



MODULE SPECIFICATION

Module code	
Module title in Polish	Geotechnika
Module title in English	Geotechnical Engineering
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 4
Semester in the academic year in which the module is taught	summer semester (winter semester/summer semester)
Pre-requisites	None (module code/module title, where appropriate)
Examination required	Yes (Yes/No)
ECTS credits	5



LEARNING OUTCOMES AND ASSESSMENT METHODS

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

Module aims	The aim of the module is to familiarise students the issues of geotechnical engineering and environmental geoengineering, i.e. preparing and analysing geotechnical documentation, designing simple direct foundations, designing retaining walls, water motion in soil, protection systems of soil against contamination, the application of geotextiles in environmental engineering, the protection and land reclamation.
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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 is knowledgeable about water and soil environment.	l/l	IŚ_W07; IŚ_W13;	T1A_W03; T1A_W08;
W_02	A student has knowledge on the principles of preparing geotechnical documentations.	l/p	IŚ_W13; IŚ_W04	T1A_W03; T1A_W02; T1A_W07;
W_03	A student knows the types of direct foundations and the principles of designing them.	l	IŚ_W03; IŚ_W13; IŚ_W14;	T1A_W02; T1A_W03;
W_04	A student knows the types of retaining walls and is familiar with the principles of designing them in terms of substitute as well as general stability and surface load bearing capability.	l	IŚ_W13; IŚ_W14;	T1A_W02; T1A_W03;
W_05	A student has knowledge on geoengineering methods of reinforcing and stabilising soil.	l	IŚ_W06; IŚ_W13; IŚ_W16;	T1A_W03; T1A_W05; T1A_W07; T1A_W08;
W_06	A student has knowledge on protection systems concerning soil against contamination.	l	IŚ_W13; IŚ_W16;	T1A_W03; T1A_W05; T1A_W07; T1A_W08;
W_07	A student has knowledge on the principles of protecting and reclaiming land.	l	IŚ_W13; IŚ_W16;	T1A_W03; T1A_W05; T1A_W07; T1A_W08;
W_08	A student has knowledge of geotechnical utilisation of industrial, post-exploitation, and processing waste.	l	IŚ_W06; IŚ_W13; IŚ_W16;	T1A_W03; T1A_W05; T1A_W07; T1A_W08;
U_01	A student can prepare geotechnical documentation on the	l/p	IŚ_U01;	T1A_U01;



	basis of foundation soil examination results.		IŚ_U03; IŚ_U10;	T1A_U03; T1A_U07;
U_02	A student can design foundation of a square foot and eccentrically loaded bench.	l/p	IŚ_U09; IŚ_U11; IŚ_U13; IŚ_U23;	T1A_U02; T1A_U03; T1A_U07; T1A_U08; T1A_U09; T1A_U14; T1A_U15; T1A_U16;
U_03	A student can design a retaining structure.	p	IŚ_U09; IŚ_U11; IŚ_U13; IŚ_U23;	T1A_U02; T1A_U03; T1A_U07; T1A_U08; T1A_U09; T1A_U14; T1A_U15; T1A_U16;
U_04	A student can select an appropriate foundation protection against contamination.	l	IŚ_U08; IŚ_U10; IŚ_U11; IŚ_U23; IŚ_U24;	T1A_U01; T1A_U04; T1A_U07; T1A_U08; T1A_U09; T1A_U10; T1A_U14; T1A_U16;
U_05	A student can select an appropriate remediation method of a degraded area.	l	IŚ_U08; IŚ_U10; IŚ_U11; IŚ_U24;	T1A_U01; T1A_U04; T1A_U07; T1A_U08; T1A_U09; T1A_U10;
K_01	A student can work responsibly on the assigned task.	p	IŚ K01	T1A_K03;
K_02	A student is responsible for the reliability of the obtained results and 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	An outline of soil physicochemistry. Clay minerals.	W_01 W_06
2	Water in soil. Bonded water. Capillarity.	W_01
3	Filtrations and flow pressure.	W_01



4	Stresses from external loads.	W_01
5	Basic information on the methods of building foundation.	W_03
6	The types and principles of designing direct foundation.	W_03
7	Thrust and resistance of soil.	W_04
8	Retaining structures: their types and principles of designing.	W_04
9	Cavity walls: their realisation and principles of designing.	W_04 W_06
10	Geotextiles in environmental geoengineering.	W_04 W_05 W_05
11	The methods of stabilising and reinforcing soils.	W_05
12	Protections systems of foundation soil against contamination.	W_06
13	The remediation of areas degraded with various forms of engineering activity.	W_07
14	Geotechnical utilisation of industrial, post-exploitation, and processing waste.	W_08

Topics to be covered in the classes

No.	Topics	Module outcome code
1.	Marking granulometric composition with the aerometric and sieve methods	W_01 W_02 U_01
2.	Marking granulometric composition with the laser diffraction method.	W_01 W_02 U_01
3.	Marking plasticity limit.	W_01 W_02 U_01
4.	Marking liquid limit.	W_01 W_02 U_01
5.	Macroscopic analysis (introduction).	W_01 W_02 U_01
6.	Macroscopic analysis (practical tests).	W_01 W_02 U_01
7.	Field practice (test/examination bores and probing with the dynamic probe).	W_01 W_02 U_01

Assessment methods

Module outcome	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
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code	
W_01	An examination and a test during laboratory classes
W_02	A project and a test during laboratory classes
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 project and a test during laboratory classes
U_02	An examination and a project
U_03	Projects
U_04	An examination
U_05	An examination
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	30
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	4
7	Contact hours: attendance at an examination	3
8		
9	Number of contact hours	70 <i>(sum)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit = 25-30 hours of study time)</i>	2.80
11	Private study hours: background reading for lectures	10
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	10
18	Private study hours: preparation for an examination	15



19		
20	Number of private study hours	40 <i>(sum)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit =25-30 hours of study time)</i>	2.20
22	Total study time	84
23	Total ECTS credits for the module <i>(1 ECTS credit =25-30 hours of study time)</i>	5.0
24	Number of practice-based hours <i>Total practice-based hours</i>	49
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit =25-30 hours of study time)</i>	2.00

E. READING LIST

References*	<ul style="list-style-type: none"> [1] Environmental soil science / Kim H. Tan. Boca Raton ; London : CRC Press : Taylor & Francis, cop. 2009. 3rd ed. [2] The mechanics of soils and foundations / John Atkinson. Atkinson, John H. London ; New York : Taylor and Francis, cop. 2007. 2nd ed. [3] Lectures on soil mechanics / Bogumił Wrana ; Politechnika Krakowska im. Tadeusza Kościuszki. Kraków : Wydawnictwo PK, 2014. [4] Laboratory testing of soil mechanics / Bogumił Wrana ; Politechnika Krakowska im. Tadeusza Kościuszki. Kraków : wydawnictwo PK, 2015. [5] Geotechnical engineering handbook. Vol. 1, Fundamentals / edit. Ulrich Smoltczyk. Berlin : Ernst & Sohn Verlag, 2002. [6] Geotechnical engineering handbook. Vol. 2, Procedures / ed. Ulrich Smoltczyk. Berlin : Ernst & Sohn Verlag, 2003. [7] Geotechnical engineering handbook. Vol. 3, Elements and structures / ed. Ulrich Smoltczyk. Berlin : Ernst & Sohn Verlag, 2003. [8] Recommendations for design and analysis of earth structures using geosynthetic reinforcements - EBGeo / published by the German Geotechnical Society (Deutsche Gesellschaft für Geotechnik e.V., DGGT); Berlin : Ernst & Sohn, cop. 2011. [9] Geotechnical engineering calculations and rules of thumb / Ruwan Rajapakse. Rajapakse, Ruwan. Amsterdam [etc.] : Elsevier/BH, cop. 2008. [10] Risk assessment in geotechnical engineering / Gordon A. Fenton, D. V. Griffiths. Fenton, Gordon A. Hoboken : John Wiley & Sons, Inc., cop. 2008. [11] Geotechnical and environmental aspects of waste disposal sites: proceedings of a Green4 International Symposium on Geotechnics Related to the Environment, Wolverhampton, UK, 28 June- 1 July 2004 / eds.: R. W. Sarsby, A. J. Felton. London [etc.] : Taylor & Francis, 2007.
Module website	

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