هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Quantum Chemistry**
Course Code:	**2042101-2**
Program:	**Bachelor in Chemistry**
Department:	**Department of Chemistry**
College:	**College of Sciences**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 2 (Theoretical)
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: 3rd Level, 2nd Year
4. Pre-requisites for this course (if any)**: General Chemistry 1 (204101-4)**
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 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**	---
3	**Tutorial**	---
4	**Others** (specify)	---
	Total	**30**

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to give an extensive knowledge about quantum chemistry. This includes lack body radiation, principle of quantization of energy, photoelectric effect, dual nature of light, de Broglie equation, dual nature of the electron, basic postulates of quantum mechanics, Schrodinger wave equation, and various applications.

2. Course Main Objective

The overall objective is to introduce students to fundamentals of quantum phenomena including quantum mechanics and theories.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding:**	
1.1	Outline the importance of quantum mechanics in describing the dual	K1

CLOs		Aligned PLOs
	nature of moving bodies.	
2	**Skills:**	
2.1	Compare between wave nature and particle nature of the moving bodies.	S1
3	**Values:**	
3.1	Participate in the development of the performance of work teams.	V1

C. Course Content

No	List of Topics	Contact Hours
1	Historical development of Quantum Mechanics	2
2	Definition: Electron, Neutron, Proton, Positive Rays, Subatomic particles, and Alpha particles.	2
3	Quantum Mechanics Arose Out of the interplay of experiments and theory: Blackbody radiation – Atomic and molecular spectra.	4
4	The photoelectric effect – Compton effect.	4
5	Particles Exhibit Wave –like behavior and quote de Broglie relation.	2
6	Atomic Spectra and the Bohr Model of the Hydrogen Atom.	4
7	What Determines if a system Needs to be Described Using Quantum mechanics?	2
8	Classical waves and the Non-dispersive wave Equation.	4
9	Waves Are conveniently represented as complex functions.	2
10	Quantum Mechanical Waves and the Schrodinger Equation – Solving Schrodinger equation for various systems.	4
Total		**30**

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Outline the importance of quantum mechanics in describing the dual nature of moving bodies.	Lecture	Written exam
2.0	**Skills**		
2.1	Compare between wave nature and particle nature of the moving bodies.	Discussion	Report assignments
3.0	**Values**		
3.1	Participate in the development of the performance of work teams.	Collaborative Learning	Individual presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Report Assignments (Electronic)	Throughout Semester	10%
2	Individual presentations	Throughout Semester	10%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Periodical Term Exam	7/8	15%
4	Mid Term Exam	11/12	15%
5	Final exam	16	50%

***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 6 h per week for this purpose and the students know these hours according to the time of professor who teach the course.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	• Quantum Chemistry, John Lowe and Kirk Peterson (2005), Academic Press- Elsevier, Latest Edition. ISBN: 978-0124575516.
Essential References Materials	• Essentials of Physical Chemistry, B. S. Bahl, G. D. Tuli and Arun Bahl, 2014. S. Chand Publishing (India), Latest Edition. ISBN: 9788121929783.
Electronic Materials	• Saudi Digital Library (SDL)
Other Learning Materials	• Learning Management System (Blackboard)

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	A classroom with movable tables and chairs conducive to group discussion and teamwork.
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)	--

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