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Subject card

Subject name and code	Numerical methods in fluid flow problems, PG_00055947
Field of study	Power Engineering, Power Engineering, Power Engineering

Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	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	3.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology

Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Krzysztof Tesch
	Teachers	dr inż. Wojciech Włodarski

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	30.0	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	8.0	37.0	75

Subject objectives	The aim of the project is to acquaint students with the problems and methods of CFD in the design of flow systems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W12] has basic knowledge of the life cycle and repairs of energy equipment in the field of thermal power stations, thermal and energy systems and heating systems, internal combustion engines and compressors as well as rotating machines	The student has a basic knowledge of the life cycle and overhaul of power equipment in the field of thermal power plants, thermal power and heating systems, internal combustion engines and compressors and rotating machinery.	[SW1] Assessment of factual knowledge
	[K6_U08] can design the basic parameters of the selected technology related to energy conversion and select auxiliary devices and evaluate the project in terms of technical and economic	Students will be able to design the basic parameters of a selected energy conversion technology and select auxiliary equipment and evaluate the design from a technical and economic point of view.	[SU4] Assessment of ability to use methods and tools
	[K6_U07] is able to use basic knowledge of fluid flow machines and methods related to their design in an analytical and numerical approach to the preliminary design of an energy installation	The student is able to apply basic knowledge of flow machines and methods related to their design in an analytical and numerical approach to the preliminary design of an energy plant	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	The scope covers the basics of CFD programs applied to the design of flow systems. The various modelling steps will be performed: - generation of meshes for selected geometries - correct definition of the calculation model and selection of calculation parameters - execution of simulations for several selected flow systems - visualisation and interpretation of results.
Prerequisites and co-requisites	Basics of thermodynamics and fluid mechanics.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	100.0%	100.0%

Recommended reading	Basic literature	1. Tesch K. Numeryczna mechanika płynów, Wyd. PG 2021
		2. Gryboś R. Podstawy mechaniki płynów, PWN Warszawa 1998
		3. Puzyrewski R. Sawicki J. Podstawy mechaniki płynów i hydrauliki, PWN Warszawa 1998
		4. Tesch K. Mechanika Płynów, Wyd. PG 2014
	Supplementary literature	Fletcher C.A.J. Computational Techniques for Fluid Dynamics
	eResources addresses	Adresy na platformie eNauczanie: Metody numeryczne w zagadnieniach przepływowych, P, E, sem. 5, letni 23/24 (PG_00055947) - Moodle ID: 36715 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36715
Example issues/ example questions/ tasks being completed	1.Operation of CFD codes 2.Formulation of boundary conditions 3.Finite volume method 4.Turbulence	
Work placement	Not applicable	