GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Bionics, PG_00064777		
Field of study	Power Engineering, Power Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
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
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jerzy Głuch	
	Teachers	prof. dr hab. inż. Jerzy Głuch	

Lesson types

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

The aim of the course is to understand the basic concepts of bionics / biomimicry. Getting to know thepossibilities and selected examples of technologies and solutions taken from living organisms. Awakeningthe ability to see and appreciate the evolutionary achievements of living organisms in the field of biologicalprocesses and their effective use for human needs, including energy. Explaining the nomenclature, scopeand area of bionics as an interdisciplinary science.

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 evironmental 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

<table>
<tr><td>Subject contents</td><td>Course content – lecture

Outline, position and division of bionics. History of the development of bionics, examples and measurableeffects of "imitating life". Methodology and modeling in bionics. Energy and bionic aspects. Structure andfunctions of biological systems. Principles of the functioning of living organisms and the possibility of theirapplication in various areas of life, in science, technology and medicine. Bionics in innovative design ofmachines and devices. Examples of inventions inspired by nature. Descriptions of selected energytechnologies viewed and downloaded from nature. Further directions of bionics development.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>none</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>final test</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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;</td></tr><tr><td>Supplementary literature</td><td>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 irobotyka praca zbiorowa, Wydawnictwo PW, Wrocław, 2000.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Discuss bionic manipulators.Present bionic models of motion control systems.Discuss energy and bionic aspects.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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