



## Course Specifications

<b>Course Title:</b>	<b>Molecular Spectroscopy</b>
<b>Course Code:</b>	<b>4024577-2</b>
<b>Program:</b>	<b>Chemistry</b>
<b>Department:</b>	<b>Chemistry</b>
<b>College:</b>	<b>Applied Sciences</b>
<b>Institution:</b>	<b>Umm Al-Qura University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 2
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> 7 <sup>th</sup> level/fourth Year
<b>4. Pre-requisites for this course (if any):</b> Quantum Chemistry
<b>5. Co-requisites for this course (if any):</b> none

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	73%
2	Blended		
3	E-learning	√	27%
4	Distance learning	---	---
5	Other	---	---

## 7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22
2	Laboratory/Studio	--
3	Tutorial	--
4	Others (E-learning + Exams + office hours)	10
	<b>Total</b>	<b>32</b>

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b> Molecular Spectroscopy course provide the students with the necessary theoretical background of the optical spectroscopic techniques to study physical process in the molecules with emphasis on the absorption techniques.
<b>2. Course Main Objective</b> <b>By the end of this course student will be able to:</b> 1. Describe the fundamental principles of molecular spectroscopy. 2. Apply quantitative reasoning and problem-solving skills with quantum chemistry as a context to explain the different types of molecular spectra. 3. Develop physical intuition, mathematical reasoning, and problem solving skills. 4. Be further prepared for the necessarily rigorous sequence in chemistry courses need the molecular spectroscopy.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding</b>	
1.1	Demonstrate knowledge and understanding of concepts in molecular spectroscopy.	K1
1.2	Recognize the techniques, and chemical terminology related to molecular spectroscopy.	K2
<b>2</b>	<b>Skills :</b>	
2.1	Apply broad theories, principles, and concepts in molecular spectroscopy.	S1
2.2	solve complex problems in molecular spectroscopy quantitatively and qualitatively	S2
2.3	Collect a data using computers and internet to find all information related to molecular spectroscopy and their applications	S5
<b>3</b>	<b>Values:</b>	
3.1	Write and present a chemical report related to synthetic molecular spectroscopy.	V2

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction to molecular structure and electromagnetic radiation	2
2	Rotational spectra-Rigid rotor	6
3	Vibrational spectra–harmonic oscillator	4+2E
4	Electronic spectra	4
5	NMR	2+2E
6	Molecular symmetry and spectroscopy	4+2E
<b>Total</b>		<b>22</b>

### D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and Understanding</b>		
1.1	Demonstrate knowledge and understanding of concepts in molecular spectroscopy.	Lecture	Mid-term and final Exams
1.2	Recognize the techniques, and chemical terminology related to molecular spectroscopy.	Lecture E-Learning	Mid-term and final Exams Active participation of students within their group on blackboard
<b>2.0</b>	<b>Skills :</b>		
2.1	Apply broad theories, principles, and concepts in molecular spectroscopy.	Lecture E-Learning	Mid-term and final Exams Active participation of students within their group on blackboard

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	solve complex problems in molecular spectroscopy quantitatively and qualitatively	Lecture E-Learning	Mid-term and final Exams Active participation of students within their group on blackboard
2.3	Collect a data using computers and internet to find all information related to molecular spectroscopy and their applications	Lecture E-Learning	Mid-term and final Exams Active participation of students within their group on blackboard
3.0	<b>Values:</b>		
3.1	Write and present a chemical report related to synthetic molecular spectroscopy.	Group work	Reports

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments and activities	All weeks	10%
2	E-learning	All weeks	10%
	Mid-term Exam	6	30%
4	Final Exam. (2 hours exam)	12	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 :**

- We have faculty members to provide counseling and advice.
- Office hours: During the working hours weekly.
- Academic Advising for students

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	I.N. Levine, Molecular Spectroscopy, Wiley Interscience, New York, 1975.
<b>Essential References Materials</b>	* W. J. Moore, Physical Chemistry, 5 <sup>th</sup> edition, Longman, 1972. * K. Anderson, Fundamental of Molecular Spectroscopy, John Wiley & Sons, 3 <sup>rd</sup> Edition, 1992. * J. Michael Hollas, Modern Spectroscopy, 4th ed. John, Wiley & Sons New York, 2004.
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• <a href="http://www.chemweb.com">http://www.chemweb.com</a></li> <li>• <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a></li> <li>• <a href="http://www.rsc.org">http://www.rsc.org</a></li> </ul>
<b>Other Learning Materials</b>	Not required

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>Classrooms capacity (30) students.</li> <li>Providing hall of teaching aids including computers and projector.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Room equipped with computer and projector and TV.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	No other requirements.

## G. Course Quality Evaluation


Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	questionnaire (indirect )
Extent of achievement of course learning outcomes	Program Leader	results data analysis (direct) and questionnaire (indirect )
Quality of learning resources	Course instructor	questionnaire (indirect )

**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	Prof. Ahmed Fawzy 
Reference No.	
Date	

Head of Chemistry Department

  
Dr Moataz Morad

