هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specifications

Course Title:	**Nuclear Physics**
Course Code:	**2034103-4**
Program:	**Bachelor in Physics**
Department:	**Physics Department**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification

1. Credit hours: 4
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 10th level /4th year
4. Pre-requisites for this course (if any)**: Quantum Physics (1) 2033202-3** **Modern physics 2033105-4**
5. Co-requisites for this course (if any)**:None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	7	100%
2	**Blended**	0	0
3	**E-learning**	0	0
4	**Distance learning**	0	0
5	**Other**	0	0

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	50
2	**Laboratory/Studio**	20
3	**Tutorial**	0
4	**Others** (specify)	0
	Total	**70**

B. Course Objectives and Learning Outcomes

1. Course Description

To provide students with an opportunity to develop insight into the key principles and applications of Nuclear Physics, and their relevance to current developments in physics. Topics to be studied will include radioactivity, decay modes, nuclear models and nuclear reactions.

2. Course Main Objective

Use nuclear models to explain nuclear properties, and nuclear stabilities and show how nuclear science and technology are essential for development.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Describe basic nuclear phenomena and properties related to nuclear force, stability, nuclear binding energy and nuclear structure.	K4
1.2	List different nuclear models and outline their theoretical descriptions.	K3
2	**Skills :**	
2.1	Solve problems relating to the Q-values for different radioactivity decay modes and for nuclear reactions.	S2
2.2	Analyze physical phenomena and concepts relevant to the course and their applications such as nuclear structure, nuclear stability, nuclear binding energy, radioactivity, decay modes, nuclear models, nuclear reactions, nuclear fission and nuclear fusion.	S4
3	**Values:**	
3.1	Work effectively in groups even when performing experiments in nuclear physics.	V2
3.2	Act responsibly and be able to prepare a written scientific report	V3

C. Course Content

No	List of Topics	Contact Hours
1	Nuclear properties	4
2	Nuclear force	4
3	Radioactivity	4
4	Theory of Alpha, Beta and Gamma decays	7
5	Nuclear models	6
6	Nuclear Fission and fusion	7
7	Nuclear reactions	6
8	Nuclear Fission and fusion	9
9	Revision	3
	Total	**50**
	Laboratory	
1	**Experiment 1:**Operating plateau of GM counter	2
2	**Experiment 2:**Resolution time of GM counter	2
3	**Experiment 3:** Background Radiation	2
4	**Experiment 4:**Inverse square law	2
5	**Experiment 5:** Gamma rays attenuation coefficient	2
6	**Experiment 6:**Beta rays attenuation coefficient	2
7	**Experiment 7:**Efficiency of GM counter for Gamma rays	2
8	**Experiment 8:** Counting statistics	2
9	**Experiment 9:** Gamma rays spectrometry	2
10	**Reports evaluation and practical exam**	2
Total		**70**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe basic nuclear phenomena and properties related to nuclear force, stability, nuclear binding energy and nuclear structure.	• Class Lectures	• Quizzes • Exams
1.2	List different nuclear models and outline their theoretical descriptions.	• Class Lectures	• Quizzes • Exams
2.0	**Skills**		
2.1	Explain and analyze physical phenomena and concepts relevant to the course and their applications such as nuclear structure, nuclear stability, nuclear binding energy, radioactivity, decay modes, nuclear models, nuclear reactions, nuclear fission and nuclear fusion.	• Class Lectures	• Quizzes • Lab Exam
2.2	Develop physics problems solving skills.	• Class Lectures	• Quizzes • Exams
3.0	**Values**		
3.1	Work effectively in groups even when performing experiments in nuclear physics.	Practical	• Lab reports • Lab exam • Activities
3.2	Act responsibly and be able to prepare a written scientific report	Practical	• Lab reports • Lab exam

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam I	6th	20%
2	Activities	Periodically	10%
3	Lab reports	Weekly/ 10th	20%
4	Final Lab Exam	10th	10%
5	Final exam	12th	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

6 Hours per week during office-hours, in teacher's staffroom or as per the arrangement made by the teacher.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Introductory Nuclear Physics, S. Krane, Wiley, 3rd edition, 1987.
Essential References Materials	• Introduction to Nuclear and Particle Physics, Das Ferbel, 2nd edition, World Scientific (2003). • Nuclear Physics , Vol. 1 , M. Eldaghmah , Ali Juma , Al Falah Library, UAE,1997 • Nuclear Physics , Vol. 2 , M. Eldaghmah , Ali Juma , Al Falah Library, UAE,2000
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture room with max 60 seats Labs
Technology Resources (AV, data show, Smart Board, software, etc.)	data show, Smart Board, software
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NONE

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student Feedback on Effectiveness of Teaching	Students	Indirect
Evaluation of Teaching	Pear reviewer Program coordinator Departmental council Faculty council	Indirect
Improvement of Teaching	Program coordinator Relevant committee	Direct
Quality of learning resources	Students Instructor Faculty	Indirect
Extent of achievement of course learning outcomes,	Program coordinator Instructor	Direct
Course effectiveness and planning for improvement	Program coordinator Instructor	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	October 2,2022