



## Subject card

Subject name and code	Pumps, Compressors and Fans, PG_00039901						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject				2022/2023	
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				2.0	
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		dr hab. inż. Marian Piwowarski				
	Teachers		dr hab. inż. Marian Piwowarski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
Pompy, sprężarki i wentylatory - Moodle ID: 29721 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29721">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29721</a>							
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		6.0		14.0	50
Subject objectives	The aim of the course is to introduce students to the principles of turbomachinery flow, their construction and cooperation with the installation.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria		The student has a basic knowledge of centrifugal pumps, compressors and fans.			[SU2] Assessment of ability to analyse information	
	[K6_W09] possesses basic knowledge within the range of thermodynamics and fluid mechanics, construction and operation of heat generating devices, process equipment, including renewable energy sources, cooling and air conditioning		The student is able to pre-design a typical pump or compressor.			[SW1] Assessment of factual knowledge	
Subject contents	<p>Division and a brief overview of the various types of rotating machinery. Common features and differences in the design and operation of pumps, fans and compressors. Schematics and scope. Basic concepts and definitions in accordance with BS. Theoretical basis of all rotary machines. Accompanying movement of the rotor and the fluid flow channels. Methods of calculation and design of the rotor and the flow channels. Cooperation with rotating machinery installations, performance collaboration. Setpoint control methods, scope, advantages disadvantages, economy. Cavitation phenomenon and its impact on the operation and performance of centrifugal pumps.</p>						
Prerequisites and co-requisites	Fundamentals of fluid mechanics, the basis of construction machinery.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	qualifying exam	50.0%	100.0%
Recommended reading	Basic literature	Karassik, Krutzsch, Fraser, Messina Pump Handbook  Hanlon P. C. Compressor handbook, McGraw-Hill Companies, Inc, NY, 2001  Bloch H., P. Pump Users Handbook Life Extension, CRC Press LLC, 2005  Nesbitt B. Handbook of Pumps and Pumping, Elsevier Science & Technology Books, 2006	
	Supplementary literature	Tyler G. Hicks "Pump selection and Application"  H. H. Anderson "Centrifugal Pumps"  Nelik L. Centrifugal and rotary pumps fundamentals with applications, CRC Press LLC, 2000  Boyce, M. P. Gas turbine engineering handbook, Oxford, UK, 2006	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Please, based on the basic pump equation, explain why among the centrifugal pumps, the centrifugal pump achieves the highest head?  To what extent are the axial and radial compressor stages designed for the speed characteristic?		
Work placement	Not applicable		