GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Thermohydraulics of nuclear reactors, PG_00065899		
Field of study	Nuclear Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
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	Division of Heating Ventilation Air Conditioning and Refrigeration -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jan Wajs	
	Teachers		

Lesson types

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

Course content – lecture

lecture: 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
exercises: 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

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">thermodynamics, fluid mechanics, heat transfer</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>written assessment of the lecture</td><td>56.0%</td><td>60.0%</td></tr>
<tr><td>colloquium</td><td>56.0%</td><td>40.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Brennen C.E.: Thermo-hydraulics of nuclear reactors. Cambridge University Press, 2016

Zohuri B.: Thermal-hydraulic analysis of nuclear reactors, Springer, 2017</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Todreas N.E., Kazimi M.S.: Nuclear systems I, Thermal hydraulic fundamentals, Taylor & Francis, 1993</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Methods of determining heat transfer coefficients. Methods of determining pressure losses in an installation. Methods of heat transfer.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.