MODULE SPECIFICATION

Module code	
Module title in Polish	Mechanika gruntów
Module title in English	Soil Mechanics
Module running from the academic year	2012/2013

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	Environmental Engineering
Level of qualification	first cycle (first cycle, second cycle)
Programme type	academic (academic/practical)
Mode of study	full-time (full-time/part-time)
Specialism	
Organisational unit responsible for module delivery	Division of Geotechnical and Hydraulic Engineering
Module co-ordinator	Tomasz Kozłowski, PhD hab., Eng., Professor of the University
Approved by:	Lidia Dąbek, PhD hab., Professor of the University

B. MODULE OVERVIEW

Module type	core module (core/programme-specific/elective HES*)
Module status	compulsory module (compulsory/optional)
Language of module delivery	**Polish/English**
Semester in the programme of study in which the module is taught	semester 3
Semester in the academic year in which the module is taught	winter semester (winter semester/summer semester)
Pre-requisites	None (module code/module title, where appropriate)
Examination required	No (Yes/No)
ECTS credits	2

LEARNING OUTCOMES AND ASSESSMENT METHODS

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

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.

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/p	IŚ_W13	T1A_W03;
W_02	A student is familiar with soil classification systems.	l/p	IŚ_W13	T1A_W03;
W_03	A student knows the methods of determining slope stability.	l/p	IŚ_W13; IŚ_W16	T1A_W03; T1A_W05; T1A_W07; T1A_W08;
W_04	A student is familiar with the principles of calculating primary effective stresses, soil pore pressure values and total stresses.	l/p	IŚ_W13	T1A_W03;
U_01	A student is able to identify soil on the basis of a particle-size distribution curve and data concerning the condition.	l/p	IŚ_U01	T1A_U01;
U_02	A student can calculate the necessary physical parameters on the basis of the existing relationships and definitions.	l/p	IŚ_U11;	T1A_U08; T1A_U09;
U_03	A student can apply normative methods of determining parameters for designing purposes.	p	IŚ_U01; IŚ_U02; IŚ_U03	T1A_U01; T1A_U02; T1A_U03;
U_04	A student can (both analytically and graphically) assess the stability of a buttress or a slope.	l/p	IŚ_U03; IŚ_U04; IŚ_U11; IŚ_U13	T1A_U03; T1A_U04; T1A_U07; T1A_U08; T1A_U09;
U_05	A student can calculate the distributions of effective primitive and total stresses (as well as porous pressure values).	l/p	IŚ_U03; IŚ_U04; IŚ_U11; IŚ_U13	T1A_U03; T1A_U04; T1A_U07; T1A_U08; T1A_U09;
K_01	A student can responsibly work on the assigned issue.	p	IŚ K01	T1A_K03;
K_02	A student is responsible for the reliability of the obtained results as well as their interpretation.	p	IŚ K02	T1A_K02; T1A_K05;
K_03	A student is aware of the necessity of raising his/her professional competences.	p	IŚ K03	T1A_K01; T1A_K02;

Module content:

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
2	Granulation and the division of constructional blocks.	W_02
3	The states of non-cohesive soils.	W_02
4	The plasticity and states of cohesive soils.	W_02
5	Mechanical properties of soils.	W_01
6	The stability of buttresses and slopes.	W_03
7	Primary stresses (effective, total, and porous pressure values).	W_04

Topics to be covered in the classes

No.	Topics	Module outcome code
1	The connections between physical properties of soils.	W_01; U_02; K_01; K_02;
2	Calculating the states of cohesive and non-cohesive soils.	W_02; U_01; K_01; K_02;
3	Determining the name of the soil on the basis of the particle-size distribution curve and Ferret's triangle.	W_02; U_01; K_01; K_02;
4	Calculating mechanical parameters.	W_02; U_02 K_01; K_02;
5	Determining geotechnical parameters with the B method.	W_02; U_02; K_01; K_03;
6	Controlling buttress stability with the Fellenius method.	W_03; U_03; U_04; K_01; K_02; K_03;
7	Calculating the distribution of primary effective stresses and total stresses and porous pressure values.	W-01; U_05; K_01; K_02;

Assessment methods

Module outcome code	Assessment methods *(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)*
W_01	A test
W_02	A test and a project
W_03	A test and a project
W_03	A test

U_01	A test
U_02	A test and a project
U_03	A test and a project
U_03	A test
K_01	A project
K_02	A project
K_03	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	**2**
7	Contact hours: attendance at an examination	**3**
8		
9	**Number of contact hours**	**38** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**1.52**
11	Private study hours: background reading for lectures	**8**
12	Private study hours: preparation for classes	**-**
13	Private study hours: preparation for tests	**5**
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	**8**
18	Private study hours: preparation for an examination	**4**
19		
20	**Number of private study hours**	**27** *(total)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**1.0**
22	**Total study time**	**63**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**2.0**
24	**Number of practice-based hours** *Total practice-based hours*	**25**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**1.0**

E. READING LIST

References*	[1] **Environmental soil science** / Kim H. Tan. Boca Raton ; London : CRC Press : Taylor & Francis, cop. 2009. 3rd ed. [2] **Unsaturated soil mechanics** / Ning Lu and William J. Likos. Hoboken : Wiley, cop. 2004. [3] **Soil physics : selected topics** / Arpad Kezdi. Budapest : Akademiai Kiado, 1979. [4] **Soil water dynamics** / A. W. Warrick. Oxford : Oxford University Press, [2012], 2003. [5] **Soil mechanics and transport in porous media : selected works of G. de Josselin de Jong** / Ed. by Ruud J. Schotting, Hans (C. J.) van Duijn and Arnold Verruijt. Dordrecht : Springer, cop. 2006. [6] **The mechanics of soils and foundations** / John Atkinson. Atkinson, John H. London ; New York : Taylor and Francis, cop. 2007. 2nd ed. [7] **Lectures on soil mechanics** / Bogumił Wrana ; Politechnika Krakowska im. Tadeusza Kościuszki. Kraków : Wydawnictwo PK, 2014. [8] **Laboratory testing of soil mechanics** / Bogumił Wrana ; Politechnika Krakowska im. Tadeusza Kościuszki. Kraków : wydawnictwo PK, 2015.
Module website	

* - only books available in the Main University Library have been considered in the list