جامعة المجمعة
Majmaah University

Course Specifications

Institution:	**Majmaah University.**
Academic Department :	**Department of chemistry**
Programme :	**Bachelor degree of chemistry**
Course :	**Quantum Chemistry (2)**
Course Coordinator :	**Ebthag ELhassan**
Programme Coordinator :	.....
Course Specification Approved Date :	**20/12 / 1435 H**

A. Course Identification and General Information

1 - Course title : **Quantum Chemistry (2)**		Course Code: **Chem 311**		
2. Credit hours : **2**				
3 - Program(s) in which the course is offered: **Chemistry**				
4 – Course Language : **Arabic**				
5 - Name of faculty member responsible for the course: **Ebthag ELhassan**				
6 - Level/year at which this course is offered : **fifth Level**				
7 - Pre-requisites for this course (if any) : • **Quantum Chemistry (1)**				
8 - Co-requisites for this course (if any) : __				
9 - Location if not on main campus **:(faculty of education Zulfi**)				
10 - Mode of Instruction (mark all that apply)				
A - Traditional classroom☐	√☐	[What percentage? ⌊	**80 %**☐	☐
B - Blended (traditional and online)☐	☐	[What percentage? ⌊	**0 %**☐	☐
D - e-learning☐	☐	[What percentage? ⌊	**0 %**☐	☐
E – Correspondence☐	☐	[What percentage? ⌊	**0 %**☐	☐
F - Other	√☐	[What percentage? ⌊	**20 %**☐	☐
Comments : .....☐				

B Objectives

What is the main purpose for this course?

Study different approximation methods: Variation method- expansion Variation method to include exited state.
Perturbation theory for degenerate casess - Perturbation theory treatment of the ground state of the helium atom
Angular momentum of the complex atoms electrons
Hekels method to describe the structure of the molecular orbitals.
Application on the hydrocarbons orbitals of bibonds

Briefly describe any plans for developing and improving the course that are being implemented :

The use of interactive whiteboard teaching instead of the chalkboard.
use of the Web in modern additions to the course .☐

C. Course Description

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Solution of the hydrogen atom equation Conclusion wave functions of self- Eigenvalues Quantum number for electon, Amounts of angular momentum , Rules of electron transmission from orbit to orbit	1	2
Approximate methods to solve the Schrödinger Equation, Perturbation theory For the helium atom , which contains more than an electron	2	4
Variational Method , The free movement of a particle in a box . Variational Method Independent of time, To calculate the self-wave functions and self-values of Perturbate system until the first class Time independent Perturbation Theory up to first order	2	4
Pauli exclusion principle Symmetric Eigen functions ,antisymmetric Eigen functions	1	2
Valence Bond	1	2
Molecular orbital Theory	1	2
comparison between the method of valence bond theory and molecular orbitals in terms of worker Alhamlton	1	2
Applications of Hakkel approximation in the calculation of the factors " influences	2	4
symmetry in molecules and the types of symmetry	1	2

The groups theory	**1**	**2**
Symmetry - the symmetry operations with applications	**1**	**2**

2. Course components (total contact hours and credits per semester):

☐	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	**30**	**---**	**--**	**---**	**---**	**30**
Credit	**30**	**---**	**---**	**---**	**---**	**30**

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3. Additional private study/learning hours expected for students per week. **2**

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	**Training students to think and develop their skills define ways of resolving student systems chemical atomic and molecular whether it is a complete solution for atoms containing one electron or solution about atoms and molecules that contain more than Electron.**	**lecture discussion, mutual dialogue**	**Oral tests at the beginning of each lecture, Written tests, final examination**
1.2	**Students gain more information to**		

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
	resolve these systems to calculate both the total energy and the atomic wave functions and molecular.		
1.3	Give a definition to the students with an introduction to the theory of groups to facilitate the study of systems Symmetric and asymmetric inversely		
2.0	Cognitive Skills		
2.1	Student to be able to think and develop their skills imagination and linking quantum to inorganic chemistry. which study advanced courses in this area	problems, Laboratory study Open discussions	Continuous questions- duties - practical test
	Gaining student scientific skills necessary to develop their professional performance		
3.0	Interpersonal Skills & Responsibility		
3.1	Dealing with team spirit in experiments	Working in groups within the lab Collective seminars .	Oral questions, Correct experimental results
3.2	Creating constructive competitive spirit		
٣.٣	Encourage communication between students		
4.0	Communication, Information Technology, Numerical		
4.1	Development of communication skills	Proplems research, study discussion	Oral and written exercises Follow-up practical books,
4.2	Development of numerical skills		
٤.٣	Use chemical Internet sites and doing some calculation		
5.0	Psychomotor		
5.1	Mastering laboratory experiments	Practical course	Follow-up practical

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
			books,

5. Schedule of Assessment Tasks for Students During the Semester:

	Assessment task	Week Due	Proportion of Total Assessment
1	Questions and exercises	4-5	10%
2	First Theoretical midterm exam	6	15%
3	Second Theoretical midterm exam	8	15%
4	Final Theoretical exam	Last week	60%

D. Student Academic Counseling and Support

Two hours of weekly academic guidance

E. Learning Resources

1. List Required Textbooks :

Quantum chemistry, Rashed Abdul -Aziz Al-Mubarak

2. List Essential References Materials :

- Foundations of physical chemistry, Adel Ahmed Jrare

. The principles of quantum chemistry, D / Salem Mohammed Khalil

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3. List Recommended Textbooks and Reference Material :

Introduction to Quantum Chemistry , D / Abdel Moneim al aaser

4. List Electronic Materials :

- .Wikipedia
- .....

5. Other learning material :

- Power point - CD show

F. Facilities Required

1. Accommodation • **Prepared Classroom with Interactive whiteboard** • **40 chair**.
2. Computing resources • **Laptop special for Professor only** • .....
3. Other resources •

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching: • Meeting with the students academic excellence and the stumble • Identification of evaluation for the course form students
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor : • Benefit from the expertise of the members of the section • Identify assessment for teachers • Report of the expert from College matchups
3 Processes for Improvement of Teaching : • Courses for Faculty members • Workshop to improve methods of evaluation ..... • .....
4. Processes for Verifying Standards of Student Achievement • The patch is checked by faculty member
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement : • discussion the members section regularly to improve the course • feedback processes for course quality

Course Specification Approved
Department Official Meeting No (…..) Date … / …. / ….. *H*

Course's Coordinator	Department Head
Name : Ebthag Elhassan	***Name :*** .....
Signature :	***Signature :*** .....
Date : …./ … / …… H	***Date :*** …./ … / …… H