**Nazwa przedmiotu:**

Engineering Geology

**Koordynator przedmiotu:**

dr Anna Lejzerowicz

**Status przedmiotu:**

Obowiązkowy

**Poziom kształcenia:**

Studia I stopnia

**Program:**

Civil Engineering

**Grupa przedmiotów:**

Obligatory

**Kod przedmiotu:**

1080-BU000-ISA-0353

**Semestr nominalny:**

4 / rok ak. 2021/2022

**Liczba punktów ECTS:**

3

**Liczba godzin pracy studenta związanych z osiągnięciem efektów uczenia się:**

Calculation of ECTS credits: - lecture 15; - tutorials - 15,
- laboratory 15; - familiarizing with the literature - 8 - preparation for tests (4 colloquiums) - 30, - preparing projects (3 drawings) - 7;
TOTAL 90 hours = 3 ECTS

**Liczba punktów ECTS na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich:**

Calculation of ECTS credits: - lecture 15; - tutorials (15) + laboratory (15);
TOTAL 45 hours = 2 ECTS

**Język prowadzenia zajęć:**

angielski

**Liczba punktów ECTS, którą student uzyskuje w ramach zajęć o charakterze praktycznym:**

Calculation of ECTS credits: - presence in the laboratory 15; - preparing projects (3 drawings) - 7; - preparation for exercises and tests (including consultation in the laboratory) - 23;
TOTAL 45 hours = 2 ECTS

**Formy zajęć i ich wymiar w semestrze:**

|  |  |
| --- | --- |
| Wykład: | 15h |
| Ćwiczenia: | 15h |
| Laboratorium: | 15h |
| Projekt: | 0h |
| Lekcje komputerowe: | 0h |

**Wymagania wstępne:**

Zakres wiadomości szkoły średniej z geografii

**Limit liczby studentów:**

laboratory 15, tutorials 30

**Cel przedmiotu:**

The course aims to teach: the genesis of different types of soils and rocks, the foundations of geological processes and the impact of their origin on the geological-engineering conditions of the subsoil. To get familiar with: the general geological processes and the genesis of rocks, the conditions of formation of different geomorphological forms occurring in Poland and their geological structure. Influence of geological processes in terms of foundation structures, evaluation of geotechnical conditions on the basis of the geological structure of the substrate, including its origin and age.

**Treści kształcenia:**

LECTURES
Geological sciences. Engineering geology aims, geological processes and their partition. Internal geological processes and their phenomena. Genesis of the igneous rocks. External geological processes - general characteristics, weathering of the rocks. Engineering-geological conditions on the weathered debris covers. Karst and its results. Glaciers activity, their deposits and geomorphological forms. Engineering-geological conditions on the areas of glacial deposits. Rivers activity – erosion, transport and accumulation. Fluvial deposits and their geomorphological forms. Geological-engineering characteristic of the alluvial deposits. Spatial arrangement of the rocks (tectonics). Engineering-geological conditions due to the tectonics. Acivity of meteoric waters (ablation), the factors influencing its intensity. Engineering-geological characteristics of its deposits. Wind activity; dunes. Engineering-geological characteristics of the eolian deposits (sands and loesses). Destructive activity of the seas and lakes (abrasion). The overgrowing of the lakes and their genetic types. Engineering-geological conditions on the areas of the lake and swampy accumulation (peatlands/peatbogs). Essential engineering-geological properties of rocks (soils). The landslides (surface mass movements) – their divisions and characteristics of the individual types. Engineering-geological examinations on the areas threaten by the landslides. Essential information concerning the groundwaters and their genesis. Groundwater table and its types. The kinds and types of groundwaters. The saturated and unsaturated zones. Hydrogeological properties of rocks. Physical and chemical properties of the groundwaters. Presentation of groundwater table on the maps. Essential principles of groundwater flow. Darcy's law. Depression cone. Suffosion and clogging (colmatage) processes.
PRACTICE
part I) Macroscopic properties of minerals. Igneous (magmatic) rocks – rock forming minerals, divisions, properties, occurrence, practical identification. Sedimentary rocks – division (clastic, organic, chemical and mixed type), minerals, properties, occurrence, practical identification. Metamorphic rocks – rock forming minerals, divisions, properties, occurrence, practical identification.;
part II) Geological maps – their divisions and principles of use. Geological cross-section based on the uncovered geological map. Geological cross-section on the base of bore holes. Hydrogeological cross-section. Geological-engineering evaluation of the suitability of the specified area for construction purposes.

**Metody oceny:**

- test from petrography (practical identification of rocks)
- two tests from lectures
- test in geological-engineering evaluation of the suitability of the specified area for construction purposes
- three projects
1. Laboratory grade = practical identification of rocks (petrography);
2. Tutorial grade = ((average grade of tests\*2) + average grade of assignments) / 5;
3. Final grade = (laboratory grade average + (tutorial grade average\*2)) / 3

**Egzamin:**

nie

**Literatura:**

[1] Tarbuck E.J. and Lutgens F.K. - Earth: An Introduction to Physical Geology;
[2] Bell F.G. – Engineering Geology;
[3] Busch R.M. - Laboratory Manual in Physical Geology;
[4] Woods K.M. - Physical Geology. Laboratory Manual;
[5] Blyth F.G.H. and de Freitas M.H. – A Geology for Engineers;
[6] Thompson G.R. and Turk J. - Introduction to Physical Geology;
[7] Licker M.D. - Dictionary of Geology and Mineralogy.
[8] Lenczewska-Samotyja E., Łowkis A., Zdrojewska N. – Zarys geologii z elementami geologii inżynierskiej i hydrogeologii;
[9] Lenczewska-Samotyja E., Łowkis A. – Przewodnik do ćwiczeń z geologii inżynierskiej i petrografii.

**Witryna www przedmiotu:**

https://pele.il.pw.edu.pl/moodle/course/view.php?id=101

**Uwagi:**

Materiały dydaktyczne do przedmiotu zostały przygotowane w Projekcie współfinansowanym przez Unię Europejską w ramach Europejskiego Funduszu Społecznego Program Operacyjny Wiedza Edukacja Rozwój 2014-2020, Oś priorytetowa III Szkolnictwo Wyższe dla gospodarki i rozwoju, Działanie 3.5 Kompleksowe programy szkół wyższych „NERW PW Nauka – Edukacja – Rozwój - Współpraca”

## Charakterystyki przedmiotowe

### Profil ogólnoakademicki - wiedza

**Charakterystyka W1:**

Knows the basic concepts used in geology, the place of engineering geology in the geological sciences, its tasks and relationships with civil engineering.

Weryfikacja:

Knows the basic concepts used in geology, the place of engineering geology in the geological sciences, its tasks and relationships with civil engineering.

**Powiązane charakterystyki kierunkowe:** K1\_W12

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WG.o

**Charakterystyka W2:**

Knows the external and internal geological processes, factors that cause them and the phenomena resulting from these processes (geomorphological forms, types of sediment and their geological-engineering characteristics). He knows the impact of geological works on constructions and engineering structures. Know the origin of rocks (soils) and its impact on the geological-engineering conditions.

Weryfikacja:

test from lectures, test from exercises

**Powiązane charakterystyki kierunkowe:** K1\_W12

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WG.o

**Charakterystyka W3:**

Knows the basic geological-engineering characteristics of rocks (soils) and their importance in the design and examples of the impact on constructions and engineering structures.

Weryfikacja:

test from lectures, test from exercises, test from petrography, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_W12

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WG.o

**Charakterystyka W4:**

Knows basic information about groundwater (division, genesis of groundwater, groundwater table and its types, unsaturated and saturated zones, the types of waters in these areas, physical and chemical characteristics of groundwater, aggressiveness in relation to the concrete and steel, basic laws of groundwater movement, the cone of depression, scouring and clogging).

Weryfikacja:

test from lectures, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_W12

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WG.o

**Charakterystyka W5:**

Knows the hydrogeological characteristics of the rocks, their importance in the design and examples of the impact on constructions and geological-engineering objects.

Weryfikacja:

test from lectures, test from exercises, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_W12

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WG.o

**Charakterystyka W6:**

Have knowledge about the types, content, use of geological maps, used symbols and explanations. Knows the basic principles of geological-engineering documentation. The current regulations concerning geological-engineering surveys.

Weryfikacja:

test from lectures, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_W16

**Powiązane charakterystyki obszarowe:** P6U\_W, I.P6S\_WK

### Profil ogólnoakademicki - umiejętności

**Charakterystyka U1:**

Have skill of macroscopic identification (with description) of major minerals - in particular the rock-forming minerals.

Weryfikacja:

test from petrography.

**Powiązane charakterystyki kierunkowe:** K1\_U20

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UU

**Charakterystyka U2:**

Have skill of macroscopic identification of igneous, sedimentary and metamorphic rocks and to recognize the environment of rock formation.

Weryfikacja:

test from petrography.

**Powiązane charakterystyki kierunkowe:** K1\_U20

**Powiązane charakterystyki obszarowe:** I.P6S\_UU, P6U\_U

**Charakterystyka U3:**

Have skill to use and read geological maps (including the geological-engineering and hydrogeological), and on this basis preliminary evaluate geological-engineering conditions.

Weryfikacja:

drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_U23, K1\_U20, K1\_U16

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UO, I.P6S\_UU, I.P6S\_UW.o, III.P6S\_UW.o

**Charakterystyka U4:**

Have skill to draw geological and hydrogeological cross-sections conditions on the basis of geological drilling.

Weryfikacja:

test from exercises, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_U23, K1\_U20

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UO, I.P6S\_UU

**Charakterystyka U5:**

Have skill to identify rocks as building substrate and make its geological-engineering evaluation.

Weryfikacja:

test from petrography, test from exercises, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_U23, K1\_U20, K1\_U16

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UO, I.P6S\_UU, I.P6S\_UW.o, III.P6S\_UW.o

**Charakterystyka U6:**

Can determine the degree of complexity of soil conditions and on this basis identify the geotechnical category.

Weryfikacja:

test from exercises, drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_U20, K1\_U16

**Powiązane charakterystyki obszarowe:** P6U\_U, I.P6S\_UU, I.P6S\_UW.o, III.P6S\_UW.o

### Profil ogólnoakademicki - kompetencje społeczne

**Charakterystyka K1:**

Awareness of the dangers resulting from the physical properties of rocks and soils constituting a potential hazard to the environment.

Weryfikacja:

test from lectures.

**Powiązane charakterystyki kierunkowe:** K1\_K06, K1\_K07, K1\_K01, K1\_K04

**Powiązane charakterystyki obszarowe:** P6U\_K, I.P6S\_KO, I.P6S\_KK, I.P6S\_KR

**Charakterystyka K2:**

Works independently and in team.

Weryfikacja:

drawing of cross-sections.

**Powiązane charakterystyki kierunkowe:** K1\_K01, K1\_K04, K1\_K07

**Powiązane charakterystyki obszarowe:** P6U\_K, I.P6S\_KR, I.P6S\_KO, I.P6S\_KK