هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Nuclear Physics
Course Code:	203460-4
Program:	Bachelor of Science in Physics
Department:	Physics
College:	Science
Institution:	Taif University
Version:	2023
Last Revision Date:	2020

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)

2. Course type

A.	☐University	√√College	☐Department	☐Track	☐Others
B.	√ Required		☐Elective		

3. Level/year at which this course is offered: (8th)

4. Course general 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.

5. Pre-requirements for this course (if any)**:**

Quantum Physics (1) 203327-3

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

- **Describe the structure of the nucleus and the nature of nuclear forces.**
- **Explain radioactivity and nuclear decays.**
- **Use nuclear models to explain nuclear properties, and nuclear stabilities.**
- **Describe different types of nuclear reactions including fission and fusion reactions, and associated properties and applications.**
- **Show how nuclear science and technology are essential for development.**

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	80
2	E-learning	2	20
3	Hybrid • Traditional classroom • E-learning	0	0

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	3
2.	**Laboratory/Studio**	3
3.	**Field**	0
4.	**Tutorial**	2
5.	**Others (specify)**	0
Total		8

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	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 enhanced with lecture handouts and/or data show and/or blackboard. • Whole group discussion and problem solving examples.	• Class performance (Interacting discussion with answers to oral questions). • Evaluation of homework and quizzes. • Evaluation of Midterm and final exams.	Describe basic nuclear phenomena and properties related to nuclear force, stability, nuclear binding energy and nuclear structure.
1.2	List different radioactivity decay modes and outline their theoretical descriptions.	• Class Lectures enhanced with lecture handouts and/or data show and/or blackboard. • Whole group discussion and problem solving examples.	• Class performance (Interacting discussion with answers to oral questions). • Evaluation of homework and quizzes. • Evaluation of Midterm and final exams.	List different radioactivity decay modes and outline their theoretical descriptions.
1.3	List different nuclear	1. Class Lectures enhanced	1. Class	List different

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	models and outline their theoretical descriptions.	with lecture handouts and/or data show and/or blackboard. 2. Whole group discussion and problem solving examples.	performance (Interacting discussion with answers to oral questions). 2. Evaluation of homework and quizzes. 3. Evaluation of Midterm and final exams.	nuclear models and outline their theoretical descriptions.
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 enhanced with lecture handouts and/or data show and/or blackboard. • Whole group discussion and problem solving examples. • Conducting Laboratory experiments.	• Class performance (Interacting discussion with answers to oral questions). • Evaluation of homework. • Evaluation of Midterm and final exams. • Evaluation of Lab reports and Lab final exam.	
2.2	Develop physics problems solving skills.	• Class Lectures enhanced with lecture handouts and/or data show and/or blackboard. • Whole group discussion and problem solving examples.	• Class performance (Interacting discussion with answers to oral questions). • Evaluation of homework. • Evaluation of Midterm and final exams.	
2.3	Measure physical quantities with different instruments, analyze experimental results (graphs / tables) and estimate errors.	• Conducting Laboratory experiments.	• Evaluation of Lab reports and Lab final exam.	

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	▪ Solving homework assignments by himself mostly and recovering missed lectures. ▪ Encourage students to take advantage of office hours.	▪ Class performance (Interacting discussion with answers to oral questions). ▪ Homework solving session's participation. ▪ Evaluation of Midterm and final exams. ▪ Evaluation Lab final exam.	
3.2	Work effectively in groups and exercise leadership when needed.	▪ Encouraging students to exchange ideas and arguing positively with each other during different group task. ▪ Conducting Lab experiments and writing reports in groups while taking always the initiative to accomplish the group task. ▪ Writing group reports in a concise manner using various learning resources (book references, websites, library, ...)	• Evaluation of Lab reports and Lab final exam. • Evaluation of group reports and discussions.	
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Nuclear properties	6
2.	Nuclear force	3
3.	Radioactivity	6
4.	Theory of Alpha, Beta and Gamma decays	6
5.	Nuclear models	6
6.	Nuclear reactions	6
7.	Nuclear Fission and fusion	9

8.	Revision	3

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exams I	8th	20%
2.	Midterm exams II	14th	10%
3.	Final exam	16th	40%
4.	Lab reports	weekly	15%
5.	Lab final exam	15th	5%
6.	group project, essay		10%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Introductory Nuclear Physics, S. Krane, Wiley, 3rd edition, 1987
Supportive References	• 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 • الفيزياء النووية، الدكتور/ أحمد الناغى، الطبعة الأولى 1421-2001. • الفيزياء النووية، الدكتور/ مناف عبد حسن، الطبعة الأولى 1424- 2004.
Electronic Materials	http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html http://www.hazemsakeek.info/magazine/ wikipedia.org/wiki/ physics subjects http://www.colorado.edu/physics/2000/index.pl
Other Learning Materials	Computer-based programs/ associated with computer assisted experiments.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Lecture room with max 60 seats Laboratories with max 24 places for each (some are provided with Data show
Technology equipment (projector, smart board, software)	▪ Data show ▪ Software for computer assisted experiments
Other equipment (depending on the nature of the specialty)	----------

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	student	Online Course evaluation by students organized by the University
Effectiveness of Students assessment	Program Leaders	Online Staff evaluation by students organized by the University
Quality of learning resources	Peer Reviewer	• Course and staff written evaluation collected by the quality assurance unit
The extent to which CLOs have been achieved	Analyze special factors (if any) affecting the results The background of students coming to physics department is low in general in physics and math. Therefore the inclusion of tutorial sessions in imperative for fundamental courses in physics and math as suggested by ex .developing committee.	Analyze special factors (if any) affecting the results The background of students coming to physics department is low in general in physics and math. Therefore the inclusion of tutorial sessions in imperative for fundamental courses in physics and math as suggested by ex .developing committee.
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHYSICS DEPARTMENT COUNCIL
REFERENCE NO.	NO. 4-45
DATE	27/09/2023 (12/03/1445)

قسم الفيزياء
Physics Department
TU
جامعة الطائف
TAIF UNIVERSITY