

Subject description

Faculty of Architecture, WUT 2020, **Architecture** studies

Architecture for Society of Knowledge speciality

EXPERIMENTAL DESIGN 1 (Examining Structural Qualities)			MSc level	semester 1
Classes: project	Hours/semester 75	Student's own workload hours: 35	Status: obligatory Level: Advanced Subject group: arch / urb design	ECTS: 5
				Exam: no

ECTS obtained with personal contact with teacher: 3,6

ECTS obtained during practical profiled classes: 5

Unit delivering this subject: Katedra Projektowania Architektonicznego
Pracownia Projektowania Architektonicznego Wspomaganego

Komputerem

Subject coordinator: dr hab. arch. Krzysztof Koszewski

Learning outcomes and subject delivery methods

Objective of the course:

The project is aimed at creating an alternative to traditional architectural studies of problem-solving methodologies. It takes place not through analysis and theoretical conceptual considerations but through the design laboratory and the experiments conducted in it. As in the area of natural sciences, the experiment runs in the sequence: assumptions, apparatus construction, observation + measurement, conclusions.

General description of the course:

We are building an environment for conducting a structural efficiency study through the use of physical models, computer simulation, and equipment that objectively evaluate the results. Course participants receive a simple task that requires the creation of an element with defined structural requirements (covering, covering the span, suspension, support, etc.) During the first half of the semester, the students individually shape material and structural concepts that solve the problem. The task is to present the idea in the form of a model illustrating the function of the element, which gives the possibility of subjecting it to functional tests (physical or simulated). In the second phase of the course, the participants join three-person teams whose composition corresponds to the specificity of the tasks undertaken. Each team strives to create the best possible method of laboratory testing, conducts tests and formulates conclusions regarding the effectiveness of solutions.

Expected obtained competencies:

- Awareness of material and structure characteristics
- The justification for engineering decisions
- Shaping the design methods
- The use of CAD tools in analysis and simulation (virtual laboratory)
- Shaping the methods of evaluating the results of the experiment
- Using laboratory experience in project work (physical laboratory)

Learning outcomes

No. of the outcome/ area	Description
Knowledge	
W01	The student has knowledge in the field of linking urban planning and architectural design with various natural disciplines
W02	The student has an extended knowledge of architecture and urban planning useful for designing complex architectural objects and urban projects.
W03	The student knows the basic principles, constructions and building materials used in solving complex engineering tasks in the field of architectural and urban design
Skills	
U01	The student is able to obtain information from literature and other properly selected sources, integrate the information obtained, make their interpretation and draw conclusions.
U02	The student has the ability to publicly present design concepts in the field of architecture and urban planning, critical evaluation, discussion and logical argumentation and conducting negotiations.
U03	The student is able to make a critical analysis of the existing conditions, the valorization of the land development, formulate conclusions for design.
U04	The student can integrate solving engineering tasks with knowledge in various fields of science - including the history of architecture, art history, sociology, spatial planning and others, and apply a systemic approach, also taking into account non-technical aspects
Social competences	
K01	The student is aware of the importance of the non-technical aspects and effects of engineering activities, including its impact on the natural and cultural environment and the related responsibility for decisions made in the environment
K02	The student can think and act in a creative and enterprising way

Learning contents:

The substantive content (design task) changes in the following years, constituting a background for the training of the competencies described above.

The exemplary project concerns the concept of a single-person shelter built using recycled materials developed in groups.

Teaching methods and forms :

Full-size, mandatory project;
 fourteen weeks of stationary classes, physical and virtual laboratory;
 a parallel e-learning platform that is a warehouse of course resources and a communication tool;
 Evaluation of the team leading, peer evaluation.

Method of testing the learning outcomes

Outcome Number	Way of testing
Knowledge	
W_01	Project/experiment: presentations, defense in a group discussion and among external reviewers, user tests, guest reviews, video presentation published on the web, activity assessment algorithms (as part of the e-learning platform), assessment of the leaders on the basis of notes on activity in individual, group and interpersonal work.
W_02	
W_03	
Skills	
U_01	
U_02	
U_03	

U_04
Social competences
KS_01
KS_02

Literature:

- D'Arcy Thompson, *On growth and form*, Cambridge University Press, Cambridge, 1966.
- Kolarevic, B., Klinger, K., *Manufacturing Material Effects*, Routledge, NY, 2008.
- Mattheck, C., *Why they grow, how they grow-the mechanics of trees*, *Arboricultural J.*, Vol. 14, pp 1-17, 1990.
- Mattheck, C. & Reuss, S., *The claw of the tiger: an assessment of its mechanical shape optimization*, *J. Theor. Biol.*, Vol. 150, pp. 323-328, 1991
- Allen, S., *From Object to Field, AD Architecture after Geometry*, Profile No. 127, Wiley & Sons, London, 1997, pp 24-31. Also: Hensel, M., *Space Reader, Heterogenous Space in Architecture*, Wiley, 2009. pp.118-143.
- Oxman, R. & Oxman, R., *The New Structuralism, Design, Engineering and Architectural Technologies*, *AD*, July/August 2010
- Bechthold, M., *The Return of the Future: A Second Go at Robotic Construction* (pages 116–121), *AD*, July/
- Rappaport, N., *A Deeper Structural Theory*, pp 122 - 129, *AD*, July/August 2010.