نموذج توصيف مقرر
Course Description Form

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

اسم الكلية:
اسم القسم العلمي:

Course Name	**Analytical Chemistry II**	**اسم المقرر**
Course No.	**0420-335**	**رقم المقرر**
No. of Credits	**4**	**عدد الوحدات**
Theoretical Hours	**2**	**عدد الساعات النظرية**
Practical Hours	**6**	**عدد الساعات المعملية**
Course topics	1. Electrochemical methods of analysis: potentiometry, conductometry, voltammetry. 2. Spectrochemical methods of analysis: properties of electromagnetic radiation; molecular UV-Vis spectrophotometry; molecular fluorescence and phosphorescence; atomic absorption spectrometry based on flame and electrothermal ionization; IR absorption spectrometry; and miscellaneous methods (polarimetry, nephelometry and turbidimetry). 3. Chromatographic methods of analysis: GC, IC, HPLC.	**مواضيع المقرر**

Text book: (Name, Author , Year , Publisher)	**عنوان الكتاب : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)**
1- Principles of Instrumental Analysis, D.A. Skoog, F.J. Holler, and S.R. Crouch (Latest ed.) Brooks/Cole, Cengage Learning, NY, USA. 2- Chemistry Experiments for Instrumental Methods, D.T. Sawyer, W.R. Heineman and J.M. Beebe, John Wiley & Sons, NY.	

References: (Name , Author , Year . Publisher)	**عنوان المرجع : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)**
Fundamentals of Analytical Chemistry, by D.A. Skoog, D.M. West and F.J. Holler, and S.R. Crouch, 9 Ed. (Latest Ed.), Brooks/Cole, Cengage Learning, NY, USA.	

Prerequisites : 0420-236 Analytical Chemistry I						**متطلبات المقرر**
Grading	**Exams**	**20**	**%**		**الاختبارات**	**آلية رصد المقرر**
	Quizzes	**-**	**%**		**امتحانات قصيرة**	
	H.W.	**-**	**%**		**واجبات**	
	Lab	**40**	**%**		**مشاريع (دراسة ميدانية)**	
	Final	**40**	**%**		**الاختبار النهائي**	
	100%					

Course objectives					
No.	**Course Objectives (Learning Outcomes)**	**Example(s) of relevant (Topics and activities)**	**Recommended Level to satisfy the objectives**		
			High	**Medium**	**Low**
1	**1-5 for Theory, 6 for Lab** To introduce the basic concepts of instrumental analysis.	1.1 outline the steps followed in analysis of real samples. 1.2 understand the difference between classical and instrumental methods of analysis.	High		
2	To discuss the various electro-analytical techniques and their applications.	2.1 categorize the various electroanalytical procedures, such as potentiometry, conductometry and voltammetry. 2.2 illustrate the functions of the different types of potentiometric sensors. 2.3 design and run the analysis procedures of different samples using ion-selective electrodes. 2.4 describe polarizable electrodes including dropping mercury electrode. 2.5 describe conductance cell and determine its constant. 2.6 apply conductance measurements to analysis of acids, bases, and salts. 2.7 illustrate the rules and relationships governing voltammetry and polarography.	High		

		2.8 apply polarography to microanalysis of reducible species. 2.9 explain the effect of complex formation and presence of dissolved oxygen on polarographic waves. 2.10 rationalize the residual current and necessity of supporting electrolytes in polarographic measurements. 2.11 explain the advantages and disadvantages of dropping mercury electrode.			
3	To classify the various methods of spectrochemical analysis.	3.1 categorize the different spectrochemical methods of analysis. 3.2 recognize the differences between atomic and molecular absorption of radiation. 3.3 apply Beer's law to analysis of solutions containing one analyte or mixture of absorbing species. 3.4 illustrate the limitations to Beer's law. 3.5 recognize the different components of UV-visible spectrophotometer and the function and nature of each component. 3.6 employ the UV-visible spectrophotometry for practical applications.	High		
4	To study the instrumentation of atomic and molecular spectroscopy as well as luminescence and infrared spectrometry.	4.1 categorize the different spectrochemical methods of analysis. 4.2 recognize the differences between atomic and molecular absorption of radiation. 4.3 apply Beer's law to analysis of solutions containing one analyte or mixture of absorbing species. 4.4 illustrate the limitations to Beer's law. 4.5 recognize the different components of UV-visible spectrophotometer and the function and nature of each component. 4.6 employ the UV-visible spectrophotometry for practical applications.	High		

5	To discuss GC and HPLC separation techniques.	5.1 apply the concepts of chemical separation to gas chromatography and its instrumentation. 5.2 draw a schematic representation of gas and HPLC chromatogram. 5.3 explain the function of each part of the instrument. 5.4 illustrate the different types of detectors in gas chromatography. 5.5 apply chromatography to quantitative analysis of mixture of chemical compounds. 5.6 illustrate the instrumentation in HPLC with special reference to the factors that affect the column efficiency. 5.7 explain the application of the technique to separation processes.	High		
6	**Lab objective**: To demonstrate the topics covered in the theoretical part.	6.1 know how to deal with the safety problems. 6.2 record the experimental results and be able to draw conclusions based on these results. 6.3 communicate the results critically and knowledgeably. 6.4 work with others to develop team-building skills. 6.5 use computers to draw graphs and titration curves. 6.6 calibrate pH meters. 6.7 use pH meters and automatic burettes for acid base titrations. 6.8 determine the concentration of single component and multicomponent acid samples. 6.9 use ion selective electrodes for the determination of concentrations of wide range of anions and cations 6.10 construct calibration curves, use direct and standard addition methods in potentiometry. 6.11 apply the oxidation reaction titrations for determination of concentration of some oxidizing or reducing agents.	High		

		6.12 apply the complexometric titrations for the analysis of a wide range of metal ions. 6.13 apply conductometry methods for determination of metal ions and mixtures and measure the conductance of different solutions. 6.14 apply voltammetry methods to determine the concentrations of mixtures of metal ions. 6.15 verify Beer's law and determine the concentration of a single component and a multi-component sample. 6.16 apply infrared spectrophotometry to identify inorganic complexes and determine the concentration of a mixture of organic compounds. 6.17 apply atomic absorption spectrophotometry to determine the concentration of a mixture of metal ions. 6.18 apply nephelometry and turbidimetry to determine the concentration of some ions. 6.19 apply polarimetric method of analysis to determine the optical rotatory dispersion of some samples and concentration of optically active compounds. 6.20 use gas chromatography to separate mixtures and determine their concentrations. 6.21 apply ion chromatography to separate and determine some anions and cations. 6.22 apply HPLC to separate mixtures of compounds and determine their concentration.			
Fields					
Skills					
Coordinator (Name and Rank) :		Convener of the Inorganic and Analytical Chemistry group			
Signature and stamp :					
Date:		30/10/2025			