

| <b>STUDY MODULE DESCRIPTION FORM</b>   |   |   |
|--|---|---|
| Name of the module/subject<br><b>Supporting Structures</b>   |   | Code<br><b>1010102121010121990</b>  |
| Field of study<br><b>Civil Engineering Second-cycle Studies</b>  | Profile of study (general academic, practical)<br><b>general academic</b> | Year /Semester<br><b>1 / 2</b>  |
| Elective path/specialty<br><b>Bridges and Underground Engineering</b>  | Subject offered in:<br><b>Polish</b>                                      | Course (compulsory, elective)<br><b>obligatory</b>  |
| Cycle of study:<br><b>Second-cycle studies</b>   | Form of study (full-time, part-time)<br><b>full-time</b>                  |   |
| No. of hours<br>Lecture: - Classes: <b>1</b> Laboratory: - Project/seminars: -   |   | No. of credits<br><b>2</b>  |
| Status of the course in the study program (Basic, major, other)<br><b>other</b>  |   | (university-wide, from another field)<br><b>university-wide</b>   |
| Education areas and fields of science and art<br><b>technical sciences</b>   |   | ECTS distribution (number and %)<br><b>2 100%</b>   |
| <b>Responsible for subject / lecturer:</b><br><br>dr inż. Iwona Jankowiak<br>email: iwona.jankowiak@put.poznan.pl<br>tel. 61 647 58 28<br>Faculty of Civil and Environmental Engineering<br>ul. Piotrowo 5, 60-965 Poznań  |   |   |
| <b>Prerequisites in terms of knowledge, skills and social competencies:</b>  |   |   |
| 1  | <b>Knowledge</b>  | Knowledge of the strength of materials, structural mechanics, soil mechanics, foundations and concrete structures in the field of engineering degree studies  |
| 2  | <b>Skills</b>   | Skills related to the static calculations and design of reinforced concrete bridge structures, self-learning skills   |
| 3  | <b>Social competencies</b>  | Ability to adapt of the type of any civil engineering structure to the communication requirements and social expectations, respect for the Polish language, understand the need for lifelong learning and group collaboration |
| <b>Assumptions and objectives of the course:</b><br>Familiarizing of students with the issues of conceptual design, structural analysis and mechanical design of simple supporting bridge structures and bridge abutments according to the system of European standards PN-EN  |   |   |
| <b>Study outcomes and reference to the educational results for a field of study</b>  |   |   |
| <b>Knowledge:</b><br>1. Student knows the rules of formation of supporting structures (walls) and bridge abutments - [K_W02, K_W04]<br>2. Student knows the systems of forces acting on the bridge supports - [K_W03, K_W15]<br>3. Student knows the procedure for the static-strength calculations of supporting structures according to the system of the PN-EN code - [K_W14, K_W16]                |   |   |
| <b>Skills:</b><br>1. Student can structurally form simple supporting structures (walls) and bridge abutments - [K_U01, K_U03, K_U15]<br>2. Students can perform static-strength calculations of simple supporting structures - [K_U04]<br>3. Student can conduct calculations in accordance with the principles set out in the new system of European standards PN-EN - [K_U09, K_U16]                 |   |   |
| <b>Social competencies:</b><br>1. Student can adapt the type of structure to the communication requirements and social expectations - [K_K09]<br>2. Student can collaborate and work together in a group, is aware of the need for self-education - [K_K01, K_K06]<br>3. Student complies with the principles of the Polish language and the rules of preparation of technical documentation - [K_K02] |   |   |
| <b>Assessment methods of study outcomes</b>  |   |   |

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|--|-----------------------------|-------------|
| 1. Preparation of the design exercise in accordance with guidelines<br>2. Ongoing monitoring of the student's knowledge on every part of preparation of the design during the consultation<br>3. Oral test (talk) on completed design (demonstrating knowledge of issues relating to the formulation and calculation of bridge supporting walls)   |                             |             |
| <b>Course description</b>  |                             |             |
| 1. Conceptual design of supporting walls and bridge abutments, matching support for the shape of bridge spans and soil-water conditions<br>2. Analysis of forces acting on bridge abutment<br>3. Verification of ultimate and serviceability limit states of bridge supporting structures<br>4. Calculations of bridge abutments according to the system of PN-EN code   |                             |             |
| <b>Basic bibliography:</b>   |                             |             |
| 1. Arkadiusz Madaj, Witold Wołowicki, Podstawy projektowania budowli mostowych, WKiŁ Warszawa 2003/2007<br>2. Zenon Wiłun, Zarys geotechniki, Wydawnictwa Komunikacji i Łączności WKŁ, 2013<br>3. Stefan Gałczyński, Podstawy budownictwa podziemnego, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001<br>4. Kazimierz Furtak, Maciej Kędracki, Podstawy budowy tuneli, Politechnika Krakowska, Kraków 2005 |                             |             |
| <b>Additional bibliography:</b>  |                             |             |
| 1. Arkadiusz Madaj, Witold Wołowicki, Projektowanie mostów betonowych, WKiŁ Warszawa 2010<br>2. Zbigniew Grabowski, Stanisław Pisarczyk, Marek Obyrcycki, Fundamentowanie, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005   |                             |             |
| <b>Result of average student's workload</b>  |                             |             |
| <b>Activity</b>  | <b>Time (working hours)</b> |             |
| 1. Participation in lecture  | 15                          |             |
| 2. Studying  | 15                          |             |
| 3. Project realization   | 20                          |             |
| <b>Student's workload</b>  |                             |             |
| <b>Source of workload</b>  | <b>hours</b>                | <b>ECTS</b> |
| Total workload   | 50                          | 2           |
| Contact hours  | 15                          | 1           |
| Practical activities   | 15                          | 1           |