

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Underground Structures		Code 1010102121010120210
Field of study Civil Engineering Second-cycle Studies	Profile of study (general academic, practical) general academic	Year /Semester 1 / 2
Elective path/specialty Bridges and Underground Engineering	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: - Laboratory: - Project/seminars: 30		No. of credits 4
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: Wojciech Siekierski email: Wojciech.Siekierski@put.poznan.pl tel. 6475834 Budownictwa i Inżynierii Środowiska ul. Piotrowo 5		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	According to knowledge skills of strength of materials, structural mechanics, concrete structures, steel structures, basics of bridges.
2	Skills	According to knowledge skills of strength of materials, structural mechanics, concrete structures, steel structures, basics of bridges.
3	Social competencies	Responsibility, reliability, independence
Assumptions and objectives of the course: Acquiring knowledge on design and erection of tunnels.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Getechnical and transportation conditions of tunnel design. - [K_W14, K_W16]		
2. Methods of tunnel erection. - [K_W14, K_W16]		
3. Tunnel design. - [K_W14, K_W16]		
Skills:		
1. Computation of loads acting on a tunnel. - [K_U04, K_U05]		
2. Ability to respect soil-tunnel interaction in computational model of a tunnel. - [K_U04, K_U05]		
3. Ability to respect geotechnical conditions in computational model of a tunnel. - [K_U04, K_U05]		
Social competencies:		
1. Honesty - [K_K02]		
2. Self-reliance - [K_K01]		
Assessment methods of study outcomes		
Written exam.		
Discussion with teacher on individual exercise.		

Course description		
Geotechnical and transportation conditions of tunnel design. Structure of tunnels. Methods of tunnel erection Loads acting on tunnels, tunnel design.		
Basic bibliography: 1. Furtak K., Kędracki M.: Podstawy budowy tuneli, PK, 2005 2. Gałczyński S.: Podstawy budownictwa podziemnego, PWr, 2001 3. Glinicki S.: Budowle podziemne, PB, 1994		
Additional bibliography: 1. Świst E.: Hydrotechniczne i komunikacyjne bud. podziemne, Wyd. STO, 2006 2. Lessaer S.: Miejskie tunele , przejścia podziemne i kolektory, WKiŁ, 1979 3. Stamatello H.: Tunele i miejskie budowle podziemne, Arkady, 1970		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation to exam	8	
2. Egzam	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	4
Contact hours	40	2
Practical activities	40	2