University of Gdańsk

Subject card

Subject name and code	Nuclear Physics, PG_00182655						
Field of study	Physics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		6.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Angelina Łobejko				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	75		0.0		75.0	150
Subject objectives	To familiarise students with the structure and properties of atomic nuclei, the nature of strong interactions, and experimental techniques in nuclear physics and its applications.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[FIZL3_W10] has advanced knowledge of the elementary components of matter and the types of fundamental interactions between them, of the manifestations of these interactions in phenomena occurring on various scales from subatomic to astronomical, knows the time and energy scales associated with these phenomena	The student has advanced knowledge of the properties and components of atomic nuclei and understands how fundamental interactions determine their stability. The student is familiar with radioactive decay and nuclear reactions. They are able to relate phenomena occurring on a subatomic scale to processes observed in the laboratory and in nature, and understand the energy and time differences characteristic of various nuclear processes – from fast nuclear reactions to long-term transformations of radioactive isotopes. The student understands that nuclear processes have consequences on various scales – from the subatomic structure of matter, through terrestrial and biological phenomena, to astrophysical processes occurring inside stars and the evolution of the Universe.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[FIZL3_U09] can extrapolate the results obtained in the terrestrial laboratory to describe phenomena in the Universe	Students are able to applytheir knowledge of the properties of atomic nuclei, models of radioactive decay, nuclear reactions, and the interaction of radiation with matter to interpret the processes of nucleosynthesis, stellar evolution, and phenomena occurring in cosmic radiation, based on the results of laboratory experiments.	[SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written
[FIZL3_W01] has advanced knowledge of physical concepts, principles and theories, understands their historical development and significance not only for physics, but also for other exact and natural sciences and cognition of the world; knows and understands fundamental dilemmas of the civilization	The student has advanced knowledge of the concepts, principles and theories of nuclear physics, such as the structure of atomic nuclei, radioactive decay processes, reactions and nuclear models, as well as the interaction of radiation with matter and methods of its detection. They understand the historical development of these concepts, from discoveries in classical physics to contemporary nuclear models, and their significance not only for physics, but also for other exact and natural sciences, as well as for understanding the world around us.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report [SW3] text preparation/written work

Subject contents

- Basic facts and concepts of nuclear physics.
- Properties of atomic nuclei.
- Nuclear forces and properties of the strong interaction.
- Nuclear stability.
- Nuclear decays and reactions.
- Models of the structure of atomic nuclei.
- Interactions of radiation with matter.
- Methods of radiation detection and particle identification in nuclear physics.
- Applications of nuclear physics.

Prerequisites and co-requisites

- A. Formal requirements: Students who have successfully completed the first and second year of study may attend the course.
- B. Prerequisites: Basic knowledge of classical physics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
colloquium	51.0%	20.0%
report	51.0%	30.0%
exam	51.0%	50.0%

Recommended reading	Basic literature	• 1. A. Strzałkowski "Wstęp do fizyki jądra atomowego", PWN 1978 • 2. E. Skrzypczak, Z. Szefliński "Wstęp do fizyki jądra atomowego i cząstek elementarnych", PWN 1995 • 3. K. N. Muchin "Doświadczalna Fizyka Jądrowa", cz.1 i 2, WNT 1978 • 4. Sz. Szczeniowski "Fizyka doświadczalna, Fizyka jądra i cząstek elementarnych", PWN 1974 • 5. J. B. England "Metody doświadczalne fizyki jądrowej", PWN 1980 • 6. D. H. Perkins "Wstęp do fizyki wysokich energii", PWN 2004 • 7. T. Mayer-Kuckuk "Fizyka jądrowa", PWN 1983 8. Z. Wilhelmi "Fizyka reakcji jądrowych", PWN 1976
	Supplementary literature	• 1. D. Griffiths "Introduction to Elementary Particles", Wiley 1987 • 2. C. Grupen "Particle Detectors" 2nd ed. Cambridge University Press, 1996
	eResources addresses	
Example issues/ example questions/ tasks being completed	not applicable	
Work placement	Not applicable	

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