



## COURSE CARD

### 1. Basic information

Course name in English:	Bioclimatic architecture	
Course name in Polish:	Architektura bioklimatyczna	
Number of hours:	30	
Type of course:	Elective course	
Form of course:	lecture	
Code of course:		
Course leader:	Dr hab. inż. arch. Barbara Widera	
Faculty of the course leader:	W1 Faculty of Architecture	
Email address of the course leader:	barbara.widera@pwr.edu.pl	
Scientific discipline(s) assigned to the course (doctoral students representing the marked disciplines can participate in the course):	Architecture and urban planning	<input checked="" type="checkbox"/>
	Automation, electronic, electrical engineering and space technologies	<input type="checkbox"/>
	Information and communication technology	<input type="checkbox"/>
	Biomedical engineering	<input type="checkbox"/>
	Chemical engineering	<input type="checkbox"/>
	Civil engineering, geodesy and transport	<input type="checkbox"/>
	Materials engineering	<input type="checkbox"/>
	Mechanical engineering	<input type="checkbox"/>
	Environmental engineering, mining, and energy	<input type="checkbox"/>
	Mathematics	<input type="checkbox"/>
	Chemical sciences	<input type="checkbox"/>
	Physical sciences	<input type="checkbox"/>
	Management and quality studies	<input type="checkbox"/>

### 2. Objectives

To make students familiar with the latest developments in contemporary architecture with the special focus on bioclimatic and environmental strategies. To help students to develop the ability and habit of analysing theories and practical solutions concerning contemporary architecture, in particular the ones related to the energy efficiency, regenerative design and climate change resilience.

### 3. Content

*Detailed information about the course content, including topics and form of classes.*

No.	Topic	Number of hours	Form of classes
1	Cultural environment in the context of sustainable development	2	Select form



2	Introduction to ecological and bioclimatic architecture	2	Select form
3	Lessons from vernacular architecture	2	Select form
4	Passive and nZEB architecture	2	Select form
5	Renewable energy sources and energy storage in building	2	Select form
6	Various aspects of user comfort in building, thermal comfort analysis	2	Select form
7	Nature-based solutions in the context of the Green Deal and climate change resilience	2	Select form
8	Energy efficiency in buildings, end-user engagement, POE	2	Select form
9	Environmental strategies in bioclimatic architecture	2	Select form
10	Multi-level ecosystem analyzes, integration of the building with its surroundings	2	Select form
11	Green facades and vertical gardens	2	Select form
12	Biomimetics in architecture	2	Select form
13	Dynamic shading systems, kinetic facades	2	Select form
14	Bioclimatic and biological architecture - development directions	2	Select form
15	Evaluation and presentation of an individually developed topic	2	Select form

#### 4. Prerequisites

*List of prerequisites relating to knowledge, skills and other competences for course participants.*

General orientation on the current state of knowledge and the latest development trends in contemporary ecological architecture.

#### 5. Learning outcomes

*List of learning outcomes at level 8 of the Polish Qualifications Framework assigned to the course (mark the learning outcomes in the last column).*

Symbol	Learning outcome	
	<i>KNOWLEDGE. Doctoral student knows and understands:</i>	
SzD_W3	the main trends in the development of the scientific or artistic disciplines covered in the curricula;	<input checked="" type="checkbox"/>
SzD_W4	research methodology;	<input checked="" type="checkbox"/>
SzD_W5	the rules for the dissemination of scientific results, including in open access mode;	<input type="checkbox"/>
SzD_W6	the fundamental dilemmas of modern civilization;	<input checked="" type="checkbox"/>
SzD_W7	the legal and ethical conditions of scientific activity;	<input checked="" type="checkbox"/>
SzD_W8	the economic and other relevant conditions of scientific activity;	<input checked="" type="checkbox"/>



SzD_W9	basic principles of knowledge transfer to the economic and social spheres and commercialisation of results of scientific activity and know-how related to these results.	<input type="checkbox"/>
<i>SKILLS. Doctoral student is able to:</i>		
SzD_U2	use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular: - define the purpose and subject of scientific research, formulate a research hypothesis, - develop research methods, techniques and tools, and use them creatively, - draw conclusions on the basis of scientific research; critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development; transfer the results of scientific activities to the economic and social spheres;	<input checked="" type="checkbox"/>
SzD_U3	communicate on specialised topics to the extent that they enable an active participation in the international scientific community;	<input checked="" type="checkbox"/>
SzD_U4	disseminate research results, including in popular forms;	<input type="checkbox"/>
SzD_U5	initiate debates and participate in a scientific discourse;	<input checked="" type="checkbox"/>
SzD_U6	be able to speak a foreign language at B2 level of the Common European Framework of Reference for Languages to a level that enables them to participate in the international scientific and professional environment;	<input type="checkbox"/>
SzD_U7	plan and implement an individual or collective research or creative activity, including in an international environment;	<input type="checkbox"/>
SzD_U8	independently plan and act for one's own development and inspire and organize the development of others;	<input type="checkbox"/>
SzD_U9	plan classes or groups of classes and implement them using modern methods and tools.	<input type="checkbox"/>
<i>SOCIAL COMPETENCES. Doctoral student is ready to:</i>		
SzD_K3	fulfilling the social obligations of researchers and creators, initiate public interest activities, thinking and acting in an entrepreneurial way;	<input checked="" type="checkbox"/>
SzD_K4	maintaining and developing the ethos of research and creative environments, including: - carrying out scientific activities in an independent manner, - respecting the principle of public ownership of research results, taking into account the principles of intellectual property protection.	<input type="checkbox"/>

## 6. Evaluation

*Short description of the method(s) used to evaluate the learning outcomes assigned to the course, e.g., exam, test, report, presentation, etc.*

Evaluation based on the activity and participation in didactic discussions during classe. Each participant prepares a brief (5-10 slides) presentation related to the selected topic from the lecture list.

## 7. Teaching methods

*Short description of the teaching methods used during the course, e.g., multimedia presentation, discussion, literature studies, developing written documents, own work, etc.*



Lecture, Power Point presentation, didactic discussion

## 8. Literature

*List of primary and secondary literature used to prepare the course and including additional knowledge for participants, e.g., books, textbooks, research papers, standards, web pages, etc.*

[1] Almusaed A., Biophilic and Bioclimatic Architecture: Analytical Therapy for the Next Generation of Passive Sustainable Architecture, Springer Science & Business Media, 2010 [2] Košir M., Climate Adaptability of Buildings: Bioclimatic Design in the Light of Climate Change Springer, 2019 [3] Widera B., Proces kształtowania relacji z naturą w architekturze współczesnej, Wrocław 2018 [4] Wilkinson, S.J., Remøy H., Langston C., Sustainable Building Adaptation: Innovations in Decision-making, John Wiley & Sons, 2014 [5] Wines J., Zielona architektura, Taschen, Koln 2008 [6] Bar-Cohen, Y., Biomimetics: Biologically Inspired Technologies, London 2005. [7] Chan, Y., Sustainable Environments, Gloucester 2007. [8] Gissen D., Big and Green: Toward Sustainable Architecture in the 21st Century, Princeton Architectural Press, 2002 [9] Guedes M.C., Cantuaria G. Bioclimatic Architecture in Warm Climates: A Guide for Best Practices in Africa, Springer, 2019 [10] Roaf S., Susan Roaf S., Crichton D., Nicol F., Adapting Buildings and Cities for Climate Change: A 21st Century Survival Guide, Routledge, 2005 [11] Yeang, K., EcoMasterplanning, Chichester 2009.

## 9. Other remarks

*Additional remarks, comments, (e.g., language of the course)*

Course in English language