

<b>COURSE DESCRIPTION CARD</b>			
The name of the course/module <b>BIONICS</b>			Code <b>A_S_2.1_002</b>
Main field of study <b>ARCHITECTURE</b>		Educational profile (general academic, practical) <b>general academic</b>	Year / term <b>I/1</b>
Specialization <b>-</b>		Language of course: <b>Polish/english</b>	Course (core, elective) <b>core</b>
Hours: Lectures:           Classes: - Laboratory classes: - Projects / seminars: <b>45</b>			Number of points <b>4</b>
Level of qualification: <b>II</b>	Form of studies (full-time studies/part-time studies) <b>Full-time studies</b>	Educational area(s) <b>Technical Sciences</b>	ECTS division (number and %) <b>4      100%</b>
Course status in the studies' program (basic, directional, other) <b>technical</b>		(general academic, from a different major) <b>-</b>	
Lecturer responsible for course: <b>prof. dr hab. inż. arch. Wojciech Bonenberg</b> e-mail: wojciech.bonenberg@put.poznan.pl Faculty of Architecture ul. Nieszawska 13C, 61-021 Poznań tel. 61 665 32 60		Lecturer: <b>mgr inż. arch Magdalena Gyurkovich</b> e-mail: magdalena.gyurkovich@put.poznan.pl Faculty of Architecture ul. Nieszawska 13C, 61-021 Poznań tel. 61 665 32 60	
<b>Prerequisites defined in terms of knowledge, skills, social competences:</b>			
1	<b>Knowledge:</b>	-student has explicit, theoretically based knowledge including the key issues of designing, composition and ergonomics, -student has basic knowledge of development trends in architectural designing,	
2	<b>Skills:</b>	-student can carry out critical analysis of the manner of operation and assess the existing technical solutions, devices, systems, processes and services related to architectural designing and designing the architectural detail, -student can design the simple device and facility using correct methods, techniques and tools,	
3	<b>Social competences:</b>	-student is aware of the importance of non-technical aspects and effects of engineering activities, in this impact upon the environment and liability for environment affecting decisions, -correctly identifies and solves dilemmas related to profession.	
<b>Objective of the course:</b>			
1. Objective of the course is use (intensification) subconscious creative processes using metaphorical associations related to appearance, construction, functioning, development and evolution of living organisms. 2. Classes consist in finding and adapting analogy relating to nature for obtain innovative design solutions. 3. Becomes familiar students with methodology of searching the innovative design solutions. 4. Stimulation of creative thinking in architectural designing. 5. Practice teaching the strategy of creative drawing up. 6. Design the innovative architectural solution. Educational assumption is based on the conviction, that innovation is one of the most important factors for succeed in architect profession.			
<b>Learning outcomes</b>			
<b>Knowledge:</b>			
W01	has knowledge of development trends and most important achievements in design;	AU2_W02	
W02	has explicit, well-grounded theoretical knowledge on designing commercial facilities, health care centres, offices and other work places;	AU2_W07	
W03	knows how to creatively seek innovative designing solutions on the basis of bionics.	AU2_W12	
<b>Skills:</b>			

U01	can acquire information from field specific literature, data bases and other properly selected sources in Polish and English, can integrate the acquired information, interpret and critically assess the said information, as well as draw conclusions and come up with opinions supported with satisfactory reasons	AU2_U01
U02	can plan respective stages of the designing process, can carry out analytical study of spatial resources and the best design solutions, as well as can interpret the analytic data and verify the adopted assumptions,	AU2_U08
U03	can assess the usefulness of the new scientific and research achievements and apply them in the field of architecture and town planning.	AU2_U10

**Social competences:**

K01	at the execution of an engineering task/organisational task, he/she can think reasonably and act in a creative, entrepreneurial way;	AU2_K02
K02	is aware of the importance of non-technical aspects and effects of engineering activities, in this impact upon the environment and liability for environment affecting decisions	AU2_K05

**The evaluation methods:**

Credit conditions and method of project assessment. An important criterion of project assessment is approach to the following issues:

- a) searching the innovative solutions of selected problem based on bionic analogies,
- b) using bionics as a heuristic operator,
- c) improvement and rationalization of design concepts,
- d) finding and separation of conflicting parts or features and searching the compromises.

**Summative assessment:**

- there are assessed work consisting of poster presenting the final effect of work on the selected design topic and portfolio, which is graphic and text report from the whole design cycle,
- the works assessment is carried out at the last classes – projects exhibition and voting for the 3 best works, which authors present the adopted design solutions in the group.

Final grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

**Positive grade for module depends on achieved by student all learning outcomes specified in the syllabus.**

**Course contents**

The subject of the student's work is to develop the design solution of usable item, facility or architectural detail based on bionic analogy.

- session in the groups:
- becomes familiar students with the information about principles of use the bionics as a heuristic operator,
- formulation of problems and solving them in innovative teams,
- generating ideas, arrangement and valuation of solutions,
- presentation of teamwork effects in the group,
- preparation of documentation from teamwork
- individual part:
- individual work on design concepts in the scope of selected issue,
- creation of concepts variants with regard to future trends, modern technologies and other issues related to project topic,
- improvement and rationalization of design concepts,
- performance the description upon innovativeness of developed project,
- performance the portfolio documenting all stages of project work,
- performance the poster presenting solution of selected issue.

**Basic bibliography:**

1. Alger J.R.M. Hays C.V. Creative Synthesis in Design, Prentice-Hall, Englewood Cliffs. 1964.
2. Balmond, C. New Structure and the Informal. w: Architectural Design. New Science=New Architecture? London. 1997.
3. Benyus, J.M. Biomimicry: Innovation Inspired by Nature. New York: W. Morrow. 1997.
4. Boneneberg W. Nowa metoda oceny rozwiązań funkcjonalnych w architekturze. w: Zeszyty Naukowe Politechniki Poznańskiej, Zeszyt 1. Poznań, 1999.
5. Hill P.H. The Science of Engineering Design. Holt, Rinehart and Winston, New York. 1970.
6. Pallasmaa J. The eye of the skin. Architecture and the senses. London: Academy Editions. 1996.
7. Passino K. M. Biomimicry for Optimization, Control, and Automation. Springer-Verlag. London. 2005.
8. Rykwert J. The dancing column. On order in architecture. Cambridge Mass. And London. MIT Press. 1996.
9. Tarnowski W. Metody konceptowania. Politechnika Śląska. Gliwice. 1986.

**Supplementary bibliography:**

1. Dietrych J. Projektowanie i konstruowanie. WNT. Warszawa. 1974.

2. Gordon W.J. Synectics. Collier. New York. 1961.
3. Osborn A.F. Applied Imagination. Ch. Scribner. New York. 1967
4. Wickens, C. D. Engineering Psychology and Human Performance. New York, Harper Collins. 1992.

<b>The student workload</b>		
<b>Form of activity</b>	<b>Hours</b>	<b>ECTS</b>
Overall expenditure	95	4
Classes requiring an individual contact with teacher	51	2
Practical classes	44	2

**Balance the workload of the average student**

Form of activity	Number of hours
participation in lectures	0 h
participation in classes/ laboratory classes (projects)	45 h
preparation for classes/ laboratory classes	13 x 2 h = 26 h
preparation to colloquium/final review	18 h
participation in consultation related to realization of learning process	3 x 2 h = 6 h
preparation to the exam	0 h
attendance at exam	0 h

Overall expenditure of student: **4 ECTS credits** **95 h**

As part of this specified student workload:

- activities that require direct participation of teachers:  
45 h + 6 h = **51 h** **2 ECTS credits**