

مختصر توصيف المقرر

(Course Information)

معلومات المقرر \*

اسم المقرر:	فيزياء النيوترونات والمفاعلات
رقم المقرر:	فيز 4852
اسم ورقم المتطلب السابق:	فيز 3812
اسم ورقم المتطلب المرافق:	--
مستوى المقرر:	السابع
الساعات المعتمدة:	3 (0+0+3)
<b>Module Title:</b>	Neutron Physics and Reactors
<b>Module ID:</b>	PHYS 4852
<b>Prerequisite (Co-requisite) :</b>	PHYS 3812
<b>Co-requisite :</b>	--
<b>Course Level:</b>	Seventh
<b>Credit Hours:</b>	3 (3+0+0)

Module Description

وصف المقرر :

Neutron reactions: cross-sections, attenuation, reaction rate, fission cross-section. Nuclear fission, fission yield, Energy distribution among fission neutrons and fragments, regeneration factor. Thermal neutrons: energy distribution, effective cross section, moderation, average energy loss, Average energy logarithmic decrement, SDP, MR and resonance escape probability. The Nuclear chain reaction: neutron cycle, thermal utilization factor and calculating the four factors formula.
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Module Aims

أهداف المقرر :

In this course establishes an introduction of what happen in nuclear reactor.
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Learning Outcomes:

مخرجات التعليم:

Neutron reactions: cross-sections, attenuation, reaction rate, fission cross-section. Nuclear fission, fission yield, Energy distribution among fission neutrons and fragments, regeneration factor. Thermal neutrons: energy distribution, effective cross section, moderation, average energy loss, Average energy logarithmic decrement, SDP, MR and resonance escape probability. The Nuclear chain reaction: neutron cycle, thermal utilization factor and calculating the four factors formula.
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Course Contents:

محتوى المقرر:

ساعات التدريس (Hours)	عدد الأسابيع (Weeks)	قائمة الموضوعات (Subjects)
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6	2	Neutron Physics: neutron sources, absorption and moderation of neutrons, neutron detectors, neutron reactions and cross sections, neutron capture, interference and diffraction with neutrons.
6	2	Neutron Interactions: Neutron Cross Sections, Neutron Energy Range, Cross Section Energy Dependence, Neutron Scattering.
6	2	NEUTRON DIFFUSION AND MODERATION: Neutron Flux, Fick's Law, The Equation of Continuity, The Diffusion Equation, Boundary Conditions, Solutions of the Diffusion Equation, The Diffusion Length, The Group-Diffusion Method, Thennal Neutron Diffusion, Two-Group Calculation of Neutron Moderation.
9	3	NUCLEAR REACTORS AND NUCLEAR POWER: The Fission Chain Reaction, Nuclear Reactor Fuels, Non-Nuclear Components of Nuclear Power Plants, Components of Nuclear Reactors, Power Reactors and Nuclear Steam Supply Systems, Nuclear Cycles, Isotope Separation, Fuel Reprocessing, Radioactive Waste Disposal.
6	2	NUCLEAR REACTOR THEORY: One-Group Reactor Equation, The Slab Reactor, Other Reactor Shapes, The One-Group Critical Equation, Thermal Reactors, Reflected Reactors, Multi group Calculations.
6	2	THE TIME-DEPENDENT REACTOR: Classification of Time Problems, Reactor Kinetics, Control Rods and Chemical Shim, Temperature Effects on Reactivity, Fission Product Poisoning, Core Properties during Lifetime.
6	2	HEAT REMOVAL FROM NUCLEAR REACTORS: General Thermodynamic Considerations, Heat Generation in Reactors, Heat Flow by Conduction, Heat Transfer to Coolants, Boiling Heat Transfer, Thennal Design of a Reactor.

### Textbook and References:

### المقرر والمراجع المساندة:

سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم الكتاب المقرر Textbook title
(1988) ISBN-13: 978-0471805533	John Wiley and Sons	K.S. Krane	Introductory Nuclear Physics
سنة النشر Publishing Year	اسم الناشر Publisher	اسم المؤلف (رئيسي) Author's Name	اسم المرجع Reference
(1966) ISBN-13: 978-0201041200	Addison Wesley	J. Lamarsh	Introduction to Nuclear Reactor Theory
(2001) ISBN-13: 978-0201824988	Addison Wesley	J. Lamarsh & A. Baratta	Introduction to Nuclear Engineering
(2008) ISBN-13: 978-0123706317	John Wiley and Sons	Elmer E. Lewis	Fundamentals of Nuclear Reactor Physics
(2013) ISBN:978-4431541943	Springer	Yoshiaki Oka & Katsuo Suzuki	Nuclear Reactor Kinetics and Plant Control