



اسم المقرر : الكيمياء التحليلية
رقم المقرر : 0420-238
متطلبات المقرر : (0420-111+0420-110)
وحدات المقرر : 4 وحدات (1-4-3)

الوصف المختصر للمقرر:
اساسيات التحليل الكيميائي التقليدي وطرق التحليل بالأجهزة وتطبيقات مختبريه.



COURSE DESCRIPTION FORM

Program: Forensic Science Program

COURSE DESCRIPTION

Course Title: Analytical Chemistry

Course Number: 0420 - 238

Course Level: ☒ Undergraduate ☐ Postgraduate

Course Type: ☐ University Requirements ☐ Department Requirements

☐ Major Compulsory ☐ Major Elective

☒ Minor Compulsory ☐ Minor Elective

Credit Hours: ☐ 1 credit ☐ 2 credits ☒ 3 credits ☐ 4 credits

Lecture Hours per Week: ☐ none ☒ 1 hour ☐ 2 hours ☐ 3 hours

Lab Hours per Week: ☐ none ☐ 2 hours ☒ 3 hours ☐ 6 hours

Tutorial Hours per Week: ☐ none ☒ 1 hour ☐ 2 hours

Prerequisites:

1. 0420-110
2. 0420-111

Recommended Textbook(s): (Author(s). Year. Title. Edt. Publisher. Place of publication)

1. Christian G.D. Analytical Chemistry. Latest Edition. John Wiley and Sons, Inc, US.

Reference Book(s): (Author(s). Year. Title. Edt. Publisher. Place of publication)

- 1.
- 2.



Catalogue Brief Description:

The basic concepts of the classical and simple instrumental methods of chemical analysis and their applications.

Course Topics:

1. Analytical Chemistry, an overview.
2. Titrimetric methods of analysis.
3. Electrochemical methods of analysis: potentiometry and voltammetry.
4. Spectrochemical methods of analysis (Molecular UV-Visible spectrophotometry, molecular fluorescence and phosphorescence, and atomic absorption spectrometry)
5. Chromatography (paper and thin layer chromatography, gas chromatography and HPLC).



Course Content:

1. Analytical Chemistry, an overview	[1 hours]
2. Titrimetry (acid-base, precipitation, and coordination reactions)	[3 hours]
3. Potentiometry, Glass electrode, and Ion-selective Electrodes	[3 hours]
4. UV-Visible spectrophotometry	[3 hours]
5. Atomic Absorption Spectrometry	[3 hours]
6. Fluorimetry and Phosphorimetry	[3 hours]
7. Introduction to Separation Techniques (Paper and Thin Layer Chromatography)	[2 hours]
8. Gas Chromatography	[2 hours]
9. High Performance Liquid Chromatography	[2 hours]
Lecture Hours	[22 hours]
Midterm Exams	[2 hours]
Total Hours	[24 hours]



Practical Topics (Laboratory):

1. Proper dealing with safety problem, preparation of standard solutions.
2. Acid base and argentometric titrations.
3. Complexometric titrations for analysis of metal ions.
4. Employment of pH meter and automatic burette for acid base titrations.
5. Use of ion selective electrodes for the determination of anions and cations.
6. Application of potentiometry to redox titrations.
7. Application of conductometry for the determination of metal ions and bases.
8. Application of voltammetry to analysis of mixture of metal cations.
9. Verification of Beer's law and spectrophotometric analysis of single component and multi - component sample.
10. Application of atomic absorption spectrometry to metal ion analysis.
11. Use of gas chromatography to separate and analyze mixture of hydrocarbons.
12. Application of HPLC to separate and analyze mixture of organic compounds.

PRACTICAL ASSESSMENT METHODS & GRADING

- Check all forms of assessments that may be used for the practical.

☒	Lab reports	20	%
☐	Lab. Work		%
☐	Fieldwork		%
☐	Other (Quizzes)		%
☒	Term Exams	10	%
☒	Final Exam	10	%
Total		40	%



ASSESSMENT METHODS & GRADING

- Check all forms of assessments that may be used for this course.

☒	Term Exams	15	%
☐	Quizzes		%
☐	Homework/Assignments		%
☐	Computer Assignments		%
☐	Term Paper/Projects		%
☐	Oral Presentation		%
☐	Poster Presentation		%
☒	Lab. Work	40	%
☐	Fieldwork		%
☐	Class Participation/Activity		%
☒	Essay	5	%
☒	Final Exam	40	%
	Total	100	%



COURSE LEARNING OUTCOMES

By the end of this course, students will be able to:

- ① ☐ Underline and master the different types of acid base, argentometric, and complexometric titrations.
- ② Explain the basic concepts of potentiometry using glass pH and ion-selective electrodes and its applications for the determination of acids, bases, cations and anions.
- ③ Illustrate the theoretical basis of voltammetry and apply them for the determination of acids, base , cations , and organic compounds.
- ④ Write on the uv-visible spectrophotometry and verify Beer's law in the laboratory for the determination of a single component and a multi-component sample.
- ⑤ Underline the basics of atomic absorption spectrophotometry and its application to the determination of metal Ions.
- ⑥ Explain the concepts of chromatography and its application in the laboratory to separate mixtures and determine their concentrations.



Relevance Rate to the Course Learning Outcomes

Course Learning Outcomes	Example(s) of Relevant Topics/Activities	Relevance Rate
❶	Analysis of sample of commercial vinegar	L
❷	Application of ion selective electrode to Ca ion determination	M
❸	Polarographic determination of Cd(II) cation	H
❹	Construction of absorbance/concentration calibration graph for Cu(II) solution	L
❺	Atomic absorption determination of metal ion [e.g Pb(II)] concentration	M
❻	Paper chromatography for separation of ink components	H



PROGRAM LEARNING OUTCOMES

Using the labels H, M, or L, rate the relevance of each **Course Learning Outcome** in the learning outcome matrix below to the **Program Learning Outcomes** where applicable. (A summary of the Program Learning Outcomes is provided in a separate document).

		COURSE LEARNING OUTCOMES					
		❶	❷	❸	❹	❺	❻
PROGRAM LEARNING OUTCOMES	1. Describe and discuss basic scientific principles that are applied in Forensic Biology and/or Forensic Chemistry				H		H
	2. Perform different analytical techniques used in Forensic Biology and/or Forensic Chemistry.		L				
	3. Conduct Forensic experiments, analyze, interpret and report results in scientific manner as part of his/her job in Governmental or private sector.	L				L	
	4. Link effectively scientific analyses of material and evidences with the enforcement of law and justice.			M			
	5. Pursue graduate studies in Biological or Chemical Forensics Sciences.						H



Course Coordinator: Dr. Hayat Marafie

Academic Rank: Assistant Professor

Program: Forensic Science - Minor

Date: 27/10/2010