MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Atomic physics**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**UOMU031033**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Department of Medical Physics		**College**	Al mustaqbal University	
Module Leader	Sara mehdi		**e-mail**		
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Explain the concept of atomic physics. 2. Clarification the atomic models. 3. Explain the line spectrum of the hydrogen atom. 4. Explain the relative effect. 5. Define perturbation theory. 6. Distinguish between the emitted and absorbed radiation. 7. Distinguish between permitted and prohibited transfers. 8. Understand the Stark effect on the electric field. 9. Understanding of Hund's rules and atomic orbitals. 10. Know the rules of atoms in electric or magnetic fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Clarification and knowledge of atomic models and how to study and structure atoms. 2. Explanation of series for the spectrum of the hydrogen atom. 3. know the theory of relativity. 4. Solving various mathematical problems related to the atom. 5. Giving homework to increase the student's ability to problem-solving techniques. 6. Promote a quick response from the student by asking conceptual questions during class. 7. Encouraging students in strategies to solve examples in class.
Indicative Contents المحتويات الإرشادية	An introduction about atoms, atomic electrons , clarification the atomic models, the hydrogen atom, relative theory, perturbation theory, distinguish between the emitted and absorbed radiation, absorption and Emission of Radiation, allowed and forbidden transitions, spontaneous Emission Many Electron Atoms, Zeeman Effect, Spin Orbit Interactions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures 2. Discussion 3. Teaching strategies to be used to develop these skills and abilities 4. Lab work 5. Case Study 6. Active learning 7. Small group discussion 8. Evaluate the efforts of each student in preparing the report. 9. Evaluate the scientific values of reports. 10. Evaluate the work in team 11. Evaluation of the role of each student in lab group assignment 12. Evaluation of student's presentations 13. Communication, Information Technology and Numerical Skills

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	25
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Atomic physics.
Week 2	Quantum mechanical description of the hydrogen atom Angular Momentum Atomic Spectra Time.
Week 3	Independent Perturbation Theory Fine Structure.
Week 4	Spin Orbit Coupling.
Week 5	Relativistic Effects.
Week 6	Time-Dependent Perturbation 7 Theory Interaction of Atoms with E. M. Radiation.
Week 7	First Exam

Week 8	Absorption and Emission of Radiation.
Week 9	Allowed and Forbidden Transitions.
Week 10	Spontaneous Emission Many Electron Atoms.
Week 11	Hund's Rules and Atomic Orbitals.
Week 12	Zeeman Effect, Weak-Field Zeeman Effect and Strong field Zeeman effect.
Week 13	Spin Orbit Interactions, LS-coupling 13 approximation and jj-coupling approximation.
Week 14	Selection Rules Atoms in Electric or Magnetic Fields.
Week 15	Second exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Electron diffraction.
Week 2	Lab 2: Zeeman phenomenon.
Week 3	Lab 3: Finding the specific charge of an electron using Thomson's method.
Week 4	Lab 4: photoelectric emission.
Week 5	Lab 5: X-ray attenuation.
Week 6	Lab 6: Stefan-Bolztmann law of radiation.
Week 7	Lab 7: Determination of Rydberg’s constant.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Born, M., Blin-Stoyle, R. J., & Radcliffe, J. M. (1989). Atomic physics. Courier Corporation. Foot, C. J. (2004). Atomic physics (Vol. 7). OUP Oxford.	Yes
Recommended Texts	Book of Atomic and Molecular Physics	Yes
Websites	None	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A –** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.