

نموذج توصيف مقرر
Course Description Form

Name of College\Faculty : Science
Name of Department: Chemistry

اسم الكلية:
اسم القسم العلمي:

Course Name	Nuclear and radio-chemistry	اسم المقرر
Course No.	0420-204	رقم المقرر
No. of Credits	3	عدد الوحدات
Theoretical Hours	3	عدد الساعات النظرية
Practical Hours	0	عدد الساعات المعملية
Course topics	1- Structure of the atomic nucleus: Nucleon, nuclides, radioactive materials and stability of nucleus. 2- Properties and models of nucleus: Charges and radius; nuclide masses and binding energy; angular momentum; parity, magnetic and electric moment. . 3- Elementary particles: Leptons, mesons and baryons.. 4- The radioactive decay law: The time law of radioactive decay; radioactive equilibrium; dual decay; examples of radioactive decay calculations.. 5- Types of radioactive decay: α – decay, β – decay; γ – radiation; spontaneous fission. 6- Interaction of radiation with matter: Interaction with α – particles, β – articles and γ – Radiation. 7- Measurement of nuclear radiation: Ionization detectors; scintillation detectors; photographic detectors; nuclear track detectors. 8- Nuclear reactions: reaction crops section; nuclear reaction with charged particles and neutrons; scattering process; mechanism of nuclear fission; fission products; energy balance of the fission process; calculations of yields in nuclear reactions. 9- Radioactive elements: Natural and synthetic radioactive elements; quasi-atoms; non-classical atoms.	مواضيع المقرر

	10- Models of nucleus: Fermi gas model; liquid drop model; nuclear shell model. 11- Nuclear reactors: Fission and fusion reactions. 12- Applications of radionuclides: Radioactive nuclides in chemistry (labelling, synthesis, exchange reactions); radioactive nuclides in medicine, radioactive nuclides in age determination.	
Text book: (Name, Author , Year , Publisher)	عنوان الكتاب : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)	
Radiochemistry and Nuclear Chemistry, By C. Choppin, J. Rydberg and J.O. Liljenzin, Butterworth-Heinemann, London, 2013 (or the Latest Edition).		
References: (Name , Author , Year . Publisher)	عنوان المرجع : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)	
Radiochemistry and Nuclear Chemistry, By W.D. Ehmann and D.E. Vance, John Wiley & Sons, New York, Vol. 116, Latest Edition.		

Prerequisites : 0420-102, 0420-106, Physics 101, Physics 105, and Math 101				متطلبات المقرر	
Grading	Exams		%	50	الاختبارات
	Quizzes		%	5	امتحانات قصيرة
	H.W.		%	5	واجبات
	Lab		%		مشاريع (دراسة ميدانية)
	Final		%	40	الاختبار النهائي
	100%				آلية رصد المقرر

Chapters included:

Chapter	Topic	Sections Included
1	Origin of Nuclear Science	1.6
2	Elementary Particles	2.6
5	Unstable Nuclei and Radioactive Decay	5.7-5.18
7	Absorption of Nuclear Radiation	7.6-7.9
9	Detection and Measurement Techniques	9.3, 9.7-9.12
11	Mechanisms and Models of Nuclear Reactions	11.3, 11.5, 11.8
18	Uses of Radioactive Tracers	18.6
19	Principles of Nuclear Power	19.6-19.18

Course objectives					
No.	Course Objectives (Learning Outcomes)	Example(s) of relevant (Topics and activities)	Recommended Level to satisfy the objectives		
			High	Medium	Low
1	1.1 give account of the types of radioactivities. 1.2 illustrate the interaction of matter with radiation				
2	2.1 explain the different laws of decay. 2.2 write on the radiation measurements 2.3 differentiate between the different types of nuclear reactions. 2.4 discuss the models of nucleus. 2.5 define the difference between fission and fusion reactions.				
3	3.1 describe the applications of radionuclides in medicine 3.2 describe the application of nuclear chemistry to age determination.				
Fields					
Skills					
Coordinator (Name and Rank) :		Convener of the Inorganic and Analytical Chemistry group			
Signature and stamp :					
Date:16-11-2025		11/11/2025			