



SZKOŁA GŁÓWNA  
GOSPODARSTWA  
WIEJSKIEGO

## Foundation Engineering and Ground Improvement

### Educational subject description sheet

#### Basic information

<p><b>Field of study</b> Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes)</p> <p><b>Speciality</b> -</p> <p><b>Organizational unit</b> Course Offer for exchange students</p> <p><b>Study level</b> second cycle studies, including uniform master studies (MA programmes)</p> <p><b>Study form</b> full-time studies</p> <p><b>Education profile</b> General academic</p>	<p><b>Didactic cycle</b> 2024/25</p> <p><b>Subject code</b> PWMPWM2S_D.B100000P.06293.24</p> <p><b>Lecture languages</b> english</p> <p><b>Mandatory</b> Elective subjects</p> <p><b>Block</b> Basic subjects</p> <p><b>Disciplines</b></p>	
<b>Coordinator</b>	Zbigniew Lechowicz	
<b>Teacher</b>	Zbigniew Lechowicz, Beata Gajewska	
<b>Period</b> Winter semester	<b>Examination</b> Exam	<b>Number of ECTS points</b> 6
	<b>Activities and hours</b> Lecture: 15 Auditorium exercises: 15	

#### Goals

Code	Goal
C1	Lecturing and laboratories hours are given to the students for understanding of the information regarding to geotechnical design in foundation engineering, design of spread and deep foundations according to Eurocode 7 using Ultimate Limit States and Serviceability Limit States as well as ground improvement. PPT slides are available to the student with major references in list.

## Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Knows and understands the principles of geotechnical design of engineering structures		Project, Test (written or computer based)
W2	Knows and understands the principles of designing the ground improvement of engineering structures		Project, Test (written or computer based)
<b>Skills - Student can:</b>			
U1	Is able to design direct foundations using the principles of Eurocode 7 with complex load conditions		Project, Test (written or computer based)
U2	Is able to design improvement of the ground of engineering structures		Project, Test (written or computer based)
<b>Social competences - Student is ready to:</b>			
K1	Is ready to critically evaluate his/her professional knowledge and consult experts in the event of difficulties in solving a geotechnical problem on his/her own		Project, Test (written or computer based)
K2	Is ready to perform professional roles responsibly, including adherence to professional ethics and maintaining the ethos of the engineering profession		Project, Test (written or computer based)

## Study content

No.	Course content	Subject's learning outcomes	Activities
1.	<ul style="list-style-type: none"> <li>· General principles of foundation engineering</li> <li>· General principles of ground improvement</li> <li>· General principles of Geotechnical design according Eurocode 7</li> <li>· Assessment of ULS and SLS of spread and deep foundations</li> <li>· Methods of ground improvement (ground improvement without and with admixtures, ground improvement with grouting or inclusions)</li> <li>· Soil reinforcement</li> </ul>	W1, W2, U1, U2, K1, K2	Lecture, Auditorium exercises

## Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, Discussion, Design method
Auditorium exercises	Case study, Discussion, Problem solving, Design method, Individual work

Activities	Examination method	Percentage
Lecture	Test (written or computer based)	50%
Auditorium exercises	Project	50%

Activities	Credit conditions
Lecture	Positive test grade (at least 51% of the maximum test score)
Auditorium exercises	Positive defense of project(s) (at least 51% of the maximum mark)

## Literature

### Obligatory

- ASIRI Recommendations for the design, construction and control of rigid inclusion ground improvements. Presses des Ponts
- BOND A., HARRIS A. 2008: Decoding Eurocode 7. Taylor&Francis. London
- CHU J., VARAKSIN S. KLOTZ U. MENGE P. 2009.: Construction Processes. TC17 State of the Art Report ([www.bbri.be/go/tc17](http://www.bbri.be/go/tc17))
- EBGEO. Recommendations for design and analysis of earth structures using geosynthetic reinforcements. DGGT; Ernst & Sohn 2011
- HAN J. 2015. Principles and practices of ground improvement. Wiley
- EN 1997-1 Eurocode 7 2004: Geotechnical Design – Part 1: General Rules, CEN, Brussels
- EN 1997-2 Eurocode 7 2007: Geotechnical Design – Part 2: Ground investigation and testing, CEN, Brussels

### Optional

- CUR 1996: Building on soft soils. Balkema. Ratterdam
- DAS B. M. 2006: Theoretical foundation engineering. J. Ross Publishing Inc.
- FRANK R., BAUDUIN C., DRISCOLL R., KAVVADAS M., KREBS OVESEN N., ORR T., SCHUPPENER B. 2004: Designers' Guide to EN 1997-1, Eurocode 7. Geotechnical design – General rules. Thomas Telford, London
- HARTLEN, J. & WOLSKI, W. 1996. Embankments on organic soils, Elsevier, Amsterdam
- ROWE R. K. 2001: Geotechnical and geoenvironmental engineering handbook. Kluwer Academic Publishers. London
- WSDOT Geotechnical Design Manual, 2013. [on-line source]. <http://www.wsdot.wa.gov/publications/manuals/fulltext/m46-03/chapter1.pdf>

## Calculation of ECTS points

Activity form	Activity hours*
Lecture	15
Auditorium exercises	15
Preparation for exercises	15
Preparing the project	45
Conducting literature research	30
Preparation for the test	40
Self-study on the content covered in class	20

<b>Student workload</b>	<b>Hours</b> 180
<b>Number of ECTS points</b>	<b>ECTS</b> 6

\* hour means 45 minutes