اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Chemistry of Spectral Analysis
Course Code:	2042201-3
Program:	Bachelor in Chemistry
Department:	Department of Chemistry
College:	College of Sciences
Institution:	Taif University

Table of Contents

A. Course Identification

1. Credit hours:	**3 (2 Theoretical, 1 Lab)**

2. Course type

a.   University ☐   College ☐   Department √   Others ☐

b.   Required √   Elective ☐

3. Level/year at which this course is offered: **4th Level/ 2nd Year**

4. Pre-requisites for this course (if any)**: NA**

5. Co-requisites for this course (if any)**: NA**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	2 Theoretical and 3 Practical hours/ Week	100 %
2	**Blended**	-	-
3	**E-learning**	-	-
4	**Distance learning**	-	-
5	**Other**	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	45
3	**Tutorial**	-
4	**Others** (specify)	-
	Total	**75**

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to give an extensive knowledge of spectral techniques, this include (incl. AAS, AES, ICP-OES, XRF) and molecular- (incl. UV/VIS, Fluorescence/ phosphorescence, IR).

2. Course Main Objective

The goal of this course is to provide the students with the important spectroscopic analytical methods concerning qualitative and quantitative analysis and their applications.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Describe the principles and basis of spectral techniques.	K1
1.2	Recognize the theoretical background and the operation of the instrumentation.	K2
2	**Skills:**	

CLOs		Aligned PLOs
2.1	Illustrate data acquisition, organization and interpretation of results.	S1
2.2	Identity of different compounds using spectral techniques and critical analysis of the results.	S2
3	**Values:**	
3.1	Clarify the concept of personal responsibility for achieving duties by teamwork.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to spectroscopy	2
2	Electromagnetic radiation and its importance in qualitative and quantitative analysis- Electronic spectra and molecular structure- Revision (Tutorial)	4
3	Infrared spectra and molecular structure- Revision (Tutorial)	2
4	Quantitative spectral analysis using UV and visible radiation- Revision (Tutorial)	4
5	Qualitative spectral analysis using IR radiation- Revision (Tutorial)	2
6	Molecular emission fluorescence and phosphorescence- Revision (Tutorial)	2
7	Quantitative spectral analysis using atomic emission spectra- Revision (Tutorial)	4
8	Arc spark atomic emission spectrometry- Revision (Tutorial)	2
9	Plasma atomic emission spectrometry- Revision (Tutorial)	4
10	Quantitative spectral analysis using atomic absorption spectra- Revision (Tutorial)	4
	Total	**30**

Lab Content

No	List of Topics	Contact Hours
1	Preparation of standard solutions for celebration curves	3
2	Determination of sodium using flame photometry	6
3	Determination of sodium and calcium in a mixture using flame photometry	6
4	Determination of calcium using atomic absorption spectrophotometry	3
5	Determination of the concentration of potassium dichromate using UV spectrophotometer	6
6	Determination of the pH of solution by calorimetric methods	3
7	Determination of ammonia using UV spectrophotometer	6
8	Determination of Cobalt using UV spectrophotometer	3
9	Determination of Nickel using UV spectrophotometer	3
10	Determination of Iron using UV spectrophotometer	6
	Total	**45**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe the principles and basis of spectral techniques	Lecture	Written exam
1.2	Recognize the theoretical background and the operation of the instrumentation	Lecture	Written exam
2.0	**Skills**		
2.1	Illustrate data acquisition, organization and interpretation of results	Discussion	Homework Assignments
2.2	Identity of different compounds using spectral techniques and critical analysis of the results	Problem-Solving	Practical tasks and Exam
3.0	**Values**		
3.1	Clarify the concept of personal responsibility for achieving duties by teamwork	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments	Throughout Semester	5%
2	Individual presentations	Throughout Semester	5%
3	Periodical Exam	7/8	20%
4	Mid Term Exam	11/12	10%
5	Practical tasks	Throughout Semester	15%
6	Final practical Exam	15	5%
7	Final exam	16	40%

Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Commitment to the rules of the Academic Advising Department at the university in accordance with the academic guidance manual approved by the university and the attached forms, there are different arrangements made by teaching staff to support student consultations including;
- Office hours: 8 hours per a week for each academic member.
- Academic guidance: an academic member has a number of students to guide them throughout degree journey.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	• Analytical Chemistry, Gary D. Christian (2004), John Willey and Sons Inc., Latest Edition. ISBN: 978-0-470-88757-8.
Essential References Materials	• Quantitative Chemical Analysis, Harris, D.C (2011). W.H. Freeman, New York (USA), Latest Edition. ISBN: 1429218150.

Electronic Materials	• Saudi Digital Library (SDL)
Other Learning Materials	• Learning Management System (Blackboard) • Software programs for graphing organic compounds and chemical reactions (Chem draw, Chem sketch).

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture hall with 80 seats. • Equipped Lab with essential instrumentations
Technology Resources (AV, data show, Smart Board, software, etc.)	• Data show, smart board.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• UV-Visible, IR, atomic emission and absorption spectrophotometers.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	Students	Survey (indirect method)
Extent of achievement of course learning outcomes	Program leader	Reports (Direct method)
Quality of learning resources	Peer referees Students	Reports (Direct method) Survey (indirect method)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council/ Quality assurance committee
Reference No.	7-3-1445
Date	27/2/1445 HJ 12/09/2023 G