بسم الله الرحمن الرحيم

جامعة آل البيت

جامعة آل البيت
دائرة ضمان الجودة والتخطيط

كلية .....العلوم.....

قسم ....الكيمياء.....

توصيف مساق : Advanced Physical Chemistry
403741

1. معلومات مدرس المساق (Instructor)

اســـــــــم (مدرس / منسق) المساق :	Dr. Raed Ghanem and Dr Khaldoun Al Soud
الساعـــــــــــــات المكتبيـــــــــــــــــــــة :	
رقم المكتب والرقـــــــــم الفرعـــــــــــــي :	Chemistry Department
البريـــــــــــــــــــد الالكترونـــــــــــــــــي :	raedag@aabu.edu.jo. khaldoun@aabu.edu.jo
مساعد البحث والتدريس/المشرف/الفني (إن وجد):	

2. وصف المساق (Course Description)

This course addresses the methods used in quantum mechanics and ab initio molecular electronic-structure theory. Its focus is at wave-function-based methods and their origin in fundamental quantum mechanics. The course covers the following topics: Revision of Quantum chemistry: Mathematical tools of Quantum chemistry. The postulates of Quantum mechanics. Particle in a box . Vibrational Harmonic Oscillator. Angular and spin momentum. Hydrogen like atom. Perturbation theory. The Variation method. Molecular Electronic atom . Diatomic Molecules. Huckel Theory. Symmetry

3. بيانات المساق (Course Title)

رقم المساق: 403471	**اسم المساق advanced physical chemistry**	**المستوى: Graduated**
طبيعة المساق: Theory	**المتطلب السابق / المتزامن:**	**وقت المحاضرة: 13:00-16:00**
العام الجامعي:2019/2020	**الفصل الدراسي: First**	**عدد الساعات الدراسية:3**

4. أهداف المساق (Course Objectives)

General Objectives : Understand the Basics of quantum mechanics and its application in chemistry, which includes: Revision of Quantum chemistry: Mathematical tools of Quantum chemistry. The postulates of Quantum mechanics. Particle in a box . Vibrational Harmonic Oscillator. Angular and spin momentum. Hydrogen like atom. Perturbation theory. The Variation method. Molecular Electronic atom . Diatomic Molecules. Huckel Theory. Symmetry

4. مخرجات التعلم (Intended Student Learning Outcomes)
(المعرفة والمهارات والكفايات)

يفترض بالطالب بعد دراسته لهذا المساق أن يكون قادرا على:

After completing this course, the student should demonstrate the knowledge and ability to:

After finishing this course, students will be able to understand and apply the concepts quantum mechanics to tackle common problems in chemistry, including spectroscopy.

5. السياسه العامه والحضور (Course Policies: Attendance Policy)

Course participants are expected to master the material from Calculus I and II and physical 3

1. This course will require weekly problem sets. A thorough understanding of each problem set will help you master the concepts.
2. The course will have two exams plus a final exam.
3. Classes will involve hands-on worksheets to summarize key ideas/results and to practice new material. Participating in the in-class exercises will help you master the concepts.
4. Students will be expected to prepare course material as indicated in reading assignments.
5. It is your responsibility to get copies of the lecture & recitation material
6. **Attendance at all classes will be recorded and is mandatory**. Please make sure you read and fully understand the University of Al Al Bayte Attendance Policy. This policy will be strictly enforced.

تنبيه : في حال التغيب عن اي امتحان لن يكون هناك امتحان تعويضي الا في حالة وجود عذر و حالة طارئة من المستشفى و على الطالب ابراز العذر في فتزة لا تتجاوز الثلاثة ايام مه تاريخ االمتحان, و للمدرس الحق في قبول او رفض العذر، و حسب التعليمات

6. محتوى المساق (Course Content)

الأسبوع	الموضـــوع
الأول	**Revision of Quantum chemistry: Mathematical tools of Quantum chemistry. The postulates of Quantum mechanics**
الثاني	**Particle in a box .**
الثالث	**Vibrational Harmonic Oscillator**
الرابع	**Angular and spin momentum**
الخامس	**Hydrogen like atom**
السادس	
الامتحان الأول	
الثامن	**Perturbation theory.**
التاسع	**The Variation method**
العاشر	**Molecular Electronic atom**

. Diatomic Molecules.	الحادي عشر
الامتحان الثاني	
Huckel Theory.	الثالث عشر
Symmetry	الرابع عشر
Revision	الخامس عشر
Spectroscopy	السادس عشر
الامتحان النهائي	

1. استراتيجيات التعليم والتعلم وطرق التقويم
(Teaching and learning Strategies and Evaluation Methods)

ت	مخرجات التعلم	استراتيجيات التدريس	أنشطة التعلم	نوع التقويم/القياس (امتحان/عروض صفية/مناقشة/واجبات)
1	**Understand the basic concepts of quantum mechanics**.	Lecture, Presentation, quizzes, Case studies, and in class questions	**Class notes - Problem sets and solutions Class Discussions, website development**	In class Questions, Presentation, Exam
2	**Understand basic concepts of** particle in a box	Lecture, Presentation, quizzes, Case studies, and in class questions	**Class notes - Problem sets and solutions Class Discussions, website development**	In class Questions, Presentation, Exam
3	**Understand basic concepts of** Vibrational and rotational spectroscopy.	Lecture, Presentation, quizzes, Case studies, and in class questions	**Class notes - Problem sets and solutions Class Discussions, website development**	In class Questions, Presentation, Quizzes, Exam
4	**Understand basic concepts of** Angular and spin momentum.	Lecture, Presentation, quizzes, Case studies, and in class	**Class notes - Problem sets and solutions Class Discussions, website development**	In class Questions, Presentation, Quizzes, Exam

		questions		
In class Questions, Presentation, Quizzes, Exam	**Class notes - Problem sets and solutions Class Discussions, website development**	Lecture, Presentation, quizzes, Case studies, and in class questions	**Understand basic concepts of** Perturbation theory.	5
In class Questions, Presentation, Quizzes, Exam	**Class notes - Problem sets and solutions Class Discussions, website development**	Lecture, Presentation, quizzes, Case studies, and in class questions	**Understand basic concepts of** The Variation method.	6
In class Questions, Presentation, Quizzes, Exam	**Class notes - Problem sets and solutions Class Discussions, website development**	Lecture, Presentation, quizzes, Case studies, and in class questions	**Understand basic concepts of** Molecular Electronic atom .	7
In class Questions, Presentation, Quizzes, Exam	**Class notes - Problem sets and solutions Class Discussions, website development**	Lecture, Presentation, quizzes, Case studies, and in class questions	**Understand basic concepts of** Diatomic Molecules. Huckel Theory. Symmetry	8

1. تقييم الطلبة (Assessment)

الأساليب المستخدمة	توقيت التقييم	توزيع الدرجات لكل أسلوب
1-أعمال الفصل: (تقرير، وظائف، حضور)	خلال الفصل	-
2-امتحان تحريري أول	الأسبوع السابع	25
2-امتحان تحريري ثاني	الأسبوع الثاني عشر	25
3-امتحان تحريري نهائي	أسبوع الامتحانات النهائية	50

2. الكتاب المقرر (Text Book)

Physical Chemitry	**المرجع الرئيس**
Ira N. Levine	**المؤلف**
Oxford press	**الناشر**
2017	**السنة**
7 Edition	**الطبعة**
https://oup-arc.com/access/pchem11e	**الموقع الالكتروني للمرجع**

3. المراجع الإضافية (References)(وتشمل الكتب والبحوث المنشورة في الدوريات او المواقع الالكترونية)

Physical Chemistry" by Thomas Engel and Philip Reid, 3rd edition. Pearson Prentice Hall, 2011 The companion website corresponding to this publisher is:	-1

http://wps.pearsoned.co.uk	
Physical Chemistry" K. J. Laidler and J.H. Meiser, 3rd Edition, Houghton Mifflin Company, 1998.	-2