

نموذج وصف المقرر باللغة العربية

1. اسم المقرر	
فيزياء الذرة	
2. رمز المقرر	
3. الفصل / السنة	
فصلى	
4. تاريخ إعداد هذا الوصف	
2026/2025	
5. أشكال الحضور المتاحة	
حضورى	
(عدد الساعات الدراسية (الكلى)/ عدد الوحدات (الكلى) 6.	
(عدد الساعات (5)، عدد الوحدات (3)	
(اسم مسؤول المقرر الدراسى (اذا أكثر من اسم يذكر 7.	
م.م. علي صالح	
8. اهداف المقرر	
Define the atomic and Nuclear Structure. 2. Learn the types of the ionization radiation. 3. Know the mechanism of radiation interaction with matter. 4. Define the interaction scatter radiation with matter. 5. Discuss the types of attenuation coefficient 8. Define nanotechnology science, types of nanomaterials synthesis, and their application 9. To inform students as to the importance of renewable energy in the energy mix required for generation within nations. 10. The students will acquire sharp knowledge on nanotechnology based alternate source of energy. 11. The students may work on advanced materials for renewable and green energy. 12. The students will get a clear understanding of Solar technology. 14. They will also understand the importance of energy storage techniques. 15. They will be clear about the role of nanotechnology in improving the efficiency in energy usage.	اهداف المادة الدراسية
9. استراتيجيات التعليم والتعلم	
الاستراتيجية	

طريقة التقييم	طريقة التعلم	اسم الوحدة او الموضوع	مخرجات التعلم المطلوبة	الساعات	الأسبوع
اسئلة عامة ومناقشة وامتحانات يومية	نظري + عملي	• Atomic and Nuclear Structure. – Fundamental particles – Nuclear Binding energy - Nuclear Stability – Auger electrons		2 نظري 3 عملي	الاول
اسئلة عامة ومناقشة بالاضافة الى جعل الطالب يطبق العملي	نظري + عملي	– Radioactive Decay – Radioactive materials – Activity - Half life		2 نظري 3 عملي	الثاني
اسئلة عامة ومناقشة بالاضافة الى جعل الطالب يطبق العملي	نظري + عملي	• Types of radiation - Alpha particles - Beta particles - Gamma radiation - Others, Decay models		2 نظري 3 عملي	الثالث
تجان آني بالاضافة الى جعل الطالب يطبق العملي	نظري + عملي	• Classification of Radiation – Electromagnetic radiation – Particulate radiation – Ionizing and non-ionizing radiations • Electromagnetic Energy – Velocity and Amplitude - Frequency and Wavelength		2 نظري 3 عملي	الرابع
امتحان تطبيق عملي	نظري + عملي	• Wave Model: Visible Light • Particle Model: Quantum Theory • Matter and energy • Interactions of photons with matter • Mechanisms of Energy Loss – Photoelectric effect – Thomson scattering - Coherent (Rayleigh) scattering		2 نظري 3 عملي	الخامس
اسئلة عامة ومناقشة	نظري + عملي	– Incoherent scattering – Pair and triplet production – Compton scattering by free electrons – Scattering and energy		2 نظري 3 عملي	السادس

		transfer coefficients stopping power			
اسئلة عامة تتجان اني بالاضافة الى جعل الطالب يطبق العملي	نظري + عملي	• Photon Attenuation Coefficients – Linear attenuation coefficient – Exponential attenuation – Mass attenuation coefficient - Energy-Absorption coefficient		2 نظري 3 عملي	السابع
واجبات جماعية	نظري + عملي	• Interactions of electrons with matter – Ionizational (collisional) interactions – Radiative Interactions - stopping power		2 نظري 4 عملي	الثامن
اسئلة عامة ومناقشة	نظري + عملي	• Introduction of Nanomaterials – Properties of nanoparticles - Types of nanoparticles		2 نظري 3 عملي	ش
امتحان	نظري + عملي	– Synthesis Routes – Bottom-Up Approaches – Top-Down Approaches - Applications of nanomaterials in medicine & biology		2 نظري 3 عملي	العاشر
اسئلة عامة ومناقشة بالاضافة الى نارات تخص الموضوع للمناقشة بين الطلبة	نظري + عملي	• Nanotechnology in renewable energy systems – Energy transport, conversion and storage – Nano, micro and meso scale phenomena and devices. • Energy sector products using nanomaterials – Light emitting diodes – Batteries – Catalytic reactors - Capacitors, Super capacitor		2 نظري 3 عملي	الحادي عشر
اسئلة عامة ومناقشة بالاضافة الى نارات تخص الموضوع للمناقشة بين الطلبة	نظري + عملي	• Nanotechnology to Hydrogen Production – Photocatalytic Water Splitting Reaction – Nano Semiconductor		2 نظري 3 عملي	الثاني عشر

		Materials for Photocatalytic Water Splitting Photolytic H ₂ Evolution Based on Nanoenhanced Material			
اسئلة عامة وامتحان آني	نظري + عملي	• Nanomaterials for the Conversion of Carbon Dioxide into Renewable Fuels and Value-Added Products – Theoretical Potentials for Electrochemical Reduction of CO₂ – Effect of Particle Size on Electrode Performance in Electrochemical CO₂ Reduction Reaction		2 نظري 3 عملي	الثالث عشر
واجبات جماعية بالإضافة الى نارات تخص الموضوع للمناقشة الطلبة وتطبيق عملي	نظري + عملي	• Nanomaterials and Direct Air Capture of CO₂ – Capture or Separation Technologies – New Roads into CO₂ Capture – Direct Air Capture and Nanomaterials		2 نظري 3 عملي	الرابع عشر
اسئلة الامتحان	نظري + عملي	• Solar energy technology – Availability of solar radiation – Photovoltaic devices – Dye sensitized solar cells – Photoelectrochemical cells for hydrogen production		2 نظري 3 عملي	الخامس عشر

11. تقييم المقرر

توزيع الدرجة من 100 على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير الخ

12. مصادر التعلم والتدريس

لا يوجد	الكتب المقررة المطلوبة (المنهجية أن وجدت)
	المراجع الرئيسة (المصادر)
	الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير....)
	المراجع الإلكترونية ، مواقع الانترنت

Course Description Form

13.Course Name:

14.Course Code:					
PHYSICS OF ATOM					
15.Semester / Year:					
SECOND SEMESTER					
16.Description Preparation Date:					
17.Available Attendance Forms:					
2026/2025					
18.Number of Credit Hours (Total) / Number of Units (Total)					
5 HOURS, 3 UNITS					
19.Course administrator's name (mention all, if more than one name)					
20.Course Objectives					
Course Objectives		Define the atomic and Nuclear Structure. 2. Learn the types of the ionization radiation. 3. Know the mechanism of radiation interaction with matter. 4. Define the interaction scatter radiation with matter. 5. Discuss the types of attenuation coefficient. 8. Define nanotechnology science, types of nanomaterials synthesis, and their applications. 9. To inform students as to the importance of renewable energy in the energy mix required for generation within nations. 10. The students will acquire sharp knowledge on nanotechnology based alternate source of energy. 11. The students may work on advanced materials for renewable and green energy. 12. The students will get a clear understanding of Solar technology. 14. They will also understand the importance of energy storage techniques. 15. They will be clear about the role of nanotechnology in improving the efficiency in energy usage.			
21.Teaching and Learning Strategies					
Strategy		Lectures and discussions Brainstorming strategy Community work strategy Strategy for dialogue and exchange of opinions In addition to the quizzes and practical application			
22. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	Theoretical 2 Practical 3		• Atomic and Nuclear Structure. – Fundamental particles – Nuclear Binding energy – Nuclear Stability – Auger electron	Theoretical and Practical	
2	Theoretical 2 Practical 3		– Radioactive Decay – Radioactive materials – Activity – Half life	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic discussion Between students and practical application
3	Theoretical 2 Practical 3		• Types of radiation - Alpha particles - Beta particles - Gamma radiation - Others, Decay mode	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic discussion Between students and practical application
4	Theoretical 2 Practical 3		• Classification of Radiation – Electromagnetic radiation – Particulate radiation – Ionizing and non-ionizing radiations • Electromagnetic	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic discussion Between students and practical application

			Wave Energy – Velocity and Amplitude - Frequency and Wavelength		
5	Theoretical 2 Practical 3		• Wave Model: Visible Light Particle Model: Quantum Theory • Matter and energy • Interactions of photons with matter • Mechanisms of Energy Loss – Photoelectric effect – Thomson scattering - Coherent (Rayleigh scattering)	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application
6	Theoretical 2 Practical 3		– Incoherent scattering – Pair and triplet production – Compton scattering by free electrons – Scattering and energy transfer coefficients - stopping power	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application
7	Theoretical 2 Practical 3		• Photon Attenuation Coefficients	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion

			– Linear attenuation coefficient – Exponential attenuation – Mass attenuation coefficient Energy-Absorption coefficient		Between students and practical application
8	Theoretical 2 Practical 3		• Interactions of electrons with matter – Ionization (collisional) interactions – Radiative Interactions - stopping power		Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application
9	Theoretical 2 Practical 3		• Introduction of Nano materials – Properties of nanoparticles - Types of nanoparticles	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application
10	Theoretical 2 Practical 3		– Synthesis Routes – Bottom-Up Approaches – Top-		Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application

			Down Approaches Applications of nanomaterials in medicine & biology		
11	Theoretical 2 Practical 3		• Nanotechnology in renewable energy systems – Energy transport, conversion and storage – Nano, micro and meso scale phenomena and devices. • Energy sector products using nanomaterials – Light emitting diodes – Batteries – Catalytic reactors Capacitors, Supercapacitors	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application
12	Theoretical 2 Practical 3		• Nanotechnology to Hydrogen Production – Photo	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion

			catalytic Water Splitting Reaction – Nano Semicond uctor Materials for Photocata lytic Water Splitting Photolytic H ₂ Evolution Based o Nanoenhanced Materials		Between students and practical application
13	Theoretical 2 Practical 3		Nanomaterials for the Conversion of Carbon Dioxide into Renewable Fuels and Value-Added Products - Theoretical Potentials for Electrochemical Reduction of CO₂ - Effect of Particle Size on Electrode Performance in Electrochemical CO₂ Reduction Reaction	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application
14	Theoretical 2 Practical 3		Nanomaterials and Direct Air Capture of CO₂ - Capture or Separation	Theoretical and Practical	Home work Group sessions, in addition to seminars on the topic for discussion Between students and practical application

			Technologies New Roads into Carbon Capture: Direct Air Capture and Nanomaterials		
15	Theoretical 2 Practical 3		• Solar energy technology – Availability of solar radiation – Photovoltaic devices – Dye sensitized solar cells - Photoelectrochemical cells for hydrogen production	Theoretical and Practical	Exam
23.					
24.					