Warsaw University of Technology

COURSE OFFERED IN THE DOCTORAL SCHOOL

Code of the course	4606-ES-00BDEGK-0310	Name of the course	Polish	Metodologia projektowania, wytwarzania i badania materiałów opartych o struktury biologiczne
			English	Methodology of designing, fabrication and investigation of materials based on biological structures
Type of the course	Speciality lecture			
Course coordinator	prof. Katarzyna Konopka	Course teacher	prof. Katarzyna Konopka	
Implementing unit	Faculty of Materials Science and Engineering	Scientific discipline / disciplines*	Materials Engineering; Chemical sciences; Chemical Engineering; Automatic Control, Electronics, Electrical Engineering and Space Technologies, Biomedical Engineering	
Level of education	Doctoral studies	Semester	winter	
Language of the course	English			
Type of assessment	Pass for assessment - final project with presentation	Number of hours in a semester	30	ECTS credits: 2
Minimum number of participants	10	Maximum number of participants	20	Available for students (BSc, MSc): No

Type of classes		Lecture	Auditory classes	Project classes	Laboratory	Seminar
Number of hours	in a week	2	2	-	-	-
	in a semester	15	15	-	-	-

1. Prerequisites

Basic knowledge on materials and various synthesis of materials.

2. Course objectives

Proposed course will be concentrated on novel materials based on biological structures The concept of a novel materials, designing of their microstructure and properties will be presented. Fabrication, properties and potential applications of novel materials will be analysed and presented at the examples. Lecture will be based on literature as well as on own investigated materials. The individual projects of student will be realized.

3. Course content (separate for each type of classes)

Lecture

During the lecture the essential information as proposed will be presented:

- New approach to design materials based on biological structures
- Building of biological materials, multifunctions of biological structures
- Morphogenesis of biological structures
- Examples of biological structures as templates for designing new bio-inspired engineering materials
- Examples of fabrication of synthesis engineering materials based on natural morphogenesis
- Fabrication of ceramic matrix composites
- Applications of materials based on biological structures
- Further perspectives in designing and fabrication bio- inspired materials

Auditory classes

During the auditory classes the practical exercises for students how to design, fabricate and investigate the bio-inspired materials will be done. Final individual/group topic for the students will be elaborated based on the presented information.

4. Learning outcomes			
Type of learning outcomes	Learning outcomes description	Reference to the learning outcomes of the WUT DS	Learning outcomes verification methods*
Knowledge			
K01	Knowledge of the basics of bio-inspired engineering materials designing processing, properties and applications	SD_W2, SD_W3	project evaluation
K02	Knowledge of the possibilities of available methods of testing materials	SD_W2, SD_W3	project evaluation
Skills			
S01	Ability to use knowledge in the field of new bio-inspired engineering materials	SD_U1	project evaluation
S02	Ability to select a research methodology depending on the analyzed materials	SD_U1	project evaluation
S03	Ability to analyze the results of testing properties of materials and formulate relevant conclusions	SD_U2	project evaluation
S04	Improving teamwork skills;	SD_U7	project evaluation
Social competences			
SC01	Presentation of own concepts, analyses and guidelines and the ability to conduct an informed discussion in this area.	SD_K2	project evaluation

*Allowed learning outcomes verification methods: exam; oral exam; written test; oral test; project evaluation; report evaluation; presentation evaluation; active participation during classes; homework; tests

5. Assessment criteria
Preparing the tasks on the auditory classes and elaboration of the final topic related to bio-inspired engineering materials which will be checked by the teacher and discussed the results with students. Final mark will be given after discussion and presentation of work by student.

6. Literature
[1] K. Konopka, A. Miazga, Kompozyty ceramika-metal, Oficyna Wydawnicza PW
[2] articles recommended by the teacher on the lectures.

7. PhD student's workload necessary to achieve the learning outcomes**		
No.	Description	Number of hours
1	Hours of scheduled instruction given by the academic teacher in the classroom	30
2	Hours of consultations with the academic teacher, exams, tests, etc.	5
3	Amount of time devoted to the preparation for classes, preparation of presentations, reports, projects, homework	15
4	Amount of time devoted to the preparation for exams, test, assessments	5
	Total number of hours	**55**

ECTS credits	**2**

** 1 ECTS = 25-30 hours of the PhD student's work (2 ECTS = 60 hours; 4 ECTS = 110 hours, etc.)

8. Additional information	
Number of ECTS credits for classes requiring direct participation of academic teachers	1
Number of ECTS credits earned by a student in a practical course	1