

MODULE SPECIFICATION

Module code	
Module title in Polish	Infrastruktura podziemna miast
Module title in English	Urban Underground Infrastructure
Module running from the academic year	2016/2017

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Civil Engineering
Level of qualification	First cycle <i>(first cycle, second cycle)</i>
Studies profile	Academic <i>(academic/practical)</i>
Mode of study	Full-time <i>(full-time / part-time)</i>
Specialism	
Organisational unit responsible for module delivery	The Department of Piped Utility Systems
Module co-ordinator	Emilia Kuliczowska, PhD, Eng.
Approved by	Marek Iwański, Professor

B. MODULE OVERVIEW

Module type	Core module <i>(core/programme-specific/elective HES*)</i>
Module status	Compulsory module <i>(compulsory / non-compulsory)</i>
Language of module delivery	English
Semester in the programme of study in which the module is taught	Semester 6
Semester in the academic year in which the module is taught	Summer semester <i>(winter / summer)</i>
Pre-requisites	None <i>(module code/module title, where appropriate)</i>
Examination required	No <i>(yes / no)</i>
ECTS credits	2

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15			15	

* elective HES – elective modules in the Humanities and Economic and Social Sciences

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to familiarise students with the issues of building the network of urban infrastructure; familiarising students with trenchless methods of repairs; the renovation and exchange of the network concerning urban underground infrastructure; familiarising students with basic methods of dimensioning the ducts of underground infrastructure made from rigid materials.
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Module outcome code	Module learning outcomes	Mode of instruction (l/c/lab/p/ others)	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student has basic knowledge on the methods of building underground networks and multi-duct tunnels.	l/p	B_W22 B_W10	T1A_W02; T1A_W03; T1A_W04; T1A_W05; T1A_W07; T1A_W08
W_02	A student has basic knowledge as regards pipeline and sewage networks.	l	B_W20	T1A_W02
W_03	A student has basic knowledge as regards the damages of sewage ducts.	l	B_W20	T1A_W02
W_04	A student has fundamental knowledge of microtunnelling technology.	l	B_W20	T1A_W02
W_05	A student has basic knowledge as regards trenchless repairs, renovations, and exchange of ducts concerning urban underground infrastructure.	l	B_W20	T1A_W02
W_06	A student knows the principles of controlling the load bearing capacity of rigid duct with circular section.	p	B_W20	T1A_W02
W_07	A student knows the principles of conducting the analysis of stresses in concrete channels with egg and bell section.	p	B_W10 B_W20	T1A_W02 T1A_W03 T1A_W04 T1A_W05 T1A_W07 T1A_W08
U_01	A student can select appropriate materials for the designed elements of urban underground infrastructure.	l/p	B_U24	T1A_U03 T1A_U05 T1A_U08 T1A_U09 T1A_U13 T1A_U14 T1A_U15 T1A_U16
U_02	A student can check the load bearing capacity of a rigid channel with a circular section.	p	B_U14	T1A_U03 T1A_U04 T1A_U05 T1A_U14 T1A_U16
U_03	A student can analyse the analysis of stresses in concrete channel with egg and bell section (together with calculating sections and internal forces).	p	B_U14	T1A_U03 T1A_U04 T1A_U05 T1A_U14 T1A_U16
K_01	A student can independently work on the assigned project task.	p	B_K01	T1A_K01 T1A_K03 T1A_K04

K_02	A student understands the significance of his/her responsibility in engineering activity, including the reliability of the results of his/her work (and their interpretation).	I/p	B_K02	T1A_K02 T1A_K05 T1A_K07
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Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	The types of underground infrastructure. The methods of building infrastructure in the soil. The types of narrow-space excavations. The methods of building in underground networks.	W_01 W_06 W_07
2	The principles of positioning multi-duct tunnels in soil; the geometry of tunnels; material solutions. The requirements concerning the principles of setting networks inside multi-duct tunnels. Additional equipment of tunnels.	W_01
3 – 4	The types and characteristics of sewage networks. Damages of sewage ducts as well as the reasons of their occurrence. The consequences of ducts in the observed channels.	W_02 W_03
5 – 6	Pipeline systems; the division of pipeline systems. Structures on pipeline networks and reinforcing pipeline networks.	W_02
7	Trenchless construction of underground ducts.	W_04
8	Trenchless repairs, renovations, and exchanges of the ducts of urban underground infrastructure.	W_05

2. Topics to be covered in the classes
3. Topics to be covered in the laboratories
4. Topics to be covered in the projects

Project number	Topics	Module outcome code
1 – 2	Calculating mean horizontal stresses from loading soil and car fleet in peak plane of a rigid channel (stoneware, concrete, or reinforced concrete) with a circular section positioned in an excavation with vertical walls above the soil water table. The types of stresses, calculating the coefficients of the concentration of stresses.	W_01 W_06 U_01 K_01 K_02
3	Analysing the load bearing capacity of a rigid channel; formulating conclusions resulting from the conducting calculations.	W_06 U_02 K_01 K_02
4 – 5	Calculating loads of the structure concerning a concrete channel with egg and bell section. Calculating stresses in soil. The distribution of loads. Horizontal thrust.	W_07 U_03 K_01 K_02
6 – 7	Calculating internal forces in a concrete channel with egg and bell channel. Analysing stresses. Drawing the diagrams of bending moments and axial forces in a channel structure.	W_08 U_03 K_01 K_02
8	Formulating conclusions resulting from the conducted calculations.	W_08 U_03 K_01 K_02

Assessment methods

Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
W_01	A test and a project
W_02	A test
W_03	A test
W_04	A test
W_05	A test
W_06	A project
W_07	A project
U_01	A test and a project
U_02	A project
U_03	A project
K_01	A project
K_02	A test and a project

C. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	15
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	3
5	Contact hours: participation in project-based classes	15
6	Contact hours: meetings with a project module leader	
7	Contact hours: attendance at an examination	
8		
9	Number of contact hours	33 <i>(total)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.32
11	Private study hours: background reading for lectures	3
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	4
14	Private study hours: preparation for laboratories	
15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	10
18	Private study hours: preparation for an examination	
19		
20	Number of private study hours	17 <i>(total)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit =25-30 hours of study time)</i>	0.68
22	Total study time	50

23	Total ECTS credits for the module <i>(1 ECTS credit =25-30 hours of study time)</i>	2
24	Number of practice-based hours <i>Total practice-based hours</i>	28
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.1