Jordan University of Science and Technology

Faculty of Engineering

Nuclear Engineering Department

NE441 Nuclear Reactors Analysis
First Semester 2019-2020

Course Catalog
3 Credit Hours. The Multi-group diffusion theory, diffusion method, heterogeneous reactors, reactor criticality calculations, reactor kinetics, changes in reactivity, the neutronic behavior of fission reactors, thermal neutron spectra, fine group whole spectrum calculations and coarse group constant generation.

Text Book	
Title	Nuclear Reactor Analysis
Author(s)	J.J. Duderstadt and L.J. Hamilton
Edition	1st Edition
Short Name	Ref #1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #2	Introduction to Nuclear Reactor Theory	John R. Lamarsh	1st Edition	

Instructor	
Name	**Dr. Khaled AL-Shboul**
Office Location	E2 L-2
Office Hours	Sun : 11:30 - 12:30 Tue : 11:30 - 12:30 Wed : 11:30 - 14:30 Thu : 14:30 - 15:30
Email	kfshboul@just.edu.jo

Class Schedule & Room

Section 1:
Lecture Time: Sun, Tue, Thu : 13:30 - 14:30
Room: E2113

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
243051	EE305 Numerical Methods For Engineers	Prerequisite / Study
2003400	NE340 Nuclear Reactors Theory	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Weeks 1, 2	Review of the Diffusion Theory	From **Ref #1**
Weeks 3, 4, 5	Multi Group Diffusion Theory	From **Ref #1**
Weeks 6, 7, 8	Reactor Kinetics	From **Ref #1**
Weeks 9, 10	Cell Calculations for Heterogeneous Core Lattices	From **Ref #1**
Weeks 11, 12	Reactivity Control	From **Ref #1**
Week 13	Control Rod Worth	From **Ref #1**, From **Ref #2**
Weeks 14, 15	Analysis of Core Composition Changes	From **Ref #1**

Mapping of Course Outcomes to Program Student Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Ability to mathematically derive and understand the general form of the multi-group diffusion equations. [11]	10%	First Exam
Ability to analytically solve the diffusion equation for certain core geometries. [11]	15%	First Exam
Ability to calculate the neutron flux behavior and the multiplication factor for multi-energy groups and multi regions systems. [11, 17]	20%	First Exam, Second Exam
Ability to derive and understand the point kinetics equations and the Inhour equation. [11]	15%	Second Exam
Ability to analyze the reactor state under a small change in reactivity and demonstrate the response of a nuclear reactor under the effect of both prompt and delayed neutrons. [11, 17]	20%	Final Exam
Ability to calculate the concentration of fission products poisoning and describe the effect of burn up on the core reactivity. [11]	20%	Final Exam

Relationship to Program Student Outcomes (Out of 100%)						
1	2	3	4	5	6	7
80						20

Evaluation	
Assessment Tool	**Weight**
First Exam	30%
Second Exam	30%
Final Exam	40%

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