MODULE SPECIFICATION

Module code	
Module title in Polish	**Geotechnika drogowa**
Module title in English	**Road Geotechnics**
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** *(first cycle, second cycle)*
Studies profile	**Academic** (*academic/practical)*
Mode of study	**Full-time** *(full-time / part-time)*
Specialism	
Organisational unit responsible for module delivery	**The Department of Geotechnical and Hydraulic Engineering**
Module co-ordinator	**Tomasz Kozłowski, PhD hab., Eng., Associate Professor**
Approved by	**Marek Iwański, Professor**

B. MODULE OVERVIEW

Module type	**Core module** (*core/programme-specific/elective HES*)*
Module status	**Compulsory module** *(compulsory / non-compulsory)*
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** *(winter / summer)*
Pre-requisites	**None** (*module code/module title, where appropriate)*
Examination required	**No** *(yes / no)*
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 aims of the module are as follows: acquiring knowledge and abilities as regards the stability of natural and artificial slopes; acquiring the ability of designing retaining structures; acquiring knowledge of frost phenomena in road building.

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 the methods of controlling the stability of buttresses.	l/p	B_W01 B_W11	T1A_W01; T1A_W02; T1A_W03; T1A_W04; T1A_W07
W_02	A student has knowledge on geosynthetics applied in road building; a student also knows the methods of reinforcing weak subgrades.	l	B_W02	T1A_W01; T1A_W02; T1A_W03; T1A_W05
W_03	A student is knowledgeable about the types of retaining structures as well as issues connected with groundthrust and resistance.	l/p	B_W08 B_W11	T1A_W03; T1A_W04; T1A_W07; T1A_W08
W_04	A student is knowledgeable about frost phenomena taking place in road subgrade.	l	B_W01	T1A_W01; T1A_W02
U_01	A student is able to check the stability of a slope.	p	B_U01 B_U17	T1A_U08; T1A_U09; T1A_U13; T1A_U14
U_02	A student is able to integrate loads connected with soil.	l/p	B_U01	T1A_U08; T1A_U09
U_03	A student can design a retaining structure.	p	B_U12 B_U13 B_U17 B_U18	T1A_U01; T1A_U05; T1A_U07; T1A_U08; T1A_U09; T1A_U11; T1A_U13; T1A_U14; T1A_U15; T1A_U16
K_01	A student can work individually and co-operate in a team on the assigned task; moreover, a student can determine the priorities for the realisation of tasks.	p	B_K01	T1A_K01; T1A_K03; T1A_K04
K_02	A student is aware of the responsibility for the safety of his/her work and the work of the team. Moreover, a student is aware of the hazards occurring in civil engineering.	l/p	B_K02 B_K05	T1A_K02; T1A_K05; T1A_K07
K_03	A student is sensitive in terms of preserving natural resources of the environment.	l/p	B_K09	T1A_K01; T1A_K02

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome

		code
1.	The stability of buttresses and slopes: accepting a computational model; selecting computational methods; the stability of buttresses and slopes in non-cohesive and cohesive soil; the stability of rocky slopes.	W_01
2.	Landslides: their genesis, classification, investor's tasks, the principles of installing surveying instruments, protection methods.	W_01
3.	Special issues of thrust and resistance: the thrust of layered soil; the thrust on retaining walls with breakage; the thrust on rigid and circular retaining walls; the resistance of the layered soil; the cases of diverse diagrams concerning surcharge loading.	W_03
4.	Geosythetics and goetextiles in road buildings: geosythetic materials, testing geosynthetics; technical features of geosynthetics; the application of geosynthetics in road building; building geosynthetics.	W_02
5.	The types of retaining structures: massive, weakly-reinforced and angular structures; structures from the reinforced ground (with metal bands and with geotextiles); structures with several horizontal shelves; the structures with the anchor slab; crib structures.	W_03
6.	Geotechnical properties of made ground (and the methods of testing them): mineal fine-grained, thick-grained, and rocky ground; geotechnical properties of waste; geotechnical properties of organic made ground; geotechnical properties of stabilized organic ground.	W_01;
7.	Buttresses on organic ground and other weak subgrades: compressible road subgrades; the classification and properties of organic ground; tests of weak subgrades; the subsidence of weak subgrade; increasing the rate of condensation subsidence; the methods of buttress foundation; control tests of the constructed buttress.	W_01; W_03
8.	The methods of reinforcing weak subgrades: deep condensation of non-cohesive ground; initial condensation of cohesive ground; jet grouting; the stabilisation of ground; reinforcing grounds; foundation of landslide areas.	W_02
9.	Frost phenomena in a road subgrade: heat flow in ground; climatic issues; the specificity of phase transitions; water inflow to the freezing zone; the mechanism of creating ice lenses; the criteria of heave soil; the occurrence of surface bucklings; preventing frost damages in road maintenance.	W_04
10.	The stability of buttresses and slopes: accepting a computational model; selecting computational methods; the stability of buttresses and slopes in non-cohesive and cohesive soils; the stability of rocky slopes.	W_01
11.	Landslides: their genesis, classification, investor's tasks, the principles of installing surveying instruments, protection methods.	W_01

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	Controlling buttress stability.	W_01; U_01; K_01, K_02; K_03
2	A project of a massive retaining wall.	W_03; U_02; U_03; K_01, K_02; K_03

Assessment methods

Module outcome code	**Assessment methods** *(Method of assessment; for module skills − reference to specific project, laboratory and similar tasks)*
W_01	A final test and a project
W_02	A final test
W_03	A final test and a project
W_04	A final test
U_01	A project
U_02	A project
U_03	A project
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	**0**
3	Contact hours: participation in laboratories	**0**
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	**0**
7	Contact hours: attendance at an examination	**2**
8		
9	**Number of contact hours**	**35** *(total)*
10	**Number of ECTS credits for contact hours** *(1 ECTS credit =25-30 hours of study time)*	**1.4**
11	Private study hours: background reading for lectures	**2**
12	Private study hours: preparation for classes	**0**
13	Private study hours: preparation for tests	**0**
14	Private study hours: preparation for laboratories	**0**
15	Private study hours: writing reports	**0**
16	Private study hours: preparation for a final test in laboratories	**0**
17	Private study hours: preparation of a project/a design specification	**15**
18	Private study hours: preparation for an examination	**5**
19		
20	**Number of private study hours**	**22** *(total)*
21	**Number of ECTS credits for private study hours** *(1 ECTS credit =25-30 hours of study time)*	**0.9**
22	**Total study time**	**57**
23	**Total ECTS credits for the module** *(1 ECTS credit =25-30 hours of study time)*	**2**

24	**Number of practice-based hours** *Total practice-based hours*	**33**
25	**Number of ECTS credits for practice-based hours** *(1 ECTS credit =25-30 hours of study time)*	**1.3**