistry I	اسم المقرر
Course No.	0420-236	رقم المقرر
No. of Credits	4	عدد الوحدات
Theoretical Hours	3	عدد الساعات النظرية
Practical Hours	6	عدد الساعات المعملية
Course topics	1. Introduction of quality assurance in analytical laboratories and good laboratory practice. 2. Effect of electrolytes on chemical equilibria. 3. Aqueous solutions equilibria. 4. Titrimetric methods of analysis. 5. Introduction to electrochemistry. 6. Separation methods of analysis.	مواضيع المقرر
Text book: (Name, Author , Year , Publisher)		عنوان الكتاب : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)
1- Fundamentals of Analytical Chemistry, by D.A. Skoog, D.M. West, F.J. Holler, and S.R. Crouch, 9 Ed. (Latest Ed.) Brooks/Cole, Cengage Learning, NY, USA, 2014. 2-Principles of Instrumental Analysis, D.A. Skoog, 3 Ed. I. Ed., Saunders College Publishing, NY, USA, 1985. 3- Laboratory Handouts.		
References: (Name , Author , Year . Publisher)		عنوان المرجع : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)
1- Analytical Chemistry), G. D. Christian, P. K. Dasgupta, K. A. Schug, 7 th Ed. (Latest Ed.), John Wiley & Sons Inc, 2013. 2-Principles of Instrumental Analysis, D.A. Skoog, 3 Ed. I. Ed., Saunders College Publishing, NY, USA, 1985.		

Prerequisites : 0420-102 and 0420-106				متطلبات المقرر	
Grading	Exams	20	%		الاختبارات
	Tutorial and Quizzes	10	%		امتحانات قصيرة
	H.W.		%		واجبات
	Lab	30	%		مشاريع (دراسة ميدانية)
	Final	40	%		الاختبار النهائي
	100%				آلية رصد المقرر

Sr. No.	Chapter / page no.	Subject / Tutorial Problems	Hours
1	1 (1-13)	The Nature of Analytical Chemistry 1A The Role of Analytical Chemistry 1B Quantitative Analytical Methods 1C A Typical Quantitative Analysis 1D An Integral Role of Chemical Analysis Feedback Control System • Case Study	1
2	4 (62-78)	Calculations used in Analytical Chemistry 11(a, c), 15(c), 27, 31(a, c, d), 32(a,e) 4A Some Important Units of Measurements 4B Solutions and their Concentrations 4C Chemical Stoichiometry	2
3	9 (197-232)	Aqueous Solutions and Chemical Equilibria 10(a, d), 14, 15, 17, 20, 21(a, c, f) 9A The chemical Composition of Aqueous Solutions 9B Chemical Equilibrium 9C Buffer Solution	2
4	10 (235-246)	Effect of Electrolytes on Chemical Equilibria 9(a, d), 10(a, c), 12(b, c), 15(a, c, d) 10A The Effect of Electrolyte of Chemical Equilibria 10B Activity Coefficient	2
5	12 (280-298)	Gravimetric Methods of Analysis 11, 17, 25, 31, 32 12A Precipitation Gravimetry 12B Calculations of Results from Gravimetric Methods 12C Applications of Gravimetric Methods	2

6	13 (302-318)	Titration in Analytical Chemistry 6(a,c), 8(c), 10, 12(a, c, d), 13(a,c), 15, 17, 18,22 13A Some Terms Used in Volumetric Titrations 13B Standard Solutions 13C Volumetric Solutions 13D Gravimetric Titrations 13E Titration Curves	4
7	14 (322-344)	Principles of Neutralization Titrations 6(b), 7(d), 17(a, d), 18, 27, 30(a, c, d), 33, 34(a, b, f), 46 14A Solutions and Indicators for Acid/Base Titration 14B Titrations of Strong Acids and Bases 14C Titration Curves for Weak Acids 14D Titration Curves for Weak Bases 14E The Composition of Solutions During Acid/Base Titrations	2
8	17 (401-437)	Complexation and Precipitation Reactions and Titrations 19, 21, 28, 23(a, b, d),30, 33, 35, 37 17A The Formation of Complexes 17B Titrations with Inorganic Complexing Agents 17C Organic Complexing Agents 17D Aminocarboxylic Acid Titration	3
9	19 (473-505)	Applications of Standard Electrode Potentials 7(b, e, f), 8(b, d, e), 9(b, f), 11(a, b, e), 12(a, b, e, see problem 19-11), 15 19A Calculating Potentials for Electrochemical Cells 19B Determining Standard Potentials Experimentally 19C Calculating Redox Equilibrium Constants 19D Constructing Redox Titration Curves 19E Oxidation/Reduction Indicators 19F Potentiometric End Point	4
10	21 (535-574)	Potentiometry 21A General Principles 21B Reference Electrodes 21C Liquid-Junction Potentials 21D Indicator Electrodes 21E Instruments for Measuring Cell Potentials 21F Direct Potentiometry 21G Potentiometric titrations 21H Potentiometric Determination of Equilibrium Constants	4

11	24 (650-665)	Introduction to Spectrochemical Methods Sections: 14(b, d, e), 21, and 23	4
12	Handout	Conductometry Principles and Applications	1
13	Handout	Nephelometry and Turbidimetry Principles and Applications	1
14	31 (847-883)	Introduction to Analytical Separation 11, 12, 15, 17, 18, 28, 31, 32 31A Separation by Precipitation 31B Separation of Species by Distillation 31C Separation by Extraction 31D Separating Ions by Ion Exchange 31E Chromatographic Separations	4
			Total : 36

Course objectives

No.	Course Objectives (Learning Outcomes)	Example(s) of relevant (Topics and activities)	Recommended Level to satisfy the objectives		
			High	Medium	Low
1	1-8 for Theory, 9 for Lab To introduce the basic concepts of analytical chemistry and its role in sciences and encourage the student to develop the skills necessary to solve analytical problems in quantitative manner.	1.1 understand the role of analytical chemistry in the different fields of science. 1.2 introduce the essential calculations in analytical chemistry. 1.3 classify the quantitative methods of analysis.	High		
2	To study how to treat and evaluate analytical data and use them to obtain high quality analytical data.	2.1 understand the effect of electrolytes on chemical equilibrium. 2.2 identify activity and discuss the properties of activity coefficient in electrolytic solutions. 2.3 explain Debye-Huckel equation. 2.4 understand the different types of solution equilibria (acid-base, precipitation, oxidation-reduction, and complexation).	High		
3	To distinguish between the different types of aqueous solution equilibria		High		

	and develop skills to use a wide range of techniques that are useful in modern analytical chemistry.				
4	To introduce titrimetric method and its applications for neutralization, precipitation, complex formation and redox reactions.	4.1 understand the theory of neutralization titrations. 4.2 distinguish between the different types of acids and bases and their titration curves. 4.3 know how to prepare buffers of different pH. 4.4 discuss the function of acid-base indicators. 4.5 understand the properties of precipitates and precipitating agents. 4.6 study titration curves in argentometric methods and the types of indicators used. 4.7 understand the complex formation reactions. 4.8 discuss amino-carboxylic acid titrations and calculation of alpha values. 4.9 discuss inorganic complexing agents.	High		
5	To understand the basic concepts of electrochemistry and their applications to titrimetric method employing redox reactions	5.1 discuss the basic concepts of electrochemistry. 5.2 understand the applications of the standard electrode potential. 5.3 explain the theory of oxidation-reduction titrations. 5.4 explain the redox titration curves and indicators. 5.4 understand the difference between the classical and basic instrumental methods of analysis. 5.5 design and run the analysis procedures of simple potentiometric titrations. 5.6 distinguish between the different types of electrodes. 5.7 understand the advantages and disadvantages of different reference electrodes. 5.8 understand the difference between potentiometric and conductometric titrations.	High		
6	To introduce the basic concepts of simple instrumental analysis.				



7	Distinguish between the classical and basic instrumental methods of analysis.				
8	To explain the different separation methods in analytical chemistry and their applications	8.1 distinguish between the different types of separation methods. 8.2 define precipitation gravimetry. 8.3 master calculations in gravimetric analysis. 8.4 apply gravimetric analysis. 8.5 apply solvent extraction method. 8.6 apply separation of ions by ion exchange method. 8.7 describe chromatographic method of analysis. 8.8 understand the different types of chromatographic columns.	High		
9	Lab objective: To provide opportunities for the students to practice analyses based on the topics covered in part A.	1. Preparation of solutions. 2. Volumetric analysis. 3. Gravimetric analysis. 4. Solvent extraction. Chromatographic analysis.	High		
Fields					
Skills					
Coordinator (Name and Rank) :	Convener of the Inorganic and Analytical Chemistry group				
Signature and stamp :					
Date:	11/11/2025				