



Jordan University of Science and Technology
Faculty of Engineering
Nuclear Engineering Department

NE431 Nuclear Reactors Thermal Hydraulics

First Semester 2019-2020

Course Catalog

3 Credit Hours. Reactor heat generation and removal, steady- and unsteady state conduction in reactor elements; single phase, two-phase, cooling, core thermal design.

Text Book

Title	Nuclear Heat Transport Mohamed Al-Wakil
Author(s)	Mohamed Al-Wakil
Edition	2nd Edition
Short Name	Ref#1
Other Information	textbook

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#2	Nuclear Systems Volume I: Thermal Hydraulics Fundamentals	Todreas N. E. and Kazimi M	2nd Edition	

Instructor

Name	Dr. Abdullah Alali
Office Location	-
Office Hours	Sun : 10:30 - 11:30 Sun : 11:30 - 12:30 Tue : 10:30 - 11:30 Tue : 11:30 - 12:30 Wed : 08:30 - 09:30 Thu : 11:30 - 12:30
Email	aealali@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 12:30 - 13:30 Room: E2113

Prerequisites		
Line Number	Course Name	Prerequisite Type
254511	ME451 Heat Transfer (1)	Prerequisite / Study
222420	CHE242 Engineering Thermodynamics	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	Topic	References
Week 1	Introduction and review Material	Chapter 3 From Ref#1
Weeks 2, 3	Reactor Heat Generation	Chapter 4 From Ref#1
Weeks 4, 5, 6	Heat Conduction in Reactor Elements	Chapter 5 From Ref#1
Weeks 7, 8, 9	Heat Removal and Convective Heat Transfer	Chapter 9 From Ref#1
Weeks 10, 11, 12	Heat Transfer with Change in Phase	Chapter 11 From Ref#1
Weeks 13, 14	Two Phase Flow	Chapter 12 From Ref#1
Weeks 14, 15	Core Thermal Design	Chapter 13 From Ref#1
Week 16	The Boiling Core	From Ref#1

Mapping of Course Outcomes to Program Student Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Ability to determine the heat generation rate and total heat generated inside several structures of a nuclear reactor [11]	15%	First exam, homeworks and quizzes, Final exam
Ability to determine the temperature distribution in a medium by solving the heat conduction equation [11]	20%	First exam, Second exam, homeworks and quizzes, Final exam
Ability to determine the heat transfer coefficient for a coolant and the effect of different parameters on its value [21, 12]	15%	Second exam, homeworks and quizzes, Final exam
Ability to describe the process of heat transfer with phase change and perform critical heat flux calculations [11, 12, 17]	20%	Second exam, homeworks and quizzes, Final exam
Ability to describe two phase flows in different channel geometries and calculate pressure drops [11, 17]	15%	homeworks and quizzes, Final exam
Ability to perform the basic calculations required for simple core thermal design [11, 12]	15%	homeworks and quizzes, Final exam

Relationship to Program Student Outcomes (Out of 100%)						
1	2	3	4	5	6	7
66.67	19.17					14.17

Evaluation	
Assessment Tool	Weight
First exam	25%
Second exam	25%
homeworks and quizzes	10%
Final exam	40%

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