Attachment no. 5 to ZW 16/2020

Attachment no. **35** to studies program

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| **FACULTY OF ARCHITECTURE****COURSE SYLLABUS**Course title in Polish: **Komputerowe wspomaganie projektowania BIM II**Course title in English: **Computer Aided Design BIM II**Specialization (if applicable): **Architecture**Profile (if applicable): **Architecture and Urban Design**Level and form of studies: **2nd level, full-time**Semester: **2**Course type: **optional**Course code: **AUA117732wL**Group of courses: **YES** |

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|  | **Lecture** | **Tutorial** | **Laboratory** | **Project** | **Seminar** |
| Number of hours of organized classes in University (ZZU) | **15** |  | **30** |  |  |
| Number of hours of total student workload (CNPS) | **25** |  | **50** |  |  |
| Form of crediting | **Crediting with grade** |  | **Crediting with grade** |  |  |
| For group of courses mark (X) final course |  |  | **X** |  |  |
| Number of ECTS points | **1** |  | **2** |  |  |
| including number of ECTS points for practical (P) classes  |  |  | **3** |  |  |
| including number of ECTS points for direct teacher-student contact classes or other people conducting classes (BU) | **0,8** |  | **1,5** |  |  |

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

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| **COURSE OBJECTIVES** |
| **C1** Providing information on practical use of BIM technology including OpenBIM.**C2** Knowledge sharing in terms of standalone and group creation and presentation of a virtual model building in BIM technology with the use of ARCHICAD software (including CAD technical documentation, visualizations, material schedules and building energy analysis). |

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| **COURSE LEARNING OUTCOMES** |
| **Relating to knowledge:**1.1.10) The graduate knows and understands the issues related to architecture and urban planning in the context of the interdisciplinary nature of architectural and urban design as well as the need to cooperate with other specialists.1.1.11) The graduate knows and understands principles of collecting information and interpreting it when developing a design concept.B.W6. The graduate knows and understands technical and building regulations (regarding BIM).**Relating to competences:**B.U5. The graduate is able to make use of properly selected advanced computer simulations, analyses and computer technologies that aid architectural and urban design, as well as evaluate the obtained results and their usefulness in designing and produce constructive conclusions.B.U6. The graduate is able to prepare and deliver a detailed presentation of the results of the completed engineering design task using various communication techniques and in a manner that is easy to understand.**Relating to social skills:**B.S1. The graduate is ready to formulate information and opinions and inform the society about the achievements of architecture and urban design, their complex determinants, and other aspects of an architect’s professional work. B.S2. The graduate is ready to perform a thorough self-assessment, articulate constructive criticisms about architectural and urban planning activities, as well as accept criticisms of the solutions he or she presents, respond to such criticisms in a clear and factual manner, also by using arguments that refer to the achievements in the scientific discipline, and to make creative and constructive use of criticisms. |

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| **PROGRAMME CONTENT** |
| **Form of classes - lectures** | **Number of hours** |
| Lec 1 | Programs and organizations involved in Building Information Modeling (OpenBIM). | 2 |
| Lec 2 | Tools, formats and techniques of data exchange in the BIM project, BEP, BIM manager, supervising the correctness of the project implementation. | 2 |
| Lec 3 | Additional tools to verify the correctness of the model's execution (e.g. Solibri). | 2 |
| Lec 4 | Revitalization projects and historical buildings in the light of BIM. | 2 |
| Lec 5 | Multi-discipline character of BIM cooperation. Real-life collaboration between architect-civil engineer and civil engineer-architect (ARCHICAD-ALLPLAN). | 2J |
| Lec 6 | Multi-discipline character of BIM cooperation. Real-life collaboration between architect-cost estimator and cost estimator-architect (ARCHICAD-BIMESTIMATE). | 2 |
| Lec 7 | BIM Parametric Modeling.  | 2 |
| Lec 8 | Final in form of test. | 1 |
|  | **Total hours** | **15** |

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| **PROGRAMME CONTENT** |
| **Form of classes - laboratory** | **Number of hours** |
| Lab 1 | Software installation. ARCHICAD interface. Basic navigation through a BIM project. | 2 |
| Lab 2 | BIM project tools and settings. | 2 |
| Lab 3 | Classification system, BIM project structure, nomenclature, LOD. | 2 |
| Lab 4 | Teamwork with the use of BIMCloud. | 2 |
| Lab 5 | Model display variants, model control. | 2 |
| Lab 6  | Views, sheets, printouts. | 2 |
| Lab 7 | Building energy assessment. | 2 |
| Lab 8 | Presentation of documentation (including BIMx application). | 2 |
| Lab 9 | Principles of multi-discipline cooperation, BIM data exchange at levels 2 and 3. | 2 |
| Lab 10 | Cooperation with other programs used for modeling, including parametric modeling. | 2 |
| Lab 11 | Schedules, bills of quantities and cost estimating with the use of BIM. | 2 |
| Lab 12 | Measured Building Surveys in BIM. | 2 |
| Lab 13 | Cooperation with other programs used for project visualization. | 2 |
| Lab 14 | Final work consultation. | 2 |
| Lab 15 | Final submission in form of presentation (or BIMx),delivery of printed version or pdf files of the project. | 2 |
|  | **Total hours** | **30** |

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| **TEACHING TOOLS** |
| **N1** - Multimedia presentations.**N2** - Problem-focused lecture.**N3** - Expository lecture.**N4** - Individual consultation.**N5** - Project presentations. |

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| **ASSESSMENT OF ACHIEVEMENT OF LEARNING OUTCOMES** |
| **LECTURE** |
| **Evaluation** (F – forming (during semester), C – concluding (at semester end) | Number of learning outcome | Method of assessing the achievement of learning outcome |
| F1 | 1.1.10)1.1.11)B.W6.B.U5.B.U6.B.S1.B.S2. | Final in form of test (with grade). |
| **C = F1**  |

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| **ASSESSMENT OF ACHIEVEMENT OF LEARNING OUTCOMES** |
| **LABORATORY** |
| **Evaluation** (F – forming (during semester), C – concluding (at semester end) | Number of learning outcome | Method of assessing the achievement of learning outcome |
| F1 | 1.1.10)1.1.11)B.W6.B.U5.B.U6.B.S1.B.S2. | Grade obtained from final work prepared in group of 2-3 students, submitted with the use of presentation or BIMx and delivery of printed version or pdf files of the project. |
| **C = F1** |

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| **BASIC AND ADDITIONAL LITERATURE** |
| **basic LITERATURE:**1. Kasznia, D., Magiera, J., Wierzowiecki, P., *BIM w praktyce. Standardy, wdrożenia, case study*, Warszawa 2017.
2. Tomania, A., *BIM Innowacyjna Technologia w Budownictwie. Podstawy, Standardy, Narzędzia*, Warszawa 2016.
3. Sanchez, A., Hampson, K., Vaux, S., *Delivering value with BIM: a whole of live approach*, Abingdon on Thames 2016.
4. Mackenzie, S. H., Rendek, A., *ArchiCAD 19 – The Definitive Guide*, Birmingham 2015.
5. *ARCHICAD Tutorials Graphisoft,* https://www.youtube.com/user/Archicad
6. *Pomoc ARCHICAD Graphisoft*, https://help.graphisoft.com/AC/23/POL/
7. *ARCHICAD help Graphisoft,* https://helpcenter.graphisoft.com/category/visualization/rendering/
8. Forum BIM, http://bim-modeling.blogspot.com/
9. Blog poświęcony technologii BIM, https://www.bimblog.pl/

**additional LITERATURE:**1. Holzer, D., *BIM manager’s handbook: guidance for professionals in architecture, engineering and construction*, New York 2016.
2. Ślęk, R., *ArchiCAD. Wprowadzenie do projektowania BIM*, Gliwice 2013.
3. Podręcznik użytkownika oprogramowania dostarczony wraz z oprogramowaniem w wersji elektronicznej.
4. *Twinmotion Tutorials Unreal Engine* https://www.unrealengine.com/en-US/blog/twinmotion-community-free-training-on-real-time-rendering-for-archviz
5. *Twinmotion Playlist, askNK,* https://www.youtube.com/playlist?list=PL0iycuXI4xZnfBlNpmKiesInbniI2Bn4r
6. *Lumion Tutorials Lumion* https://support.lumion.com/hc/en-us/sections/360005978054-Lumion-10-Tutorials
7. Cardoso, C., *Lumion 3D Best Practices*, Birmingham 2015.
8. *Grasshoper Tutorials, Grasshoper,* https://www.grasshopper3d.com/video/video/listTagged?tag=tutorial&sort=mostPopular
9. Khbazi, Z., *Generative Algorithms using Grasshopper*, morphogenesism, 2012.
10. *Grasshoper Tutorials*, Parametrichouse, https://parametrichouse.com/
11. Pottman, H., Asperl, A., Hofer, M., Kilian, A., *Architectural Geometry,* Exton 2007.
12. Issa, R., *Essential Mathematics for Computational Design – Fourth Edition,* Seattle 2019.
13. Jaworski, P., Zwierzycki, M., *Projektowanie Parametryczne architektura w nowym wydaniu*, http://www.projektowanieparametryczne.pl/?p=494
14. *Getting Started with Grasshopper,* TU Delft, http://wiki.bk.tudelft.nl/toi-pedia/Getting\_Started\_with\_Grasshopper#The\_Interface *Grasshoper Tutorials* https://www.youtube.com/watch?v=FpUm5JdBVfs&list=PLtH\_NepQ2ym59Uqw5TELSsrrdW21KwBUb&index=1
15. *Grasshoper Tutorials* https://www.youtube.com/watch?v=FpUm5JdBVfs&list=PLtH\_NepQ2ym59Uqw5TELSsrrdW21KwBUb&index=1
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| **COURSE SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)** |
| **Przemysław Wojsznis, PhD., Eng., Arch.,**przemyslaw.wojsznis@pwr.edu.pl |