Jordan University of Science and Technology

Faculty of Engineering

Nuclear Engineering Department

NE521 Nuclear Reactor Safety
Second Semester 2019-2020

Course Catalog
3 Credit Hours. Deterministic and probabilistic analysis of nuclear reactor safety. Analysis and evaluation applied to reactor design for accident prevention and mitigation; protective systems and their reliability, containment design, emergency cooling requirements, reactivity excursions and the atmospheric dispersion of radioactive material.

Text Book	
Title	Class Notes
Author(s)	Instructor
Edition	1st Edition
Short Name	Ref#1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#2	Nuclear Safety	Gianni Petrangeli	1st Edition	
Ref#3	Introduction to Nuclear Engineering	John R. Lamarsh, Anthony John Baratta	3rd Edition	

Instructor	
Name	**Dr. Salaheddin Malkawi**
Office Location	E2L2
Office Hours	Sun : 08:30 - 11:00 Mon : 08:00 - 09:00 Tue : 08:30 - 11:00 Thu : 09:00 - 11:00

Email	salahm@just.edu.jo

Class Schedule & Room
Section 3: Lecture Time: Sun, Tue, Thu : 11:30 - 12:30 Room: E2117

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
2004510	NE451 Nuclear Power Plant Systems & Operations (1)	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	Introduction, History and Terminology	
Weeks 2, 3	Dispersion of Radioactive releases	
Weeks 4, 5	Health Consequences of Radioactive releases	
Week 5	Siting of Nuclear Power Plants	
Week 6	Principles of Reactor Safety	
Week 7	Accidents of Nuclear Reactors	
Week 8	Safety Systems in Nuclear Reactors	
Weeks 9, 10	Deterministic Safety Analysis	
Weeks 11, 12, 13, 14	Probabilistic Safety Analysis	
Week 15	Major Accidents in the Nuclear Industry	

Mapping of Course Outcomes to Program Student Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Ability to demonstrate a good understanding of the basic safety terminology and its history, Identify the isotopes that constitute the source term for a nuclear reactor and calculate their concentration upon a postulated release using dispersion equations. [21, 12, 14, 17]	24%	
Ability to calculate radiological doses due to different types of exposure and to use dose limits along with other site physical characteristics in the siting process of a nuclear reactor. [21, 12, 17]	10%	
Ability to demonstrate a good understanding of the principle of defense in depth and to recognize and analyze the different types of nuclear reactor accidents and the different groups of safety systems intended to mitigate their consequences. [32, 17]	22%	

Ability to describe the different elements of a deterministic safety analysis. [17]	12%	
Ability to implement event tree and fault tree analysis along with the probability theory to perform probabilistic safety analysis. [11, 12, 17]	22%	
Ability to explain the different circumstances and conditions during the Chernobyl, Three Miles Island and the Fukushima accidents. [17]	10%	

Relationship to Program Student Outcomes (Out of 100%)						
1	2	3	4	5	6	7
21.93	31.13		4.80			42.13

Evaluation	
Assessment Tool	**Weight**
First Exam	25%
Second exam	25%
Final exam	40%
Quizzes, Class Participation and Homework	10%

Date Printed: 2020-10-10