

KARTA PRZEDMIOTU

Nazwa przedmiotu: **Engineering Geology and Soil Mechanics (BudAB>SI4ENGESM19)**

Nazwa w języku polskim:

Nazwa w jęz. angielskim: **Engineering Geology and Soil Mechanics**

Dane dotyczące przedmiotu:

Jednostka oferująca przedmiot: Wydział Budownictwa

Przedmiot dla jednostki: Politechnika Śląska

Domyślny typ protokołu dla przedmiotu:

EGZ

Język wykładowy:

angielski

Strona WWW:

<https://platforma2.polsl.pl/rb/course/view.php?id=65>

Skrócony opis:

The aim of the course is to provide knowledge of basic soil mechanics. The course covers selected topics necessary to understand the behaviour of soils subjected to various types of loads.

Opis:

LECTURES: 15 hrs

1. Three phase-soil model (soil skeleton, air, groundwater) and parameters of its description: density, unit weight, water content, void ratio, porosity, saturation degree.
2. Physico-chemical properties of soils: soil structure, activity,
3. Non-typical soils: sensitive and swelling (swelling strain and swelling pressure).
4. State of stress and strain in the ground: Mohr circle, stress and strain paths, initial and induced stress, effective stress, coefficient of earth pressure at rest, loading history (OCR).
5. Compressibility and consolidation: stress-strain behavior of typical soils, stiffness moduli, coefficient of consolidation, preconsolidation pressure.
6. Groundwater flow: Darcy's law, coefficient of permeability, flow nets, seepage pressure, uplift and hydraulic heave.
7. Shear strength of soil and Coulomb-Mohr failure envelope: effective angle of friction, effective cohesion, undrained shear strength, dilatancy and contraction, peak/critical/residual shear strength.

LABORATORY: 15 hrs

1. determination of soil compaction parameters based on Proctor test,
2. determination of mechanical geotechnical parameters in laboratory tests using: an oedometer, a direct shear box, a triaxial apparatus.

Literatura:

- [1] Atkinson J. (2014) Fundamentals of Ground Engineering, CRC Press, ISBN 9781482206173
- [2] Barnes G. E. (2016) Soil mechanics, Red Globe Press, ISBN: 9781137512208
- [3] Lambe T.W., Whitman R. V. (1991) Soil Mechanics, Wiley, ISBN: 978-0-471-51192-2
- [4] Whitlow R. (2000) Basic soil mechanics, Longman, ISBN 10: 0582381096
- [5] PN-EN 13286-2:2010 Unbound and hydraulically bound mixtures – Part 2: Test methods for the determination of the laboratory reference density and water content – Proctor compaction
- [6] PN-EN ISO 14688-1 Geotechnical investigation and testing -- Identification and classification of soil -- Part 1: Identification and description
- [7] PN-EN ISO 14688-2 Geotechnical investigation and testing -- Identification and classification of soil -- Part 2: Principles for a classification
- [8] PN-EN ISO 17892-1:2015-02 Geotechnical investigation and testing — Laboratory testing of soil — Part 1: Determination of water content
- [9] PN-EN ISO 17892-5 Geotechnical investigation and testing - Laboratory testing of soil - Part 5: Incremental loading oedometer test
- [10] PN-EN ISO 17892-9 Geotechnical investigation and testing — Laboratory testing of soil — Part 9: Consolidated triaxial compression tests on water-saturated soils
- [11] PN-EN ISO 17892-10 :Geotechnical investigation and testing — Laboratory testing of soil. Part 10: Direct shear tests
- [16] PN-EN 13286-2 Unbound and hydraulically bound mixtures. Part 2: Test methods for the determination of the laboratory reference density and water content. Proctor compaction
- [17] PN-EN 1997-1:2008 Eurocode 7: Geotechnical design - Part 1: General rules
- [18] PN-EN 1997-2:2009 Eurocode 7: Geotechnical design - Part 2: Ground investigation and testing
- [19] <http://environment.uwe.ac.uk/geocal/SoilMech/basic/soilbasi.htm>
- [20] Holtz R.D., Kovacs W.D.: An Introduction to Geotechnical Engineering, Prentice Hall, New Jersey, 1981

Efekty uczenia się:

KNOWLEDGE - K1A_W07

(1) The student knows how to:

- describe soil components and use physical parameters of the soil model,
- determine stress distribution in the ground,
- describe stress-strain behavior of typical soils and soil stiffness,
- assess the groundwater flow velocity and knows the effects of water flow,
- explain the dependency of shear strength of soil on normal stress, loading history and drainage conditions,

SKILLS - K1A_U06

(2) The student is able to:

- conduct a Proctor test to determine compaction characteristics of soil,
- determine the basic physical and mechanical parameters of soils from laboratory tests, such as time of consolidation, stiffness modulus, cohesion, internal angle of friction
- prepare a report from geotechnical tests,

(3) The student is able to:

- calculate geostatic effective stress in the ground,
- check stability of excavation base due to hydraulic heave and soil piping

The learning outcomes (1) K1A_W07 and (3) K1A_U06 are verified in the exam, while (2) K1A_U06 by getting credit in the laboratory part of the course.

Metody i kryteria oceniania:

PREREQUISITES: No requirements

REQUIREMENTS TO PASS THE COURSE:

1) LABORATORY

To get a credit in the laboratory part, required are:

- Active PARTICIPATION in the laboratory tests;
- Submission of a written REPORT on soil compaction;
- Passing the FINAL LAB TEST (4 topics: Proctor compaction test, oedometer test, direct shear test, triaxial test); there will be 2 make-ups allowed.

The LABORATORY grade is the maximum grade obtained in any of the test attempts (min. 50% points required to pass).

Note that:

- at the beginning of the class, the tutor can check the student's preparation by organising a little quiz; failure to pass it means that the student will not be allowed to participate in this class and will be obliged to attend these classes with another group (after agreeing the date with the teacher);
- the approval of the report (0/1) is the condition to take part in the final lab test.

2) EXAM

The exam will cover the lecture topics.

There will be one pre-attempt before the session (date 0), one attempt in the main session (date 1) and two make-ups in the 'make-up session' (dates 2 & 3).

Except for the date 0, to take part in the exams the student must first get credit from the laboratory part.

The final EXAM grade (min. 50% points required to pass) is the maximum grade obtained in any of the exam attempts.

Lecture bonus: The positive grade obtained in the exam on date 0 or date 1 may be raised by the number of % points equal to the number of lectures that the student attended, but not more than by 8%.

FINAL GRADE:

The final grade is an arithmetic mean of the grades from the laboratory part and the exam.

To get credit in the course it is required to get 50% points in total.

STUDENTS WHO REPEAT THE COURSE: Rewriting partial grades is possible provided that the Student submits such a request within the first two weeks of the semester.

This syllabus is valid since the summer semester of the academic year 2025/2026, and its content is not subject to change during the semester.

Przynależność do grup przedmiotów w cyklach:

Opis grupy przedmiotów	Cykl pocz.	Cykl kon.
2019 Stacjonarne I stopnia sem. 4 ANG (BudAB-S1-2019-sem4)	2020/2021-L	

Punkty przedmiotu w cyklach:

<bez przypisanego programu>			
Typ punktów	Liczba	Cykl pocz.	Cykl kon.
Europejski System Transferu Punktów (ECTS)	3	2020/2021-Z	