Attachment no. 5 to ZW 16/2020

Attachment no. **2** to studies program

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| **FACULTY OF ARCHITECTURE**  **COURSE SYLLABUS**  Course title in Polish: **Projektowanie architektoniczne - Architektura hybrydowa – megastruktury / farmy wertykalne w miastach**  Course title in English: **Architectutal Design - Hybrid Architecture – Megastructure / Urban Vertical Farms**  Specialization (if applicable): **Architecture**  Profile (if applicable): **Architecture and Urban Planning**  Level and form of studies: **2nd level, full-time**  Semester: **1**  Course type: **optional**  Course code: **AUA117693P**  Group of courses: **NO** |

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|  | **Lecture** | **Tutorial** | **Laboratory** | **Project** | **Seminar** |
| Number of hours of organized classes in University (ZZU) |  |  |  | **105** |  |
| Number of hours of total student workload (CNPS) |  |  |  | **225** |  |
| Form of crediting |  |  |  | **Crediting with grade** |  |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points |  |  |  | **9** |  |
| including number of ECTS points for practical (P) classes |  |  |  | **5** |  |
| including number of ECTS points for direct teacher-student contact classes or other people conducting classes (BU) |  |  |  | **6,75** |  |

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

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| **COURSE OBJECTIVES** |
| **C1** getting acquainted with the research methodology for the design of complex functional and spatial structures - hybrid objects of vertical farms in an urban environment proposing an alternative method of producing food for residents.  **C2** getting acquainted with the problem of integrating urban and production space treated as a social space and with the design of space stimulating the creative activity of residents.  **C3** familiarization with the complex technical infrastructure of the farm, which implements the postulate of sustainable production in a closed cycle, as well as far-reaching autonomy in terms of generating own energy, saving water and recycling waste.  **C4** familiarization with the problems of designing high-rise buildings in terms of optimization of the structure and form in a specific geo-climatic environment of the city. |

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| **COURSE LEARNING OUTCOMES** |
| **Relating to knowledge:**  1.1.2) The graduate knows and understands detailed issues in the field of architecture and urban planning related to solving complex design problems.  1.1.6) The graduate knows and understands regulations and procedures that are necessary to implement building projects and integrate buildings with the overall urban planning project.  1.1.7) The graduate knows and understands methods and measures for the implementation of ecologically responsible and sustainable design and the protection and conservation of the surrounding environment.  1.1.10) The graduate knows and understands 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.  1.1.12) The graduate knows and understands principles of professional presentation of architectural and urban planning concepts.  1.1.13) The graduate knows and understands the nature of the architectural profession and its role in society.  A.W1. The graduate knows and understands architectural design that varies in the level of complexity, ranging from simple tasks to structures with complex functions in a complex context, in particular simple buildings that satisfy basic needs of users, single-family and multi-family residential buildings, service facilities in residential complexes, public use buildings and complexes of such buildings with a varying scale and level of complexity in an open landscape or in an urban environment.  A.W2. The graduate knows and understands urban design related to completing tasks that vary in scale and level of complexity, in particular building complexes, and local development plans that take local conditions and relations into account.  A.W4. The graduate knows and understands provisions of local land-use plans to the extent that is necessary for architectural design.  A.W5. The graduate knows and understands the principles of universal design, including the concept of designing spaces and buildings accessible to all users, in particular to people with disabilities, in architecture, urban planning and spatial planning, and the principles of ergonomics, including ergonomic parameters necessary to provide full functionality of the space and structures under design to all users, in particular for people with disabilities.  A.W6. The graduate knows and understands advanced methods of analysis, tools, techniques and materials necessary to develop design concepts in an interdisciplinary environment, with particular emphasis on cross-industry collaboration.  A.W8. The graduate knows and understands the interdisciplinary nature of architectural and urban design and the need to integrate knowledge from other disciplines and to apply it in the designing process in cooperation with specialists in these disciplines.  **Relating to competences:**  1.2.2) The graduate is able to use interdisciplinary knowledge and skills acquired during studies to design a sophisticated architectural structure or urban complex that meets the aesthetic and technical requirements, creating and transforming space and giving it new values.  1.2.3) The graduate is able to prepare an advanced graphic, written and oral presentation of his or her original design concepts in the field of architecture and urban planning, using a convention that satisfies the requirements of professional architectural and urban design.  1.2.5) The graduate is able to organize the work including all phases of design concept development.  A.U1. The graduate is able to design a simple and complex architectural structure, creating and transforming space so as to give it new values – in accordance with the assigned or adopted program which takes into account the requirements and needs of all users, the spatial and cultural context, and the technical and non-technical aspects.  A.U2. The graduate is able to design a simple and compound urban complex.  A.U5. The graduate is able to evaluate the usefulness of advanced methods and tools for solving simple and complex engineering tasks that are typical in architecture, urban planning and spatial planning, and choose and apply appropriate methods and tools in designing.  A.U8. The graduate is able to think and act creatively, with an understanding that designing is a complex and multi-faceted endeavor, and express his or her own artistic concepts in architectural and urban design.  A.U9. The graduate is able to integrate information obtained from various sources, interpret and critically analyse it in detail and use it to draw conclusions, as well as formulate and justify opinions and demonstrate their relationship with the designing process on the basis of available scientific achievements in the discipline.  A.U10. The graduate is able to communicate by means of various techniques and tools in a professional and interdisciplinary environment to the extent that is appropriate for architectural and urban design and spatial planning.  A.U11. The graduate is able to work individually and in a team, including collaborating with specialists from other industries, and take on a leadership role in such teams.  A.U12. The graduate is able to estimate the time needed to complete a complex design task.  A.U13. The graduate is able to formulate new ideas and hypotheses, analyse and test novelties related to engineering and research problems in the field of architectural and urban design and spatial planning.  A.U14. The graduate is able to prepare architectural and construction documentation using appropriate scales and in relation to the conceptual architectural design.  A.U15. The graduate is able to implement the principles and guidelines of universal design in architecture, urban planning and spatial planning.  **Relating to social skills:**  1.3.3) The graduate is ready to take responsibility for humanistic, social, cultural, architectural and urban planning values in the protection of the environment and the cultural heritage.  A.S1. The graduate is ready to effectively use imagination, intuition, creative attitude and independent thinking to solve complicated design problems.  A.S2. The graduate is ready to peak and make presentations in public.  A.S3. The graduate is ready to take on the role of coordinator of activities in the design processes, manage team work and use interpersonal skills (conflict resolution, negotiation, task delegation), follow teamwork principles and take responsibility for joint tasks and projects.  A.S4. The graduate is ready to take responsibility for shaping the natural environment and cultural landscape, including preservation of the heritage of the region, the country and Europe. |

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| **PROGRAMME CONTENT** | | |
| **Form of classes - project** | | **Number of hours** |
| Proj 1 | Introduction: discussion of the topic, methodology of research and project work (design by research), the scope of the project, conditions for passing, literature.  Organization of the classes: students work in teams of 3 people. The team is responsible for the implementation of an interdisciplinary, integrated project.  Knowledge:  Introduction to the problem of hybrid objects – megastructures. | 7 |
| Proj 2 | **1st Review and discussion.**  Research: studies and analyses.  Wrocław as an educational laboratory in the field of hybrid structures. Urban analysis of the possibility of locating a hybrid facility in the city structure. Spatial analysis of possibilities, city autonomy in the field of food production in vertical structures. Optimal size of city farms to cover the needs of the inhabitants.  Case studies aiming at the location choice:  A city farm in the centre of a large city - identification of design problems (social and technological). Formulating conclusions.  Municipal farm in degraded areas - identification of design problems (social and technological). Formulating conclusions.  Municipal farm in extreme city environments: water, underground, etc. Identification of design problems: spatial, infrastructural, social and technological. Formulating conclusions.  Knowledge:  Definition of the term hybrid architecture - megastructure – examples. Definition of agro-urban planning – examples. | 7 |
| Proj 3 | Concepts for the arrangement of hybrid objects - vertical farms in the city structure (Wrocław, Warsaw, Gdańsk etc.). Assessment of the location concept (SWOT) and selection of the location of the hybrid complex / municipal farm / in the revitalized areas of the city.  Further analyses of the selected variant and detailing the selection for the location of the hybrid team's own project (the project team is divided into smaller sub-assemblies and selects a detailed location – every different one), in particular, the team performs:  analyses of residents' needs for a selected location,  infrastructure analyses for a selected location.  Knowledge:  Definition of various forms of hybrid objects:  office and residential megastructures - examples,  production and service megastructures / vertical farms - examples. | 7 |
| Proj 4 | **2nd Review and discussion.**  Research synthesis and formulation of conclusions.  1. Determining the type of hybrid facility / megastructure / farm type and integrated functions based on urban analyses,  2. Formulation of a detailed program:  basic functional program for a hybrid facility / vertical farm,  program of functions integrated with the basic function.  Knowledge:  Megastructure as an autonomous form, farm as a self-sufficient structure. Analysis of examples. | 7 |
| Proj 5 | Research synthesis and conclusions drawn - continuation.  1. Connections matrix, urban and architectural diagrams.  2. Synthetic technological solution for a closed production cycle.  3. Cooperation with industry professionals: specialists in special installations and agricultural production technologists.  Knowledge:  Examples of cultivation technology and animal breeding for vertical farms and environmental conditions in vertical farm spaces.  Examples of working technology in co-working spaces. | 7 |
| Proj 6 | **3rd Review and discussion.**  Urban concept of a hybrid urban complex (optional):  A. megastructure - a multifunctional space for creative work and services, integrated with the living space,  B. multifunctional vertical farm.  Location structure of a megastructure / vertical farm in an urban agglomeration on a scale of 1:25000. Description of the location selection method. Landscape analyses of the scale of the facility in the context of the city.  Knowledge:  New typology - hybrid facilities / city farms, megastructures:  mega-architecture,  mini farms in megastructures (SITE). | 7 |
| Proj 7 | The team's land development plan concept on a scale of 1:500/1:1000 and its evaluation using the SWOT analysis.  Knowledge:  Case studies - recycling of post-industrial megastructures as an example of hybrid objects. | 7 |
| Proj 8 | **Review 4th and discussion.**  Architectural concept:  1.functional and spatial concept of a megastructure on a scale of 1:200 with technology, Sankey diagrams,  2. flexibility and universality of the spatial structure.  Knowledge:  Typology of forms and zoning in hybrid objects. | 7 |
| Proj 9 | Construction and material concept.  Variants of megastructure / vertical farm construction solutions in the scale of 1:200 with construction technology. Cooperation with a constructor - specialist in special and high-rise constructions.  Knowledge:  Construction typology for vertical objects.  Parametric and bionic structures. | 7 |
| Proj 10 | **5th Review and discussion.**  Installation and vertical transport concept.  1. The concept of zoning of vertical transport.  2. The concept of solution for installation risers and technical storeys.  Knowledge:  Installations integrated with the structure - BIM modelling.  Principles of designing vertical communication in high-rise buildings. | 7 |
| Proj 11 | Housing concept.  1. Housing variants considering the climate conditions, lighting and insolation requirements.  2. Housing integrated with the building structure / independent housing.  Knowledge:  Aerodynamics of high structures.  Helicoidal forms of vertical farms.  Passive solar strategies in shaping vertical farms and megastructures. | 7 |
| Proj12 | **6th Review and discussion.**  Development of the detail of the building envelope.  Double facade and ecological materials.  Knowledge:  Typology of double facades.  Green double enclosures in high-rise buildings. | 7 |
| Proj 13 | Ecological solutions.  1. Recycling of materials used in the project.  2. Renewable energy production systems.  Knowledge:  Autonomy of megastructures: closed circulation of materials - zero-waste facility.  Renewable energy in megastructures. | 7 |
| Proj 14 | Description of the design problem solution.  Essay - research results, synthesis and architectural and construction description of the concept.  Solution analysis using the SWOT method.  Knowledge:  Instructions for writing a research paper. | 7 |
| Proj 15 | **7th Review and discussion.**  Evaluation. | 7 |
|  | **Total hours** | **105** |

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| **TEACHING TOOLS** |
| **N1** - Model workshop.  **N2** - Multimedia presentations.  **N3** - Specialist consultations.  **N4** - Team work.  **N5** - Project presentations.  **N6** - Problem discussion.  **N7** - Case studies.  **N8** - Design by research. |

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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** | 1.1.2)  1.1.6)  1.1.7)  1.1.10)  1.1.12)  1.1.13)  A.W1.  A.W2.  A.W4.  A.W5.  A.W6.  A.W8.  1.2.2)  1.2.3)  1.2.5)  A.U1  A.U2.  A.U5.  A.U8.  A.U9.  A.U10.  A.U11.  A.U12.  A.U13.  A.U14.  A.U15.  1.3.3)  A.S1.  A.S2.  A.S3.  A.S4. | evaluation of the substantive value of the project |
| **F2** | evaluation of the graphic design of the project |
| **F3** | evaluation of the project presentation and discussion (workshop method of conducting classes - review and discussion on the project every second class) |
| **C = 50%F1 + 30%F2 + 20%F3** | | |

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| **BASIC AND ADDITIONAL LITERATURE** |
| **basic LITERATURE:**   1. Ackerman, K., *The Potential for Urban Agriculture in New York City. Growing Capacity, Food, Security & Green Infrastructure*, New York 2012. 2. Bayley, G.E., *Vertical Farming*, Wilmington, Delavere 1915. https://archive.org/details/cu31924000349328. 3. Banham, R., *Megastructure: Urban Future of the Recent Past*, New York 1976. 4. Benke, K., Tomkins, B., *Future Food-Production Systems: Vertical Farming and Controlled-Environment Agriculture*,“Sustainability: Science, Practice and Policy”, 2017, t.13, nr 1, s. 13-26. doi:10.1080/15487733.2017.1394054. 5. Birkby, J., *Vertical Farming.* A program of the National Center for Appropriate Technology 2016. 6. DDS& partners, *Competition: The Youth Village Farm LAB and Milan Expo Horizontal Farm, Milan,* Milano 2016. https://aasarchitecture.com/2016/06/youth-village-farm-labmilan-expo-horizontal-farm-competition-dds-parteners.html. 7. Despommier, D., *The Vertical Farming,* New York 1999. 8. Dodington, E. M., *Polyspeces Park*, Houston 2016. http:// www.expandedenvironment.org/polyspecies-park/. 9. Dodington, E. M., *How to Design with the Animal. Constructing Posthumanist Environments,* Master of architecture thesis, Houston 2016. 10. Drożdż-Szczybura, M., *Vertical Farms in the Cites of the Future / Farmy pionowe w miastach przyszłości*, „Czasopismo Techniczne”, 2016, t. 2-A. 11. Drożdż-Szczybura, M.*, The Architectural Expression of Buildings Realising the Ideas of Urban Agricultura / Wyraz architektoniczny obiektów realizujących idee rolnictwa miejskiego*, „Czasopismo Techniczne”, 2015, t. 1-A. 12. Frampton, K., *Megaform as Urban Landscape*, Chicago 2009. 13. Hilbesheimer. L., *The City in the Landscape*, *The New City*, Chicago 1944. https://placesjournal.org/article/ notes-toward-a-history-of-agrarian-urbanism. 14. Howard, E., *Garden Cities of To-Morrow*, London 1902, 1946. 15. Jansma, J. E., Visser, A. J., de Wolf, P., Stobbelaar, D.J., *Agromere: How to Integrate Urban Agriculture in the Development of the Dutch City of Almere?*, 16th IFOAM Organic World Congress, Modena 2008. 16. Johansson, S., Wikberg-Nilsson, Å., *A Challenge for the Future: Efficient, Attractive and Sustainable Factories,* Proceedings of the 3rd International Conference on Applied Human Factors and Ergonomics, Louisville 2010. 17. Kohler, N., König, H., Kreissig, J., Lützkendorf, T., *A Life Cycle Approach to Buildings: Principles - Calculations - Design Tools*, “DETAIL” Green Books, 2010. 18. Koolhaas, R., *Delirious New York,* New York 1978. 19. Koolhaas, R., *Project Japan Metabolism Talks*, London 2011. 20. Ley, S., Richter, M., *Megastructure Reloaded - Visionary Architecture and Urban Design of the Sixties*, Ostfildern near Stuttgart 2008. 21. Maki, F., *Investigation in Collective Form*, Washington1964. 22. McQuaid, M., *Envisioning Architecture: Drawings from The Museum of Modern Art*, New York 2002. 23. Meghna, *Vertical Farms in Cities are the Future of Urban Farming*, “Evolving Science” 2017. 24. Mougeot, L. J. A., *Urban Agriculture: Definition, Presence, Potential and Risks*. W: Bakker, N., *Growing Cities, Growing Food: Urban Agriculture on the Policy Agenda. A Reader on Urban Agriculture*, Feldafing 2000. 25. Perlman, J., *Favela: Four Decades of Living on the Edge in Rio De Janeiro*, Oxford 2010. 26. Philips, A., *Designing Urban Agriculture. A Complete Guide to Planning, Design, Construction, Maintenance, and Management of Edible Landscapes*, New Jersey 2013. 27. Poulsen, M., Spiker, M., *Integrating Urban Farms into the Social Landscape of Cities. Recommendations for Strengthening the Relationship Between Urban Farms and Local Communities*, Baltimore 2014. 28. Remmers, G., *City Resilience: Building Cultural Repertoire for Urban Farming in Almere*, “Urban Agriculture Magazine”, 2011, nr 25. 29. Schiere, H., Matthys, F., Rischkowsky, B., Schiere, J., Thys, E., *Livestock* K*eeping in Urbanised Areas, Does History Repeat Iitself?*. W: van Veenhuizen, R. (red.), *Cities Farming for the Future - Urban Agriculture for Green and Productive Cities*, Ottawa, Kair, Dakar, Montevideo, Nairobi, New Dehli, Singapur 2006. 30. Sholto, J.D., *Hydroponics: The Bengal System: with Notes on Other Methods of Soilless Cultivation*, New Delhi 1977. 31. Sroka, W., *Definicje oraz formy miejskiej agrokultury - przyczynek do dyskusji*, „Wieś i Rolnictwo”, 2014, t. 164, nr 3. 32. *Cities Farming for the Future - Urban Agriculture for Green and Productive Cities*, van Veenhuizen, R. (red.), Ottawa, Kair, Dakar, Montevideo, Nairobi, New Dehli, Singapur 2006. 33. Veenhuizen, van R., Danso, G., *Profitability and Sustainability of Urban and Peri-Urban Agriculture,* “Agricultural Management, Marketing and Finance Occasional Paper”, 2007, t. 19. 34. Wowrzeczka, B., *Agropolis. Część I. Nowa Atlantyda,* „Architectus”, 2014a, t. 37, nr 1. 35. Wowrzeczka, B., *Agropolis. Część I. Współczesna farma miejska,* „Architectus”, 2014b, t. 39, nr 3.   **additional LITERATURE:**   1. „A10 - new European architecture”. 2. „Architectural Design”. 3. „Casabella”. 4. „DETAIL”. 5. „Domus”. 6. „Plan”. |

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