Attachment no. 5 to ZW 16/2020

Attachment no. **13** to studies program

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| **FACULTY OF ARCHITECTURE**  **COURSE SYLLABUS**  Course title in Polish: **Wstęp do modelowania matematycznego**  Course title in English: **An Introduction to Mathematical Modelling**  Specialization (if applicable): **Architecture**  Profile (if applicable): **Architecture and Urban Planning**  Level and form of studies: **2nd level, full-time**  Semester: **1**  Course type: **obligatory**  Course code: **MAT001755W**  Group of courses: **NO** |

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|  | **Lecture** | **Tutorial** | **Laboratory** | **Project** | **Seminar** |
| Number of hours of organized classes in University (ZZU) | **15** |  |  |  |  |
| Number of hours of total student workload (CNPS) | **30** |  |  |  |  |
| Form of crediting | **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) | **0,8** |  |  |  |  |

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| **PREREQUISITES RELATED TO KNOWLEDGE, COMPETENCES AND SOCIAL SKILLS** |
| **No prerequisites.** |

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| **COURSE OBJECTIVES** |
| **C1** Presenting the Fibonacci sentence and the principle of mathematical induction.  **C2** Presenting the theory of convex sets.  **C3** Giving 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. |

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| **COURSE LEARNING OUTCOMES** |
| **Relating to knowledge:**  PEK\_W1 The graduateknows the properties of the Fibonacci sequence.  PEK\_W2 The graduatehas basic knowledge related to convex set.  PEK\_W3 The graduateknows solids and tilings.  PEK\_W4 The graduatehas basic knowledge related to lattice polygons.  PEK\_W5 The graduateknows basic classes of graphs.  PEK\_W6 The graduateknows basic curves and surfaces.  **Relating to competences:**  PEK\_U1 The graduates able to apply Euler’s formula to investigate polyhedral solids.  PEK\_U2 The graduateis able to investigate basic properties of graphs.  PEK\_U3 The graduateis able to describe areas in diverse coordinates sets  PEK\_U4 The graduateis able to investigate properties of curves on the plane.  **Relating to social skills:**  PEK\_K01 The graduatecan, without assistance, search for necessary information in the literature.  PEK\_K02 The graduateunderstands necessity of systematic and individual work on the material of the course. |

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| **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** |

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

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| **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  PEK\_K02 | Final test |
| **C = rules set by the lecturer** | | |

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| **BASIC AND ADDITIONAL LITERATURE** |
| **basic LITERATURE:**   1. Webster, R., *Convexity*, Oxford 1994. 2. Roman, St., *An Introduction to Discrete Mathematics*, Innovative Textbooks, 2004. 3. Wilson, R. J., *Introduction to Graph Theory*, Prentice Hall 2010.   **additional LITERATURE:**   1. Strzelecki, P., *Matematyka współczesna dla myślących laików*, Warszawa 2011. 2. Tarczewski, R., *Topologia form strukturalnych*, Wrocław 2011. 3. Gewert, M., Skoczylas, Z., *Elementy analizy wektorowej. Teoria, przykłady zadania*, Wrocław 2012. 4. Zakrzewski, M., *Markowe Wykłady z Matematyki, Matematyka Dyskretna*, Wrocław 2014. 5. Gewert, M., Skoczylas, Z., *Analiza matematyczna 2, Definicje, twierdzenia, wzory*, Wrocław 2016. |

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| **COURSE SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)** |
| Wydziałowa Komisja Programowa ds. Kursów Ogólnouczelnianych  **mgr Bogusław Merdas**  boguslaw.merdas@pwr.edu.pl |