



Course Specification

(Bachelor)

Course Title: Nuclear Physics 2

Course Code: PHYS 0453

Program: BSc in Physics

Department: Department of Physics

College: College of Science

Institution: Majmaah University

Version: 2024

Last Revision Date: 30/ 12/2024



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A. General information about the course:

1. Course Identification

1. Credit hours: (3,0,0)

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered:

4. Course General Description:

The course describes the properties of nuclei, various nuclear models, accelerators, and elementary particles.

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

Nuclear Physics 1 PHYS 0351

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

NA

7. Course Main Objective(s):

By the end of this course, students are expected to:

- Describe the basic properties of the strong nuclear force between nucleons.
- Evaluate nuclear properties using different nuclear models such as the shell and collective model.
- List different types of accelerators and describe the basic principles for their operations.
- Evaluate nuclear spin and moments.
- Recognize meson physics.
- Categorize the different types of elementary particles

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3 h/ week	100
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4	Distance learning		

3. Contact Hours (based on the academic semester)





No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		45

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			
CLO1.2	Outline nuclear models such as the liquid drop model, shell model, and collective model.	K2	<u>Lecture</u> <u>Exercises</u> <u>Quizzes</u> <i>Problem-solving</i>	<u>Exams</u> <u>Quizzes</u> <u>Homework</u> <u>Assignments</u>
...				
2.0	Skills			
2.2	Evaluate the nuclear spin and parity of even-even, odd-odd, and odd nuclei.	S2	<u>Lecture</u> <u>Exercises</u> <u>Quizzes</u> <i>Problem-solving</i>	<u>Exams</u> <u>Quizzes</u> <u>Homework</u> <u>Assignments</u>
2.4	Identify and describe the elementary particles and justify their allowed or forbidden reactions.	S4		
3.0	Values, autonomy, and responsibility			
3.3	Present a short report in written form and orally using appropriate scientific language.	V3	<u>Lecture</u> <u>Exercises</u> <u>Quizzes</u> <i>Problem-solving</i>	<u>Exams</u> <u>Quizzes</u> <u>Homework</u> <u>Assignments</u>

C. Course Content

No	List of Topics	Contact Hours
1.	The basic properties of strong nuclear force between nucleons	6





2.	Nuclear models	9
3.	Accelerators	9
4.	Nuclear spin and moments	6
5.	Meson physics	6
6.	Elementary particles	9
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1*	6	15
2.	H. W	Every week	10
3.	Mid-term 2*	11	15
4.	Presentation	12	10
5.	Electronic exam	13	10
6.	Final exam *	16	40
7.	total		100
...			

*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	<ul style="list-style-type: none"> • Introductory Nuclear Physics, K.S. Krane, 2nd edition, John Wiley, and Sons, 1988. • Concepts of Modern Physics, Beiser, McGraw Hill, 6th edition, 2003. • Introduction to Elementary Particles, David Griffiths, Wiley 2008.
Supportive References	<ul style="list-style-type: none"> • Modern Physics, K.S. Krane, John Wiley and Sons Inc. 2012 • Structure of the Nucleus, M. A. Preston & R. K. Bhaduri Westview Press (1993) ISBN: 0201627299 • Pions and Nuclei T. Ericson & W. Weise Oxford University Press (1998) ISBN: 0198520085





	<ul style="list-style-type: none"> • An Introduction to Nuclear Physics W. N. Cottingham & D. A. Greenwood Cambridge University Press (2001) ISBN: 0521657334
Electronic Materials	<ul style="list-style-type: none"> • Saudi Digital Library (SDL) • https://www.wikipedia.org/ • Web of Knowledge • Physics Today (web version) • MIT Courseware • www.eagle.co.uk/news/ppnews.html • http://faculty.mu.edu.sa/mskhan • http://vlib.org/physics.html • http://dir.yahoo.com/science/physics • http://demonstrations.wolfram.com • http://askthephysicist.com • http://cyberphysics.co.uk
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with at least 25 seats. Auditorium of a capacity of not less than 100 seats for large lecture format classes.
Technology equipment (Projector, smart board, software)	A smart board to write on and computer.
Other equipment (Depending on the nature of the specialty)	Library, Seminar Room, and Wi-Fi internet connections, White board.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Internal Reviewer committee	Direct
Effectiveness of Students' assessment	Students	Indirect
Quality of learning resources	Peer Reviewer	Direct
The extent to which CLOs have been achieved	Internal Reviewer committee	Direct
Other		

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

Assessment Methods (Direct, Indirect)





G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	16
DATE	30/12/2024

