GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Steam and Gas Turbines, PG_00045056		
Field of study	Ocean Engineering, Ocean Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Dzida	
	Teachers	dr hab. inż. Marek Dzida mgr inż. Anna Butterweck mgr inż. Jacek Frost	

Lesson types and methods of instruction

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

E-learning hours included: 0.0

Adresy na platformie eNauczanie:

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	10.0	30.0	100

Subject objectives

Provide knowledge of thermal rotor machines allows preliminary design cycle of gas and steam turbines, the combined cycles.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] can formulate a simple engineering task and its specification within the range of design, construction and operation of ocean technology objects and systems	The student is able to assess usefulness of typical methods and tools applied in engineering to select the proper method and tool for solving the simple problems in the range of steam and gas turbine system	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[K6_U04] has self-education skills in order to improve professional qualifications, is ready to work in industrial environment, adheres to HSE rules and regulations	The student is able to assess usefulness of typical methods and tools applied in engineering to select the proper method and tool for solving the simple problems in the range of steam and gas turbine system	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W06] has an organized knowledge on engineering methods and design tools allowing the conducting of projects within the construction and operation of ocean technology objects and systems	The student has the knowledge of methods and tools applied for design of steam and gas turbine	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	The student is able to formulate simple engineering problems and its specification in the range of rotor rotating machinery.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents	1. Cycles of steam turbine (Clausius-Rankine cycle, cycle with reheating, heat-regenerative feedwater, steam cycle of nuclear power plants, calculating the steam cycle). 2. Cycles of gas turbines (simple open cycle, open-cyclet complex (regenerative, intercooled, with the "reheat" in additional combustion chambers), closed cycle, calculation of gas turbine cycle). 3. Steam and gas turbine combined cycle (with supplementary firing or without it). 4. The theory of expansion nozzles (basic equations of motion of the gas, the calculation of nozzles and extension work in varying conditions nozzles, turbine profile types, characteristics palisades vane and rotor - the geometric parameters and flow). 5. Energy losses in flow through the palisade turbine (classification of losses, the impact of geometric parameters and motor losses on individual components, the selection of the main parameters of the palisade). 6. Theory of axial stage (main flow equation for the stage, the efficiency of peripheral indicators of the stage, the characteristics of efficiency, selection of basic design parameters, the stage of Curtis; stages with long blades). 7. Another losses (friction loss of rotor blades, ventilation loss, leakage loss, the internal efficiency of turbine stage). 8. Multi-stage turbines (basic types of construction of turbines, turbine efficiency rating).
Prerequisites and co-requisites	Thermodynamics Mechanics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	60.0%	20.0%
Colloquium for credit from lecture	50.0%	50.0%
Colloquium for credit from exercises	50.0%	30.0%

Recommended reading

Basic literature	Sawyers Gas Turbine. Engineering Handbook Turbomachinery International Publication. USA 1985 Sawyers Gas Turbomashinery. Engineering Handbook Turbomachinery International Publication. USA 1980
Supplementary literature	Perycz S.: Turbiny parowe i gazowe. Skrypt Politchniki Gdańskiej, T. 10. 1988
eResources addresses	

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable