



Subject card

Subject name and code	Nuclear fuels and fuel cycle, PG_00065881						
Field of study	Nuclear Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject				2024/2025	
Education level	second-cycle studies	Subject group				Obligatory subject group in the field of study 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	1	Language of instruction				Polish	
Semester of study	1	ECTS credits				1.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Dąbrowski				
	Teachers		dr inż. Paweł Dąbrowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		4.0		6.0	25
Subject objectives	The subject aims to familiarize students with the fuel cycle from the extraction of radioactive ores to the storage of spent nuclear fuel. In addition, the course aims to introduce students to the types of nuclear fuels. This course will teach students how nuclear fuel is produced, what forms of fuel rods are used in nuclear power plants and what safety measures are taken at each stage of the fuel cycle.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study		Student verifies potential fuel cycles for use in a nuclear power plant		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study		The student explains aspects of storage, processing, and recycling of nuclear spent fuel		[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Nuclear Power Technologies, the physics of processes, structure, principle of operation, operation, safety aspects, fuels and materials for reactors, systems, machines and devices of a nuclear power plant		Student compares different types of nuclear fuels		[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
Subject contents	<ol style="list-style-type: none"> Fuel cycle - main idea, types, basic concept Production of nuclear fuel - extraction, enrichment and processing of radioactive elements Types and forms of nuclear fuel Construction of fuel elements Energy transformation in a nuclear reactor Transport, storage, processing and recycling of spent fuel Fuel cycle safety 						

Prerequisites and co-requisites	The knowledge of basic thermodynamic concepts and heat and mass transfer issues.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture - written test	60.0%	100.0%
Recommended reading	Basic literature	1. Wilson, P.D. (ed.), <i>The Nuclear Fuel Cycle from Ore to Wastes</i> (Oxford, 1996; online edn, Oxford Academic, 31 Oct. 2023) DOI: 10.1093/oso/9780198565406.001.0001 2. Taylor R. (ed.), <i>Reprocessing and Recycling of Spent Nuclear Fuel</i> , Woodhead Publishing 2015 DOI: 10.1016/C2013-0-16483-5	
	Supplementary literature	1. Kathryn D. Huff, Chapter One - Economics of Advanced Reactors and Fuel Cycles, Editor(s): Hitesh Bindra, Shripad Revankar, Storage and Hybridization of Nuclear Energy, Academic Press, 2019, DOI: 10.1016/B978-0-12-813975-2.00001-6	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Definitions: fuel cycle, fuel rod, radioactive element 2. Describe the selected fuel cycle 3. Describe the methods of extracting ores of radioactive elements 4. What is uranium enrichment? 5. What is the difference between processing and recycling of nuclear fuel? 6. Describe safety measures in the fuel cycle		
Work placement	Not applicable		

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