GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00069994		
Field of study	Modelowanie CFD wysokotemperaturowych wymienników ciepła w obiegach jądrowych		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	
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	6.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Thermal Power Systems -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Paweł Ziółkowski	
	Teachers	dr inż. Paweł Ziółkowski	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	30.0	0.0	60

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	60	0.0	0.0	60

Subject objectives

The aim of the course is to provide students with knowledge on the use of numerical tools for designing heat exchangers used in nuclear power plants.

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	Students use the analytical and simulation methods they have learned to analyse and evaluate the processes occurring in heat exchangers used in nuclear power engineering and on ships using nuclear reactors.	[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu [SU4] Ocena umiejętności korzystania z metod i narzędzi
[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study	Students assesse the usefulness and applicability of new CFD modelling achievements in terms of improving the performance of the entire power unit.	[SU4] Ocena umiejętności korzystania z metod i narzędzi
[K7_U04] creatively designs or modifies, either entirely or at least in part, nulear power systems, considering both technical and non-technical aspects, estimating costs and utilizing design techniques appropriate for tasks within the scope of Nuclear Power Technologies	Students creatively design or modifies heat exchangers in nuclear power systems in accordance with the specifications obtained from 0D calculations. In addition, taking into account technical and non-technical aspects, students use CFD (Computational Fluid Dynamics) techniques.	[SU1] Ocena realizacji zadania [SU4] Ocena umiejętności korzystania z metod i narzędzi
[K7_W04] recognizes and interprets selected issues in the field of advanced detailed knowledge, particularly in the scope of methods, techniques, tools, algorithms and standards specific to Nuclear Power Technologies taking into account the principles of safety and radiological protection	Students recognise and interpret selected issues in the field of advanced specialist knowledge, particularly in the design of heat exchangers using CFD for nuclear energy, taking into account safety and radiation protection principles.	[SW1] Ocena wiedzy faktograficznej [SW2] Ocena wiedzy zawartej w prezentacji

Subject contents	Course content – lecture Designing selected flow devices, e.g. regenerative heat exchangers, coolers, reactors. Course content – laboratory Designing cooperation between individual devices, ability to select boundary conditions and the operating range of a given component. Course content – project Performing CFD calculations for a regenerative heat exchanger.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lab - During meetings as part of the discussion	56.0%	25.0%
Lecture - During meetings as part of the discussion	56.0%	25.0%
Credit for the project based on the presentation	56.0%	50.0%

Recommended reading

Basic literature	1. S. Perycz: Turbiny parowe i gazowe, Wydaw. Politechniki Gdańskiej, Gdańsk, 1988 2. J. Madejski: Teoria wymiany ciepła, Wydaw. Politechniki Szczecińskiej, Szczecin 1998. 3. Głuch, J., Kodlewicz, T., Drosińska-Komor, M., ... Breńkacz, Ł., Ziółkowski, P. Thermodynamic Efficiency of an Advanced 4th Generation VHTR Propulsion Engine for Large Container Ships. Polish Maritime ResearchOpen source preview, 2024, 31(4), pp. 7688
Supplementary literature	1.Patankar S.V. Numerical Heat Transfer and Fluid Flow, Taylor and Francis, 1980. 2.Minkowycz W. J., Sparrow E. M., Schneider G. E., Pletcher R. H., Handbook of Numerical Heat Transfer, Whiley, 1988
eResources addresses	

Example issues/ example questions/ tasks being completed	Balances necessary for equipment design Operating conditions Boundary conditions
Practical activites within the subject	Not applicable

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