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| **FACULTY OF ARCHITECTURE** SUBJECT CARDCourse name in Polish: Konstrukcje w Architekturze Współczesnej 2Course name in English: Structures in Contemporary Architecture 2Main field of study (if applicable): Architecture Specialization (if applicable): **Architecture and Urban Planning** Level and form of studies: 2nd level, full-time Semester: **2**  Level and form of studies: **obligatory**  Subject code:  Group of courses: **NO** |

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|  | **Lecture** | **Classes** | **Laboratory** | **Project** | **Seminar** |
| Number of hours of organized classes in University (ZZU) | **15** | **30** |  |  |  |
| Number of hours of total student workload (CNPS) | **50** | 50 |  |  |  |
| Form of crediting | **exam** | **credit with a grade** |  |  |  |
| For group of courses mark (X) final course |  |  |  |  |  |
| Number of ECTS points | **2** | **2** |  |  |  |
| including number of ECTS points for practical (P) classes |  | 1 |  |  |  |
| including number of ECTS points for direct teacher-student contact (BK) classes | **1,6** | 1 |  |  |  |

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| **PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES** |
| 1. Completion of the course Structures in Contemporary Architecture 1. |

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| **SUBJECT OBJECTIVE** |
| C1 - The aim of the course is to familiarize students with the issues of practical shaping of structural systems using the *Research by Design* method.  C2 - The aim of the course is for students to acquire the ability to assess the scope of suitability of using particular structural systems in specific design tasks  C3 - The aim of the course is for students to acquire the ability to combine various structural elements into complex systems  C4 - The aim of the course is for students to acquire the ability to use the aesthetic potential and symbolic structural system to shape the architectural form of the object |

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| SUBJECT EDUCATIONAL EFFECTS |
| **Relating to knowledge:**  1.1/1 – The graduate knows and understands construction, building and engineering problems related to the design of buildings;  1.1/9 – The graduate knows and understands the rules, solutions, structures and building materials used in the performance of complex engineering tasks in the field of architectural and urban design;  1.1/10 – The graduate knows and understands the issues of architecture and urban planning in the context of the multi-sector nature of architectural and urban design and the need to cooperate with other specialists  B.W4 – The graduate knows and understands issues related to architectural, urban and spatial planning, such as technical infrastructure, communication, natural environment, landscape architecture, economic, legal and social conditions - necessary to understand social, economic, ecological, natural, historical, cultural, legal and other non-technical determinants of engineering activity and sees the need to take them into account in architectural, urban and rural design and spatial planning;  B.W5 – The graduate knows and understands the advanced issues of construction, construction technologies and installations, construction and building physics, covering key, complex issues in architectural, urban and planning design;  B.W8 – The graduate knows and understands the ways of communicating the ideas of architectural, urban and planning projects and their development;  B.W9 – The graduate knows and understands the basic principles of the ethics of the profession of an architect and concepts in the field of intellectual property protection.  **Relating to skills:**  1.2/1 – The graduate is able to use the experience gained during the studies in order to make a critical analysis of conditions and formulate conclusions for design in a complex, interdisciplinary context;  1.2/2 – The graduate is able to use the interdisciplinary knowledge and skills acquired during the studies in order to design a complex architectural object or an urban complex that meets aesthetic and technical requirements, creating and transforming space and giving it new values;  1.2/4 – The graduate is able to use analytical methods to formulate and solve design tasks, present the theoretical background and justification of the presented solutions in the form of a scientific study;  B.U1 – The graduate is able to integrate advanced knowledge from various areas of science, including history, history of architecture, history of art and protection of cultural goods, spatial management while solving complex engineering tasks;  B.U2 – A graduate is able to see the importance of non-technical aspects and effects of an architect's design activity, including its impact on the cultural and natural environment, and take responsibility for technical decisions made in the environment and for passing on cultural and natural heritage to the next generations;  B.U3 – The graduate is able to use properly selected advanced computer simulations, analyzes and information technologies, supporting architectural and urban design, as well as evaluate the obtained results and their usefulness in designing and draw constructive conclusions;  B.U4 – The graduate is able to prepare and present a presentation devoted to the detailed results of the implementation of a design engineering task using various communication techniques, including formulated in a commonly understood manner.  **Relating to social competences:**  1.3/1 – The graduate is ready to undertake and perform work in a professional manner, including observing the principles of professional ethics and taking responsibility for undertaken actions;  B.S1 – The graduate is ready to formulate opinions on the achievements of architecture and town planning, their conditions and other aspects of the architect's activity, as well as to provide information and opinions The graduate is ready to formulate opinions on the achievements of architecture and town planning, their conditions and other aspects of the architect's activity, as well as to provide information and opinions;  B.S2 – The graduate is ready for a reliable self-assessment, formulating constructive criticism regarding architectural and urban planning activities, as well as accepting criticism of the solutions presented by them, responding to criticism in a clear and factual manner, also using arguments referring to the available achievements in the discipline scientific, and the creative and constructive use of criticism. |

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| **PROGRAMME CONTENT** | | |
| Form of classes - lecture | | No. of hours |
| Lec 1 | Descriptive methods in shaping structural systems - part 1 | 1 |
| Lec 2 | Descriptive methods in shaping structural systems - part 2 | 2 |
| Lec 3 | Shaping continuous, discrete and mixed structural forms in various material solutions. | 2 |
| Lec 4 | Examples of solving tasks in the field of structural forms of contemporary architecture. Part 1 - Long span coverings. | 2 |
| Lec 5 | Examples of solving tasks in the field of structural forms of contemporary architecture. Part 2 - Facilities with large cantilever overhangs. | 2 |
| Lec 6 | Examples of solving tasks in the field of structural forms of contemporary architecture. Part 3 - Objects with organic and free forms. | 2 |
| Lec 7 | Construction detail and architectural form. Influence of the solutions of details on the selection of the structural system. | 2 |
| Lec 8 | Problems of the foundation of objects. Influence of the foundation method on the structural solution and architectural form. | 2 |
|  | **Sum of hours** | **15** |

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| Form of classes – practice classes | | No. of hours |
| Cl 1 | Introduction to classes. Discussion and selection of topics. Presentation of the method of work and the rules of evaluation. | 2 |
| Cl 2 | Concept of a spatial solution, scale 1: 200 or 1: 100. Inspirations for the development of the concept of a structural system - sketches or photos. | 2 |
| Cl 3 | Initial proposal of the structural system, scale 1: 200 or 1: 100. | 2 |
| Cl 4 | Development of a preliminary physical model of the structural system of the facility, scale 1: 100 or 1: 50. | 2 |
| Cl 5 | Presentation, discussion. | 2 |
| Cl 6 | Work on the solution of the structural system:  - floor plans - scale 1: 200 or 1: 100,  - characteristic sections and elevations - scale 1: 200 or 1: 100,  - perspectives and visualizations,  - selected details 1:50, 1:20,  - detailed mock-up of the object. | 14 |
| Cl 7 | Work on technical and material solutions as well as graphic presentation of the study in the form of a 100 × 70 cm poster. | 4 |
| Cl 8 | Final delivery and presentation. Evaluation of the work. | 2 |
|  | **Sum of hours** | **30** |

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| **TEACHING TOOLS USE** |
| N1 – Informative lecture with elements of problem lecture  N2 – Multimedia presentations  N3 – Individual consultations  N2 – Individual adjustments  N5 – Teamwork  N6 – Problem discussions  N7 – Modeling workshops  N9 – Project presentations |

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| **EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT** | | |
| **Evaluation** (F – forming (during semester), P – concluding (at semester end) | Educational effect number | Way of evaluating educational effect achievement |
| **Lecture** | | |
| P1 | 1.1/1, 1.1/9, 1.1/10, B.W.4, B.W.5, B.W.8, B.W.9, B.U.2, B.S.1, B.S.2 | Final exam grade |
| **Practice classes** | | |
| F1 | 1.2/1, 1.2/2, B.U1, B.S1, B.S2 | Assessment of involvement in model exercises and discussion |
| F3 | B.U1, B.U3, B.U4 | Assessment of the substantive value of the prepared presentation and the manner of its presentation |
| F2 | 1.3/1, B.U1, B.U2, B.U4, B.S1, B.S2 | Assessment of the substantive value of the prepared final presentation and the manner of its presentation |
| P2 is a summary grade, based on F1 ÷ F3 grade:  P = α1 F1 + α2F2 + α3F3, where α1=0,4 α2=0,3 α3=0,3 Σαi = 1 | | |

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| **PRIMARY AND SECONDARY LITERATURE** |
| **PRIMARY LITERATURE:**   1. Harbison R., *Zbudowane, niezbudowane i nie do zbudowania. W poszukiwaniu znaczenia architektonicznego*, Wydawnictwo Murator, Warszawa 2002 2. Kolendowicz T., *Architektoniczne konstrukcje przestrzenne*, Wydawnictwo Politechniki Wrocławskiej, Wrocław 1976 3. Mielczarek Zb., *Nowoczesne konstrukcje w budownictwie ogólnym*, Arkady, Warszawa 2009 4. Rokicki W., *Konstrukcja w aeurytmicznej architekturze*, Wydawnictwo Politechniki Warszawskiej 2006 5. Salvadori M., *Siła architektury: dlaczego budynki stoją*, Murator, Warszawa 2001. 6. Allen E., Zalewski W., *Form and forces: designing efficient, expressive structures*, John Wiley & Sons, Hoboken 2010 7. Burry J., Burry M., The new Mathematics of Architecture, Thames & Hudson, London 2010 8. Balmond C., *Informal*. Prestel, Münich 2007 9. Bechthold M., *Innovative Surface Structures*, Taylor & Francis, London 2009 10. Berger H. *Light Structures-Structures of Light*. The Art and Engineering of Tensil Architecture, Basle 1996 11. Otto F., *Das Gesamtwerk. Leicht Bauen Natürlich Gestalten,* Birkhäuser, Basel 2005 12. Pottmann H., Asperl A., Hofer M., Kilian A., *Architectural Geometry,* Bentley Institute Press, 2007 13. Scheck H-J., *Soft Shells. Design and Technology of Tensile Architecture,* Birkhäuser, Basel 1997 14. Schleifer S., *Spectacular Buildings,* Evergreen Taschen, Köln 2007 15. Senosiain J., *Bio-Architecture,* Architectural Press, Elsevier, Oxford 2003   **SECONDARY LITERATURE:**   1. Brownell B., *Transmaterial 3,* Princeton Architectural Press, New York 2010 2. Heartney E., *Kenneth Snelson – Forces Made Visible,* Hudson Hills Press LLC, Lenox 2009 3. Holgate A., *The Art of Structural Engineering: The Work of Jörg Schlaich and His Team,* Edition Axel Menges, Stuttgart/London1997 4. Iori T., *Pier Luigi Nervi,* Motta Architettura, Milan 2009 5. Jodido P., *Calatrava,* Taschen, Köln 2005 6. Kawaguchi M., *Structural Engineer,* Universitat Politecnica de Valencia 2009 7. Sakamoto T., Ferré A., *From Control to design. Parametric/Algorithmic Architecture*, Actar-D, New York 2010 8. Kolendowicz T. *Mechanika Budowli*, Wrocław 2010 9. Sławińska J., *Ekspresja sił w nowoczesnej architekturze*, Warszawa 1997 (wyd. II). |

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