FACULTY OF ARCHITECTURE

COURSE SYLLABUS

Course title in Polish: **AN INTRODUCTION TO MATHEMATICAL MODELLING**
Course title in English: **WSTĘP DO MODELOWANIA MATEMATYCZNEGO**
Specialization (if applicable): ***Architecture***
Profile (if applicable):
Level and form of studies: **1st level, full-time**
Semester:
Course type: **obligatory**
Course code: **MAT001755W**
Group of courses: **NO**

	Lecture	**Tutorial**	**Laboratory**	**Project**	**Seminar**
Number of hours of organized classes in University (ZZU)	15				
Number of hours of total student workload (CNPS)					
Form of crediting	**Crediting with grade**	**Examination / Crediting with grade***	**Examination / Crediting with grade***	**Examination / Crediting with grade***	**Examination / Crediting with grade***
For group of courses mark (X) final course					
Number of ECTS points	1				
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact classes or other people conducting classes (BU)					

PREREQUISITES RELATED TO KNOWLEDGE, COMPETENCES AND SOCIAL SKILLS

Knowledge of vector calculus. Knowledge of differential and integral calculus of functions of one and two variables.

COURSE OBJECTIVES

C1 – Presenting the Fibonacci sentence and the principle of mathematical induction.
C2 – Presenting the theory of convex sets.
C3 – Givong basic knowledge related to tilings of surfaces and to filling spaces.
C4 – Passing on basic knowledge related to lattice polygons.
C5 – Giving basic understanding of graph theory.
C6 – Passing on knowledge related to curves and surfaces.

COURSE LEARNING OUTCOMES
Relating to knowledge: PEK_W1 knows the properties of the Fibonacci sequence. PEK_W2 has basic knowledge related to convex set, PEK_W3 knows solids and tilings, PEK_W4 has basic knowledge related to lattice polygons, PEK_W5 knows basic classes of graphs, PEK_W6 knows basic curves and surfaces. **Relating to competences:** PEK_U1 is able to apply Euler's formula to investigate polyhedral solids, PEK_U2 is able to investigate basic properties of graphs, PEK_U3 is able to describe areas in diverse coordinates sets, PEK_U4 is able to investigate properties of curves on the plane. **Relating to social skills:** PEK_K01 can, without assistance, search for necessary information in the literature PEK_K02 understands necessity of systematic and individual work on the material of the course.

PROGRAMME CONTENT		
Form of classes - lectures		**Number of hours**
Lec 1	Golden ratio. The Fibonacci sequence. The principle of mathematical induction.	2
Lec 2	Convex and starshaped sets. Helly's and Krasnosel'skii's theorems.	2
Lec 3	Planar tilings. Euler's polyhedral formula. Euler characteristic. Platonic and Archimedean solids.	2
Lec 4	Lattice polygons and Pick's theorem.	2
Lec 5	Elements of graph theory. Eulerian and Hamiltonian graphs. Platonic graphs. Planar graphs and Kuratowski's theorem.	2
Lec 6	Curves on the plane. Conic sections. Parametric curves.	2
Lec 7	Cylindrical and spherical coordinates. Description of regions and surfaces in cylindrical and spherical coordinates.	2
Lec 8	Final test.	1
	Total hours	**15**

TEACHING TOOLS
N1 - Lectures – traditional and using multimedia tools. **N2** - Discussions. **N3** - Tutorial.

ASSESSMENT OF ACHIEVEMENT OF LEARNING OUTCOMES		
Evaluation (F – forming (during semester), C – concluding (at semester end)	Number of learning outcome	Method of assessing the achievement of learning outcome
F1 – Dis	PEK_U1–PEK_U4 PEK_K01	Oral presentations
F2 – Lec	PEK_W1-PEK_W6 PEK_U1-PEK_U4	Final test

	PEK_K02	

C = rules set by the lecturer

BASIC AND ADDITIONAL LITERATURE

BASIC LITERATURE:

[1] R. Webster, Convexity, Oxford University Press, 1994.
[2] St. Roman, An Introduction to Discrete Mathematics, Innovative Textbooks, 2004.
[3] R. J. Wilson, Introduction to Graph Theory, Prentice Hall, 2010.

ADDITIONAL LITERATURE:

[1] P. Strzelecki, Matematyka współczesna dla myślących laików, Wydawnictwa Uniwersytetu Warszawskiego, Warszawa, 2011.
[2] R. Tarczewski, Topologia form strukturalnych, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2011
[3] M. Gewert, Z. Skoczylas, Elementy analizy wektorowej. Teoria, przykłady zadania. Oficyna Wydawnicza GiS, Wrocław, 2012.
[4] M. Zakrzewski, Markowe Wykłady z Matematyki, Matematyka Dyskretna, Oficyna Wydawnicza GiS, Wrocław, 2014.
[5] M. Gewert, Z. Skoczylas, Analiza matematyczna 2, Definicje, twierdzenia, wzory. Oficyna Wydawnicza GiS, Wrocław, 2016.

COURSE SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Wydziałowa Komisja Programowa ds. Kursów Ogólnouczelnianych
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