

MODULE SPECIFICATION

Module code	
Module title in Polish	Mechanika gruntów
Module title in English	Soil Mechanics
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 Geotechnical and Hydraulic Engineering
Module co-ordinator	Tomasz Kozłowski, PhD hab., 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 4
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	Yes <i>(yes / no)</i>
ECTS credits	4

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15	15	30		

* 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 fundamentals of soil mechanics and soil engineering. The subject covers classification systems of soils, granulometric composition, plastic and mechanical properties, primary stresses and the stability and the stability of buttresses and slopes (together with the theory of thrust and resistance).
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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 general knowledge as regards the physical and mechanical soil properties as a multi-phase centre.	l/l	B_W03 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W07; T1A_W08;
W_02	A student is familiar with soil classification systems.	l/c/l	B_W03 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W07; T1A_W08;
W_03	A student is acquainted with soil physicochemistry as well as the structure and properties of clay minerals.	l	B_W03 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W07; T1A_W08;
W_04	A student knows the laws ruling filtration and capillary rise.	l	B_W03 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W07; T1A_W08;
W_05	A student knows the principles of calculating primary effective and total stresses as well as porous pressure values.	l/c	B_W03 B_W06 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W06; T1A_W07; T1A_W08;
W_06	A student knows the principles of determining stresses from an external load.	l/c	B_W03 B_W06 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W06; T1A_W07; T1A_W08;
W_07	A student knows the methods of determining slope stability.	l	B_W03 B_W06 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W06; T1A_W07; T1A_W08;
W_08	A student knows the fundamentals of the thrust	l/c	B_W03	T1A_W01;

	and resistance theories.		B_W06 B_W11	T1A_W02; T1A_W03; T1A_W04; T1A_W06; T1A_W07; T1A_W08;
U_01	A student can identify soil on the basis of particle-size distribution curve and the data concerning state.	I/c/I	B_U04 B_U17	T1A_U01; T1A_U02; T1A_U03; T1A_U05; T1A_U08; T1A_U13; T1A_U14
U_02	A student can calculate the necessary physical parameters on the basis of the existing relationships and definitions.	I/c	B_U04 B_U17 B_U18	T1A_U01; T1A_U02; T1A_U03; T1A_U05; T1A_U07; T1A_U08; T1A_U11; T1A_U13; T1A_U14; T1A_U16
U_03	A student is familiar with the principles of calculating primary effective stresses, pore pressure values and total stresses (taking flow pressure and capillarity into consideration).	I/c	B_U17 B_U18	T1A_U07; T1A_U08; T1A_U11; T1A_U13; T1A_U14; T1A_U16
U_04	A student can determine stresses from concentrated forces and continuous loads on soil surface.	I/c	B_U17 B_U18	T1A_U07; T1A_U08; T1A_U11; T1A_U13; T1A_U14; T1A_U16
U_05	A student can (both analytically and graphically) assess the stability of a buttress or a slope.	I/c	B_U17 B_U18	T1A_U07; T1A_U08; T1A_U11; T1A_U13; T1A_U14; T1A_U16
U_06	A student is able to determine the stability of retaining structures.	I/c	B_U14 B_U17 B_U18	T1A_U03; T1A_U04; T1A_U05; T1A_U07; T1A_U08; T1A_U11; T1A_U13; T1A_U14; T1A_U16
U_07	A student can make terrain and laboratory soil testing.	I	B_U16	T1A_U03; T1A_U04; T1A_U08; T1A_U09; T1A_U11; T1A_U14; T1A_U15; T1A_U16

K_01	A student can responsibly work on the assigned issue.	c/l	B_K01	T1A_K01; T1A_K03; T1A_K04
K_02	A student is responsible for the reliability of the obtained results as well as their interpretation.	c/l	B_K02	T1A_K02; T1A_K05; T1A_K07
K_03	A student is aware of the necessity of raising his/her professional competences.	l/c/l	B_K03	T1A_K01; T1A_K05; T1A_K06

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1	Soil as a three-phase centre, physical properties of soils.	W_01 U_02 U_07 K_03
2	Granulometric composition and the division of constructional blocks.	W_01 W_02 U_01 U_07 K_03
3	The states of non-cohesive soils.	W_01 W_02 U_01 U_07 K_03
4	The plasticity and states of cohesive soils.	W_01 W_02 U_01 U_07 K_03
5	The fundamentals of the physicochemistry of soils. Clay minerals.	W_01 W_03 U_07 K_03
6	Filtration and capillarity.	W_01 W_04 U_07 K_03
7	Mechanical properties of soils.	W_01 U_07 K_03
8	Primary stresses (effective, total, and porous pressure values).	W_05 U_03 U_07 K_03
9	Stresses from external loads.	W_06 U_04 U_07 K_03
10	The stability of buttresses and slopes.	W_07 U_05 U_07 K_03

11	Thrust and resistance.	W_08 U_06 U_07 K_03
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2. Topics to be covered in the classes

No.	Topics	Module outcome code
1.	Physical properties.	U_02 K_01 K_02 K_03
2.	The particle-size distribution curve and Ferret's triangle.	W_02 U_01 K_01 K_02 K_03
3.	The states cohesive and non-cohesive soils.	W_02 K_01 K_02 K_03
4.	Mechanical properties.	U_05 K_01 K_02 K_03
5.	Determining primary stresses and porous pressure values.	W_05 U_03
6.	Determining stresses from external load.	W_06 U_04 K_01 K_02 K_03
7.	The stability of retaining walls.	W_08 U_06 K_01 K_02 K_03

1. Topics to be covered in the laboratories

No.	Topics	Module outcome code
1.	Marking moisture.	W_01 U_07 K_01 K_02 K_03
2.	Marking granulometric composition with aerometric and sieve methods.	W_01 U_01 U_07 K_01 K_02 K_03
3.	Marking granulometric composition with the laser diffraction method.	W_01 U_01 U_07

		K_01 K_02 K_03
4.	Marking the plasticity boundary.	W_01 U_07 K_01 K_02 K_03
5.	Marking the yield value.	W_01 U_07 K_01 K_02 K_03
6.	Macroscopic analysis (introduction).	W_01 W_02 U_07 K_01 K_02 K_03
7.	Macroscopic analysis (practical tests).	W_01 W_02 U_07 K_01 K_02 K_03
8.	Marking the density level.	W_01 U_07 K_01 K_02 K_03
9.	Marking optimal moisture in the Proctor's apparatus.	W_01 U_07 K_01 K_02 K_03
10.	Marking volumetric density.	W_01 U_07 K_01 K_02 K_03
11.	Marking the angle of internal friction and cohesion in the direct shearing apparatus.	W_01 U_07 K_01 K_02 K_03
12.	Marking the angle of internal friction and cohesion in the tri-axial pressing apparatus.	W_01 U_07 K_01 K_02 K_03
13.	Field work (examination/test bores and probing with the dynamic probe).	W_01 U_07 K_01 K_02 K_03
14.	Processing the results of field tests.	W_01 U_07

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2. Topics to be covered in the projects

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	An examination
W_02	An examination
W_03	An examination
W_04	An examination
W_05	An examination
W_06	An examination
W_07	An examination
W_08	An examination
U_01	A test and an examination
U_02	A test and an examination
U_03	A test and an examination
U_04	A test and an examination
U_05	A test and an examination
U_06	A test and an examination
U_07	A test
K_01	A test and an examination
K_02	A test and an examination
K_03	A test and an examination

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	15
3	Contact hours: participation in laboratories	30
4	Contact hours: attendance at office hours (2-3 appointments per semester)	3
5	Contact hours: participation in project-based classes	
6	Contact hours: meetings with a project module leader	
7	Contact hours: attendance at an examination	3
8		
9	Number of contact hours	66 <i>(total)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit =25-30 hours of study time)</i>	2.6
11	Private study hours: background reading for lectures	5
12	Private study hours: preparation for classes	3

13	Private study hours: preparation for tests	5
14	Private study hours: preparation for laboratories	10
15	Private study hours: writing reports	5
16	Private study hours: preparation for a final test in laboratories	2
17	Private study hours: preparation of a project/a design specification	
18	Private study hours: preparation for an examination	5
19		
20	Number of private study hours	35 <i>(total)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.4
22	Total study time	101
23	Total ECTS credits for the module <i>(1 ECTS credit =25-30 hours of study time)</i>	4
24	Number of practice-based hours <i>Total practice-based hours</i>	43
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.7