توصيف مقرر دراسى

جامعة : المنصورة

كليـة : العلـــوم

قســم : الرياضيات

١- بيانات المقرر		
كود المادة : Math 423	**اسم المقرر :** **Quantum Mechanics**	**المستوى: الرابع**
التخصص : رياضيات	**عدد الوحدات الدراسية: ٣ ساعة معتمدة نظرى ٢: تمارين: ٢ عملى: ٠**	

٢- هدف المقرر:	**For students undertaking this course, the aims are to:** • Introduce the basic information of studying small particles (ones which are affected by emission or absorption of light. • Study the applications of this theory which is known to have provided trillions of dollars to USA since it is known that all electronics depend on this theory. • Get a feeling of the possible future directions e.g. quantum informatics.
٣- المستهدف من التدريس المقرر:	
أ- المعلومات والمفاهيم:	**Knowledge and Understanding :** **On completing this course, students will be able to:** a1- define the basic concepts of why classical mechanics cannot be used to study small particles. a2- define the basic concepts of quantum mechanics. a3- Acquire advanced mathematical knowledge needed to study quantum mechanical particles.
ب - المهارات الذهنية	**b- Intellectual Skills:** **On completing this course, students will be able to:** b1- Recognize basic differences between classical and quantum mechanical particles. b2- Understand the evolution of theories and the need to check their agreement in their common zone. b3- make use of advanced abstract mathematics to solve applied mathematical problems.
ج- المهارات المهنية الخاصة بالمقرر:	**c-Professional and Practical Skills:** **On completing this course, students will be able to:**

c1- learn how to use theoretical results to explain real phenomena. c2- see how quantum mechanics is turned into real electronic devices. c3- get a feeling of how mathematics can be used in real life.	
d-General and Transferable Skills: **On completing this course, students will be able to:** d1- work effectively both in a team, and independently on solving mathematical problems. d2- use IT and search for information. d3- communicate effectively with his teacher and colleagues.	**د- المهارات العامة:**
• Why classical mechanics is not suitable for studying small particles. • Particle wave duality. • Schrodinger equations and its applications e.g. Tunneling, harmonic oscillator and hydrogen atom. • Advanced mathematics needed for quantum mechanics. • Ehrenfest theorem and uncertainty principle. • Perturbation theory. • Elements of quantum entanglement.	**٤- محتوى المقرر:**
Teaching and Learning Methods 1- Lectures. 2- Homework reports and discussion groups. 3- Internet search done by students.	**٥- اساليب التعليم والتعلم:**
The same as normal students, only skeletal disabilities are allowed in the Faculty of Science.	**٦- أساليب التعليم والتعلم للطلاب ذوى القدرات المحدودة:**
	٧- تقويم الطلاب :
1- Oral Exam. to assess a1-a3,b1-b3,d1-d3 2- Final Exam to assess a1-a3,b1-b3,c1-c3 3- Mid-Term Exam to assess a1-a3,b1-b3,c1-c3	**أ- الأساليب المستخدمة :**
1- Oral Eexam week 16 2- Final Exam week 16 3- Mid-Term Exam week 7	**ب- التوقيت :**
- Mid-Term Examination 10	**ج- توزيع الدرجات:**

- Final-Term Examination 80 - Oral Examination 10 - Practical Examination 0 Total 100%	
٨- قائمة الكتب الدراسية والمراجع :	
Lecture Notes.	**أ- مذكرات:**
A.Rae, "Quantum Mechanics", Taylor and Francis, 2002.	**ب- كتب ملزمة**
D.R.Bes, "Quantum Mechanics", Springer Publishers, 2007.	**ج- كتب مقترحة :**
http://en.wikipedia.org/wiki/Quantum_mechanics.	**د- دوريات علمية أو نشرات**

(أ) مصفوفة المعارف والمهارات المستهدفة من المقرر الدراسى

المحتويات للمقرر	اسبوع الدراسة	المعارف الرئيسية	مهارات ذهنية	مهارات مهنية	مهارات عامة
Why classical mechanics is not suitable for studying small particles.	1	a1, a3	b1		
Particle wave duality.	2-3	a1-a3	b1		
Schrodinger equations and applications e.g. tunneling.	4-5	a1, a3	b1		
harmonic oscillator and hydrogen atom.	6-8	a1,a2,a3	b2, b3	c1-c3	
Advanced mathematics needed for Q. Mech.	9-10	a1, a3	b1, b3		
Uncertainty principle and Ehrenfest theorem.	11-12	a1, a3	b1, b2, b3		
Perturbation theory.	13	a1, a3	b3		
Quantum entanglement.	14			c1-c3	d1, d2, d3

أستاذ المادة : أ د. السيد محمد أحمد

رئيس مجلس القسم العلمي :ا.د. مجدى الياس فارس