



Subject card

Subject name and code	Bionics, PG_00064777						
Field of study	Power Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject				2025/2026	
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 none	
Semester of study	2	ECTS credits				1.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jerzy Gluch				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		4.0		6.0	25
Subject objectives	<p>The aim of the course is to understand the basic concepts of bionics / biomimicry. Getting to know the possibilities and selected examples of technologies and solutions taken from living organisms. Awakening the ability to see and appreciate the evolutionary achievements of living organisms in the field of biological processes and their effective use for human needs, including energy. Explaining the nomenclature, scope and area of bionics as an interdisciplinary science.</p>						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study		Students have an extended knowledge needed to understand the mechanical and thermo-flow phenomena in bio-inspired energy systems.			[SU4] Assessment of ability to use methods and tools [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 Power Engineering, the structure, principles of operation and environmental impact of energy systems, machines and devices, transmission grids and internal installations		Students are able to use the knowledge acquired during the course to design elements, systems and energy systems inspired by biological origin.			[SW1] Assessment of factual knowledge	

Subject contents	Outline, position and division of bionics. History of the development of bionics, examples and measurable effects of "imitating life". Methodology and modeling in bionics. Energy and bionic aspects. Structure and functions of biological systems. Principles of the functioning of living organisms and the possibility of their application in various areas of life, in science, technology and medicine. Bionics in innovative design of machines and devices. Examples of inventions inspired by nature. Descriptions of selected energy technologies viewed and downloaded from nature. Further directions of bionics development.		
Prerequisites and co-requisites	none		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final test	60.0%	100.0%
Recommended reading	Basic literature	1. Heynert H. Bionika ogólna WNT Warszawa, 1975;2. Tkacz E., Borys P. Bionika WNT Warszawa, 2006;3. Morecki A., Ekiel J., Fidelus K. Bionika ruchu WNT Warszawa, 1971;4. Benyus J. Innovation inspired by nature. Biomimicry Perennial. New York; 2002;5. Samek A. Bionika wiedza przyrodnicza dla inżynierów Wyd. AGH, Kraków, 2010;	
	Supplementary literature	1. Morecki A. Manipulatory bioniczne WNT Warszawa, 1976;2. Ayre M. Biomimicry A Review, 2004 ESTEC.3. Samek A. (redakcja) Bionika w zagadnieniach technicznych :projekty koncepcyjne studentów V roku kierunku Automatyka i robotyka praca zbiorowa, Wydawnictwo PW, Wrocław, 2000.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Discuss bionic manipulators. Present bionic models of motion control systems. Discuss energy and bionic aspects.		
Work placement	Not applicable		

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