COURSE DESCRIPTION CARD

The name of the course/module		Code
GEOTECHNICS		**A_U_1.5_008**
Main field of study: **ARCHITECTURE**	Educational profile (general academic, practical): **general academic**	Year/ term: **III/5**
Specialization: **all specializations**	Language of course: **Polish**	Course (core, elective): **core**
Hours: Lectures: **15** Classes: **15** Laboratory classes: **0** Projects / seminars: **0**		Number of points: **2 ECTS**

Level of qualification:	Form of studies (full-time studies/part-time studies)	Educational area(s)	ECTS distribution (number and %)
I	**Full-time studies**	**Technical Sciences**	**2 100%**

Course status in the studies' program (basic, directional, other)	(general academic, from a different major)
Supplementary	-

Lecturer responsible for the course :

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Lecturer:

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Prerequisites defined in terms of knowledge, skills, social competences:

1	**Knowledge:**	Full scope of knowledge covered by the program preceding first-cycle studies in the field of Architecture and Urban Planning, especially concerns the freely use the knowledge obtained during first-cycle studies from courses: Mathematics, Mechanics, General engineering, Building constructions, geology and physiography.
2	**Skills:**	Full scope of knowledge covered by the program preceding first-cycle studies in the field of Architecture and Urban Planning, especially concerns the skills obtained during first-cycle studies from courses: Mathematics, Mechanics, General engineering, Building constructions, geology and physiography.
3	**Social competences:**	Student: • can cooperate in a team during realization of given task; • is responsible for the reliability of results his/her own works; • can independently obtain and develop the knowledge in the scope of modern methods, processes and technologies.

Objective of the course:

Obtaining the level of geotechnical knowledge, enabling the effective cooperation with building constructor and investor in the scope of:

- optimal location of building facilities, including the engineering-geological conditions and geotechnical conditions,
- programming the geotechnical researches, geotechnical determinants and limitations for designing the buildings,
- identification of relations between soil-water environment and natural environment and structure of building and its foundation.

knows basic legal regulations related to engineering geology, geotechnics and foundation works.

Learning outcomes

Knowledge:

W01	has knowledge of geotechnics and foundation engineering	AU1_W09

Skills:

U01	can communicate using different IT tools in the professional environment and in other environments	AU1_U05

U02	can draw and dimension the basic structural and construction elements in an architectural concept and in the building plans and designs	AU1_U10
Social competences:		
K01	can work over a set task independently and can cooperate in a team, assuming a number of different roles therein; demonstrates responsibility in the work performance	AU1_K01
K02	is aware of the importance of non-technical aspects and effects of engineering activities, in this impact upon the environment and liability for environment affecting decisions	AU1_K05

The evaluation methods:

1. Lectures – written exam
2. Classes – written tests (2), implementation of design task concerning the geotechnical dimensioning of simple direct foundations.

The credit condition of course is obtain minimum 35 points on 60 possible with grade according to scale:

- 35 – 40 grade 3
- 41 – 45 grade 3,5
- 46 – 50 grade 4
- 51 – 55 grade 4,5
- 56 – 60 grade 5.

Positive grade for module depends on achieved by student all learning outcomes specified in the syllabus.

Course contents

I. Introduction to issues of course:

- relations between geotechnics and urban planning and architecture, examples of practical applications of geotechnical knowledge;
- selected issues of engineering geology of Tertiary and Quaternary in the area of Poland;
- geotechnical norms and classification of building soils;
- basic physicochemical properties of soil-water environment;
- soils load-bearing capacity, filled-up soils, made grounds, dumping grounds, organic soils, glacitectonically disturbed foundations, spatial heterogeneity of the foundation.

II. Mechanical properties of soils:

- soils compressibility;
- shear strength of soils;
- earth pressure and foundation stability;
- influence of environmental factors on mechanical properties of soils.

III. Bearing capacity, stability and deformability of ground base:

- stress state in the foundation, initial, additional stress and secondary stress;
- theoretical foundations of bearing capacity calculation
- designing the shallow foundations from the condition of load-bearing capacity;
- calculation of projected buildings sedimentation;
- slope stability, the impact of groundwater on building;
- computer-aid methods in the analysis of geotechnical problems.

IV. Foundation methods of buildings in different soil-water conditions:

- structural solutions of shallow foundations;
- methods of deep foundation engineering;
- foundations of monumental buildings and techniques of their reinforcement;
- geotechnical problems of earth works, dewatering of excavations;
- selected technologies of specialist foundation works and soils stabilization;
- application of the new materials in geotechnics – geosynthetics, foamed polystyrene, kermesite, the foamglass granulate, foamed concrete, liquid consistency of cohesive soil, steel fibre for concrete reinforcement, materials from recycling …

V. Destructive environmental interactions:

- sources of vibrations in urbanized environment, determinants of vibrations propagation processes in foundation, assessment of vibrations harmfulness for buildings, protection of buildings against the effects of excessive vibrations propagating in the ground base.
- erosion, infiltration, suffosion, disturbances in flow of groundwater;
- the spread of contaminations in soil-water environment, aggressiveness in relative to concrete, chemical and biological corrosion of concrete and steel;
- the influence of natural environment and climatic factors on buildings founded in expansive soils, threats of building facilities by roots of trees and shrubbery.

VI. Geotechnical activities in different stages of investment realization:

- determination of geotechnical categories of building facility and programming the geotechnical researches;
- research methods of ground base for the geotechnical designing;
- geotechnical inspection on the stage of facility realization and monitoring of building facility;
- legislations in geotechnics.

VII. Geotechnics in spatial planning:

- using the engineering-geological maps, ecophysiographic studies and geotechnical materials of archival in urban planning and for making location decisions;
- the role of historical and cartographic information in geotechnical assessment of territory;
- geotechnical problems of location of waste landfills, cemeteries, car roads etc.;
- making planning and design decisions including the geotechnical determinants, specialized systems of spatial information.

VIII. Disasters and damages of buildings of the geotechnical causes:

- mistakes on the stage of engineering-geological and geotechnical identification;
- design mistakes and execution mistakes;
- mistakes of exploitation and environmental causes;
- determination of causes of geotechnical failures;
- improving the conditions of foundation the existing buildings;
- examples of building failures and disasters of the geotechnical causes.

Basic bibliography

Norms and legal acts:

1. PN–B–02481:1998. Geotechnika. Terminologia podstawowa, symbole podstawowe i jednostki miar.
2. PN–86/B–02480. Grunty budowlane. Określenia, symbole, podział i opis gruntów.
3. PN–EN ISO 14688–1:2006. Badania geotechniczne. Oznaczanie i klasyfikacja gruntów. Część 1: Oznaczanie i opis.
4. PN–EN–ISO–14688–2:2006. Badania geotechniczne. Oznaczanie i klasyfikowanie gruntów. Część 2: Zasady klasyfikowania
5. PN–B–02479:1998. Geotechnika. Dokumentowanie geotechniczne. Zasady ogólne.
6. PN–S–02205:1998. Drogi samochodowe. Roboty ziemne. Wymagania i badania.
7. PN–B–06050:1999. Geotechnika, Roboty ziemne. Wymagania ogólne.
8. PN–B–04452.:2002. Geotechnika. Badania polowe.
9. PN–81/B–03020. Grunty budowlane. Posadowienie bezpośrednie budowli.
10. PN–EN 1997–1:2008. Projektowanie geotechniczne. Część 1. Zasady ogólne.
11. PN–EN 1997–2: 2009. Projektowanie geotechniczne. Część 2: Rozpoznanie i badanie podłoża gruntowego.
12. PN-83/B-03010. Ściany oporowe. Obliczenia statyczne i projektowanie.
13. PN-83/B-02482. Fundamenty budowlane. Nośność pali i fundamentów palowych.
14. PN-85/B-02170 Ocena szkodliwości drgań przekazywanych przez podłoże na budynki.
15. Rozporządzenie Ministra Transportu, Budownictwa i Gospodarki Morskiej z dnia 25 kwietnia 2012 roku w sprawie ustalania geotechnicznych warunków posadowienia obiektów budowlanych. (Dz. U. z 2012 r. poz. 463).
16. Prawo budowlane (fragmenty), Prawo geologiczne (fragmenty),
17. Warunki techniczne jakim powinny odpowiadać ... (dla różnych rodzajów budownictwa)

Books and scripts:

1. Wiłun Z.,, Zarys geotechniki. Warszawa, WKiŁ, 2010.
2. Pisarczyk St., Gruntoznawstwo inżynierskie, Warszawa, Wydawnictwo Naukowe PWN S.A. 2001.
3. Obrycki M.,Pisarczyk St.: Wybrane zagadnienia z fundamentowania, Przykłady obliczeń, Oficyna Wydawnicza Politechniki Warszawskiej 1998.
4. Grabowski Z., Pisarczyk St., Obrycki M.: Fundamentowanie, Oficyna Wyd. PW, Warszawa 1999.
5. Rybak Cz., Puła O., Sarniak W.: Fundamentowanie, Projektowanie posadowień, Wrocław, Dolnośląskie Wydawnictwo Edukacyjne 1997 i późniejsze wydania.

Articles in the engineering periodicals:

1. Inżynieria i Budownictwo.
2. Inżynieria Morska i Geotechnika.
3. Geoinżynieria, Drogi, Mosty, Tunele.
4. Nowoczesne Budownictwo Inżynieryjne.
5. Drogownictwo.
6. Przegląd Komunikacyjny
7. Przegląd Budowlany

The student workload

Form of activity	Hours	ECTS
Overall expenditure	55	2
Classes requiring an individual contact with teacher	39,5	1
Practical classes	22,5	-

Balance the workload of the average student

Form of activity	Number of hours
participation in lectures	15 h
participation in classes/ laboratory classes (projects)	15 h
preparation for classes/ laboratory classes	15 x 0,5 h = 7,5 h
preparation to colloquium/review	-
participation in consultation related to realization of learning process	15 x 0,5 h = 7,5 h
preparation to the exam	8 h
attendance at exam	2 h

Overall expenditure of student: 2 **ECTS credits** **55 h**

As part of this specified student workload

- activities that require direct participation of teachers:

  15 h +15 h + 7,5 h + 2 h = 39,5 **h** 1 **ECTS credit**