



Subject card

Subject name and code	Thermohydraulics of nuclear reactors, PG_00065899						
Field of study	Nuclear Engineering						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
Education level	second-cycle studies		Subject group		Specialty 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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Zakład Ogrzewnictwa, Wentylacji, Klimatyzacji i Chłodnictwa -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jan Wajs				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	Education of students in the field of thermohydraulic issues of nuclear reactors.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U01] utilizes acquired analytical, simulation, and experimental methods, as well as mathematical models to analyse and evaluate processes occurring in nuclear power sector and related industries		is able to use the laws of physics learned in the analysis of selected thermohydraulic processes in nuclear reactors		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[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		defines the principles of conservation of mass, momentum, and energy; explains the mechanisms of heat transfer in key components of a nuclear power plant		[SW1] Assessment of factual knowledge		
	[K7_K11] is aware of importance of professional acting, the need for critical verification of acquired knowledge and consulting experts opinion in case of facing difficulties with individual problem solving		critically verifies the results of student own work, using reliable sources of information		[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	<i>lecture:</i> thermodynamic aspects of nuclear power plant operation, coolants and their properties, heat sources in a nuclear reactor, heat conduction in fuel elements, heat transfer and hydraulic resistance during coolant flow under single-phase forced convection conditions, heat transfer under coolant boiling conditions, critical heat flux, residual heat, thermal-flow processes under reactor failure conditions <i>exercises:</i> calculation of temperature distribution in core elements, determination of heat transfer coefficient in single-phase forced convection of coolant, determination of heat transfer coefficient during boiling, analysis of the system under failure conditions						
Prerequisites and co-requisites	thermodynamics, fluid mechanics, heat transfer						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written assessment of the lecture	56.0%	60.0%
	colloquium	56.0%	40.0%
Recommended reading	Basic literature	Brennen C.E.: Thermo-hydraulics of nuclear reactors. Cambridge University Press, 2016 Zohuri B.: Thermal-hydraulic analysis of nuclear reactors, Springer, 2017	
	Supplementary literature	Todreas N.E., Kazimi M.S.: Nuclear systems I, Thermal hydraulic fundamentals, Taylor & Francis, 1993	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Methods of determining heat transfer coefficients. Methods of determining pressure losses in an installation. Methods of heat transfer.		
Work placement	Not applicable		

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