STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Special foundations		**1010102121010126022**

Field of study	Profile of study (general academic, practical)	Year /Semester
Civil Engineering Second-cycle Studies	**general academic**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Structural Engineering	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **30** Classes: **-** Laboratory: **-** Project/seminars: **15**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
major	**from field**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**
Technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Physics, Mathematics, Theory of Elasticity and Plasticity (a first/second degree level) Engineering Geology, Soil Mechanics. Foundation Engineering (a first degree level)
2	**Skills**	creation of the computational models od subsoil on the base of geotechnical data use of CAD software packages and spreadsheets design of footings and strip foundations in simple geotechnical conditions the proper use of Polish language
3	**Social competencies**	the need to continuous update and supplement knowledge and skills.

Assumptions and objectives of the course:

The course aims to familiarize students with modern foundation methods applied in structural engineering. Students learns about: design of specific application of different foundation solutions in complex geotechnical conditions, with special attention to deep foundations, soil improvement techniques and soil modification with the use of geosynthetics

Design of deep pile foundations is executed individually by students, in order to acquire practical skills.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Knowledge on special foundation techniques and methods; - [[K W 01-03, K_W15]]
2. Knowledge on soil improvement and modification technologies and methods; - [[K W 01-03]]
3. Knowledge on rules, codes and methods of analysis of soil bearing capacity and deformation states for shallow and deep foundations - [[K W 01-03]]

Skills:

1. Correct identification of engineering problems associated with ?soil-structure? interaction; - [[K U 01, 03]]
2. Analysis of bearing capacity and deformations in multilayered subsoil; - [[K U 01, 03]]
3. Geotechnical design of shallow and pile foundations, in complex geotechnical conditions; - [[K U 01, 03, KU_15]]
4. Design of ground improvement, in complex geotechnical conditions; - [[K U 01, 03]]

Social competencies:

1. Student is able to cooperate and work in teams; - [[K_K01]]
2. Student understands the need of continuous learning and is able to organize the learning process of others; - [[K_K03, K_K06]]

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Assessment methods of study outcomes
Deep foundation exercise: design and calculations of a pile foundation and ground improvement or reinforcement
Final evaluation of lectures and classes - test in week 14.

Course description
Methods of in situ geotechnical investigations and interpretation of their results
Computer methods in geotechnical design and ?soil-structure? interaction analyses
Advanced foundation technologies in complex geotechnical and loading conditions ? deep foundations and ground improvement
Applications of geosynthetics and other ?untypical? materials to modification, reinforcement and improvement of soils.
Deep excavations and foundation works in urban environments, ground movements during excavation and stability problems of nearby buildings, utilities and streets
Geotechnical design of shallow foundations in complex geotechnical conditions (layered soils, soft soils, expansive soils, glacitectonically disturbed soils)
Geotechnical design of ground improvement and pile foundations in structural engineering
Construction failures and disasters caused by geotechnical reasons ? discussion of case studies
Modern methods of geotechnical measurements and monitoring ? requirements and real examples of application

Basic bibliography:

1. Siemińska-Lewandowska A.: Głębokie wykopy. Projektowanie i wykonawstwo, WKŁ, Warszawa 2010
2. Gwizdała K.: Fundamenty palowe. Technologie i obliczenia, PWN, Warszawa 2010
3. Bzówka J., Knapik K., Juzwa A., Stelmach K..: Geotechnika komunikacyjna, Wydawnictwo Politechniki Śląskiej, Gliwice 2013
4. Jarominiak A.: Lekkie konstrukcje oporowe, Wydawnictwo Komunikacji i Łączności, Warszawa 2002
5. Pisarczyk St.: Geoinżynieria. Metody modyfikacji podłoża gruntowego, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005
6. Stilger-Szydło E.: Posadowienia budowli infrastruktury transportu lądowego: teoria, projektowanie, realizacja, Dolnośląskie Wydawnictwo Edukacyjne, Wrocław 2005

Additional bibliography:

1. Wiłun Z.: Zarys geotechniki, WKiŁ, Warszawa 2010 i późniejsze wydania.
2. Rybak Cz., Puła O., Sarniak W.: Fundamentowanie, Projektowanie posadowień, Dolnośląskie Wydawnictwo Edukacyjne, Wrocław 2009 i późniejsze wydania.
3. Obrycki M.,Pisarczyk St.: Wybrane zagadnienia z fundamentowania. Przykłady obliczeń, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1998.
4. Grabowski Z., Pisarczyk St., Obrycki M.: Fundamentowanie, Oficyna Wyd. PW, Warszawa 1999.
5. Jeż J.: Biogeotechnika, Wyd. Politechniki Poznańskiej, Poznań 2008
6. Wysokiński L., Kotlicki W., Godlewski T.: Projektowanie geotechniczne według Eurokodu 7, Wydawnictwo ITB, Warszawa 2011
7. Puła O.: Projektowanie fundamentów bezpośrednich według Eurokodu 7, Dolnośląskie Wydawnictwo Edukacyjne, Wyd. 2., Wrocław 2012
8. Dąbska A., Gołębiewska A.: Podstawy geotechniki. Zadania według Eurokodu 7, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012
9. Uwaga: aktualne dane bibliograficzne podstawowych norm, aktów prawnych, instrukcji, wytycznych i poradników będą przekazywane studentom w toku zajęć.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures, classes and tutorials	35
2. Individual work at	45

Student's workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	45	2
Practical activities	30	1

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