

# **SOIL SCIENCE WITH ELEMENTS OF LAND RECLAMATION**

Course Code/Course ID : Ochrona i rekult.gleb 03LBUD\_pNadGenOPNGG

Type of course: compulsory

Teaching language: English

Director of studies: dr hab. inż. Andrzej Greinert, prof. UZ

Name of lecturer: IEE teachers

Form of instruction	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Points ECTS
<b>Full-time studies</b>					7
Lecture	30	2		Grade with notes	
Project	15	1		Grade with notes	
Laboratory	30	2		Grade with notes	

## **THE AIM OF THE LECTURE**

An introduction to the basic problems of soil science – soil genesis, soil chemical, physical, and biological properties, soil classification systems, soil as the place for plants, soil as an element of the entire environment. Estimation of the influence of soil characteristics on the habitat's fertility including regulation possibilities. Causes and effects of the soil degradation processes; methods and techniques being used during reclamation activities.

## **ENTRY REQUIREMENTS**

Formal: positive results from the units: Biology and ecology, Chemistry, Earth sciences.

Informal: Knowledge from the biology, chemistry and geography on the base of ended units within the study cycle and from the high school.

## **SCOPE OF COURSE TOPICS**

The program of lectures: Soil science – past, present and future. Basic terms of the soil science. Functions of soils. Soil-forming factors. Soil-forming processes. Soil as a three phase system. Physical, chemical and physico-chemical soil characteristics. Biological transformations. Genesis and classification of soils: soil formation, soil profile, soils distribution, classification factors and systems. Polish Genetic Classification of Soils in comparison with other classification systems. Polish land use classifications. Anthropogenic transformations of soils. Purity of soil in the light of the polish regulations and standards. Selecting the direction and goals of reclamation. Technical and biological phases of reclamation works. Methods of prevention of environmental degradation. Erosion: mechanisms and control.

Laboratory classes: Soil profile description. Soil sampling techniques. Basic field methods of the soil characteristics estimation. Techniques of soil extracts preparation. Laboratory analysis of the basic soil characteristics – pH, soil sorption, TOC, grain size distribution, EC. Colorimetric analysis of soils. Flame photometry in the analysis of soils. Reading the soil maps. Evaluation of soil based on the results of laboratory analyses

Program of projects: design the reclamation of contaminated site.

## **TEACHING METHODS**

Giving methods: lecture information – problem; analysis of the situation; debate.

Searching methods: problematic: exchange of ideas in the assessment of the causes and effects of the soil characteristics and soil degradation phenomena; situational: analyzing by the student group the actual situation of soil covering the real area; practice: laboratory analyses, field exercises.

## LEARNING OUTCOMES

Symbol	Learning outcomes after completion of the course. Student:	The reference to the effects of education in the field of technical sciences
<b>Knowledge</b>		
<b>IS1A_W00</b>	defines the concept of soil, ground, bed and related	T1A_W02
<b>IS1A_W00</b>	develops and understands the functions of soils	T1A_W02; T1A_W08; InzA_W03
<b>IS1A_W00</b>	describes the course of development of the soil cover, including human pressure	T1A_W02
<b>IS1A_W00</b>	explains the variability of sod processes	T1A_W02
<b>IS1A_W00</b>	defines the properties of soils	T1A_W02; T1A_W08
<b>IS1A_W00</b>	classified and estimated soil degradation phenomena	T1A_W02; T1A_W08; InzA_W03
<b>IS1A_W00</b>	evaluates directions of reclamation	T1A_W02; T1A_W08; InzA_W05
<b>IS1A_W00</b>	estimates the possibility of remediation techniques implementation	T1A_W02; T1A_W08; InzA_W05
<b>Skills</b>		
<b>IS1A_U00</b>	recognise the basic soil units	T1A_U08; T1A_U09
<b>IS1A_U00</b>	indicates the basic properties of soils	T1A_U08; InzA_U01; InzA_U02; InzA_U03
<b>IS1A_U00</b>	evaluates the status soil based on the results of laboratory analyses	T1A_U09; InzA_U01; InzA_U02; InzA_U03
<b>IS1A_U00</b>	recognize the symptoms of sod degradation	T1A_U08; T1A_U09; InzA_U01; InzA_U02; InzA_U03
<b>IS1A_U00</b>	reports and presents the results of research	T1A_U03; T1A_U04;
<b>Social competence</b>		
<b>IS1A_K00</b>	initiates research in the course of preparation of land for development	T1A_K02; InzA_K01
<b>IS1A_K00</b>	identify functional problems related to the condition of soils	T1A_K02; InzA_K01
<b>IS1A_K00</b>	identifies threats associated with soil to the entire environment	T1A_K02; InzA_K01
<b>IS1A_K00</b>	works in the local community to improve the condition of the land	T1A_K02; InzA_K01

## ASSESSMENT CRITERIA

The basis for passing the project classes is the attendance at all classes, systematic preparation for each class; preparation and submission on time and passing the project.

Examination: the condition to take the exam is to obtain a positive grade from the laboratory exercises - the exam is in writing (2 problem questions, 2 accounting tasks).

Grading scale: 0 ÷ 50% - insufficient, 51 ÷ 60% - satisfactory, 61 ÷ 70% - satisfactory plus, 71 ÷ 80% - good, 81 ÷ 90% - good plus, 91 ÷ 100% - very good. The basis for determining the cumulative rating is the weighted average obtained by adding: 0.7 lecture scores, 0.3 grades from laboratory exercises. The weighted average is rounded to two decimal places. The total rating is based on the weighted average according to the rule: below 3.24 - sufficient, from 3.25 to 3.74 - satisfactory plus, from 3.75 to 4.24 - good, from 4.25 to 4.74 - a good plus, from 4.75 - very good.

The total mark for this course is the weighted average obtained by adding: 0.5 lecture grade and 0.3 evaluation from laboratory classes and 0.2 evaluation from project classes.

## SELF STUDENT'S WORK

Independent student work (set up to: classes, exams, reading literature, dissertations, projects, presentations, reports, speeches): 80 h;

Contact hours (classes, tutorials, exams, etc.): 120 h.

## RECOMMENDED READING

1. Brady N.C., Weil R.R., 2007. The Nature and Properties of Soils, 14th Edition. Pearson Education Inc.
2. Eash N., Green C.J., Razvi A., Bennett W.F. 2008. Soil Science Simplified. Fifth edition. Khonke and Franzmeier, Waveland Press.
3. Davis B.N.K., Walker N., Ball D.F., Fitter A., 2013. The Soil. Collins New Naturalist Library, Book 77.
4. IUSS Working Group WRB. 2015. World Reference Base for Soil Resources 2014, update 2015 International soil classification system for naming soils and creating legends for soil maps. World Soil Resources Reports No. 106. FAO, Rome.
5. PSSS, 2011. Polish soil classification (Systematyka Gleb Polski), Vth ed., Soil Science Annual, Polish Soil Science Society, Vol. LXII, No. 3, Wyd. „Więś Jutra” Warszawa (in Polish).

## OPTIONAL READING

1. Keys to Soil Taxonomy (Eleventh edition), 2010. U.S. Department of Agriculture, Natural Resources Conservation Service and Soil Survey Staff.
2. Kim H. Tan, 2005. Soil Sampling, Preparation, and Analysis, Second Edition. Books in Soils, Plants, and the Environment.
3. Schoeneberger P.J., US National Soil Survey Center, 2013. Field Book for Describing and Sampling Soils, Version 3.0.
4. Kim H. Tan, 2009. Environmental Soil Science, Third Edition. Books in Soils, Plants, and the Environment.
5. Soil Science Annual – The Polish Society of Soil Science
6. Polish Journal of Soil Science – Institute of Agrophysics Polish Academy of Sciences

## REMARKS

It is required for use of the latest edition of the descriptions of Polish Soil Classification (V th ed., 2011) and international classification – World Reference Base for Soil Resources 2006, first update 2007.