Faculty: Engineering Technology	
Department: Energy	Program: Bachelor Degree
Academic year: 2022-2023	Semester: 2st (Fall)

Course Plan

First: Course Information

Course No. 0906410	Course Title: Nuclear Reactions	Credit Hours:3
Prerequisite: 0300122	Section No.: 1	Lecture Time: 12-1,Sun,Tue,and Thu
Type Of Course:	☐ Obligatory Faculty Requirement Elective ☐ University Requirement ☐ ObligatoryUniversity Requirement ☐ FacultyRequirement ☐ Course Elective SpecialtyRequirementObli ▨ gatorySpecialization requirement	
Type of Learning:	▨ Face-to-Face Learning ☐ BlendedLearning(2 Face-to-Face + 1Asynchronous) ☐ Online Learning (2 Synchronous+1 Asynchronous)	

Second: Instructor's Information

Name: **Dr. Ayman Amer**	Academic Rank: **Assistant Professor**	
Office Number:344 l	Ext. Number:2051	E-mail: **aamer@zu.edu.jo**
Office Hours:	Sunday 10-11 Monday 1-2 Tuesday 10-11 Wednesday 1-2	Thursday 10-11

Third: Course Description

Energetic and kinetics of nuclear reactions and radioactive decay , fission, and reactions of low – energy neutrons ; properties of the fission products and the actinides ; nuclear models and transition probabilities ; interaction of radiation with matter .

Fourth: Learning Source

Main Reference:	**Basic nuclear engineering by a . foster and j. wright**	
Author: **a . foster and j. wright**	*Issue No.:*	*Publication Year:* **(2005)**
Additional Sources&Websites:	• •	
Teaching Type:	☒ *Classroom* ☐ *Laboratory* ☐ *Workshop* ☐ *MS Teams* ☐ *Moodle*	

Fifth: Learning Outcomes

Course Code	*Course IntendedLearning Outcomes (CILOs)*	*Connection To Program ILOs Code*
Knowledge		
**K1	**Explain** the meaning of atomic and nuclear physics	*PK1
K2	**Explain** the meaning of atomic and nuclear interactions .	PK2
K3	**Explain** the meaning of radiation physic and radiation detection	PK3
Skills		
***S1	**Calculate** the Reactions , cross-sections , and moderation	PS1
S2	**Apply the** Characteristics of nuclear fuel materials	PS2
S3	**Calculate** the Nuclear thermal efficiency and cooling	PS3
S4	**Calculate** Criticality , control , and nuclear fuel cycle	PS4
Competencies		
****C1	**Derive** the equations of neutron interactions , nuclear cross section , and nuclear half lives	PC1
C2	**Design** fission and fusion reactor physics plant .	PC2

* P: Program, **K: knowledge, ***S: skills, ****C: competencies.

Sixth: Course Structure

Lecture Date	Intended Teaching Outcomes(ILOs)	Topics	Teaching Procedures*	TeachingMethods***	References***
5/3/2023	0	Introduction to atomic and nuclear physical	General discussions	Discussion and problem Solving	Energy Engineering
7/3/2023	1	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
9/3/2023	1	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
12/3/2023	1	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
14/3/2023	2	Introduction to atomic and nuclear physical	At least one exam will be held suddenly during the semester	Discussion and problem Solving	Energy Engineering
16/3/2023	1 & 2	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
19/3/2023	3	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
21/3/2023	3	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
23/3/2023	3	Introduction to atomic and nuclear physical	General discussions	Discussion and problem Solving	Energy Engineering
26/3/2023	3	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
28/3/2023	3	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
30/3/2023	4	Introduction to atomic and nuclear physical	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
2/4/2023	3 & 4	Atomic structure	At least one exam will be held suddenly during the semester	Discussion and problem Solving	Energy Engineering
4/4/2023	3 & 4	Atomic structure	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
6/4/2023	4	Atomic structure	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
9/4/2023	5	Atomic structure	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
11/4/2023	5	Atomic structure	General discussions	Discussion and problem Solving	Energy Engineering
13/4/2023	5	Atomic structure	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering

16/4/2023	5	Atomic structure	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
18/4/2023	5	Decay of radioactive nuclei	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
20/4/2023	4	Decay of radioactive nuclei	At least one exam will be held suddenly during the semester	Discussion and problem Solving	Energy Engineering
27/4/2023	3 & 4	Decay of radioactive nuclei	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
30/4/2023	6	Nuclear reactions Exam1 (up to end of week 5)	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
2/5/2023	4	Radiation detection	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
4/5/2023	3 & 4	Radiation detection	General discussions	Discussion and problem Solving	Energy Engineering
7/5/2023	3 & 4	Radiation detection	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
9/5/2023	4	Radiation detection	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
11/5/2023	6	Health physics	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
14/5/2023	4	Health physics	At least one exam will be held suddenly during the semester	Discussion and problem Solving	Energy Engineering
16/5/2023	6	Health physics	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
18/5/2023	4	Neutron interactions Exam2 (up to end of week 11).	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
21/5/2023	7	Nuclear reactions	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
23/5/2023	8 , 9 , 10	Nuclear reactions	General discussions	Discussion and problem Solving	Energy Engineering
28/5/2023	8 , 9 , 10	Nuclear reactions	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
30/5/2023	8 , 9 , 10	Nuclear reactions	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
1/6/2023	8 , 9 , 10	Nuclear reactions	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering
4/6/2023	10	Nuclear reactions	At least one exam will be held suddenly during the semester	Discussion and problem Solving	Energy Engineering
6/6/2023	10	Nuclear reactions	Review the previous lecture, then explain the current lecture	Discussion and problem Solving	Energy Engineering

* Learning procedures: (Face-to-Face, synchronous, asynchronous). * * Teaching methods: (Lecture, video…..). ** * Reference: (Pages of the book, recorded lecture, video….).

Seventh: Assessment methods

Methods	Grade	Date	Platform	CLO'S
First Exam	20	Fixed by the Department	Classroom	
Second Exam	20	Fixed by the Department	Classroom	
Assign, Quizzes &Participation	10	During Semester	Classroom+Moodle	
Final Exam	50	Fixed by the Department	Classroom	

Eighth: Course Policies

- All course policies are applied on all teaching patterns (online, blended, and face-to-face Learning) as follows:
  a. Punctuality.
  b. Participation and interaction.
  c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).

Approved by:	Name	Date	Signature
Head of Department	Dr. Ayman Amer	7/3/2023	
Faculty Dean	Prof .Taiseer Alghanim	7/3/2023	