## Syllabus

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| Academic Year: | 2018/2019 | Group of subjects:  | mandatory | Catalogue number: |  |
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| Module title1):  | Soil science | **ECTS 2)** | **4,0** |
| Polish Translation3):  | Gleboznawstwo |
| Faculty4):  | Faculty of Agriculture and Biology, field of study: Organic Agriculture and Food Production (OAFP) |
| Person in charge of the module5):  | Prof. dr hab. Józef Chojnicki,  |
| Teachers responsible for laboratory classes, workshops and seminars6):  | dr Wojciech Kwasowski, dr Łukasz Uzarowicz  |
| Unit responsible for the module7): | Department of Soil Environment Sciences, Faculty of Agriculture and Biology |
| Faculty in charge8): | Faculty of Agriculture and Biology  |
| Module status9):  | a) mandatory  | b) stage I  | year I | c) stationary |
| Teaching cycle10):  | Semester: summer | Module language11): English |  |
| Objectives of the module12): | The purpose of course is to get acquainted of students with: basic soil-forming factors creating soils, basic processes creating physical and chemical soil properties and with utilitarian value of soils (soil quality classification and land capability units). Students will be also acquainted with basic methods for determination of soils properties and with morphological structures of soils. This knowledge should enable of students independently estimate of usefulness and fertility of soils.  |
| Teaching forms and number of hours13): | 1. Lecture 30 hours
2. Laboratory classes 25 hours
3. Field exercises 5 hours
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| Teaching methods14): | Lectures, analysis and interpretation of experimental results; report, discussion, consultation.  |
| Detailed module description15): | **Lectures:** 1. Definition of soil and its functions as well as factors causing the formation and development of soils. 2. Genesis, mineral composition and properties parent rocks of soils: igneous, sedimentary and metamorphic rocks. 3. Sorptive and buffer properties of soils: types of sorption in soils (exchangeable, chemical, biological, mechanical), sorption complex of soils and its composition. 4. Reaction, pH, acidity of soils, types of acidity, natural and anthropogenic causes of soil acidification. 5. Soil organic matter (soil humus): formation, transformation (mineralization, humification), properties and impact of humus on soil properties and factors determining its content in soils. 6. Mineral nutrients of plants: macro- and micronutrients and their content and availability in various soils. 7. Physical properties of soils: basic, water, air and thermal, regulation of air-water relations. 8. Soil organisms and their role in the process of: mineralization, humification, ammonification, nitrification, denitrification. 9. Basics of soil systematics and characteristics of the main soil-forming processes occurring in the soils of Poland. **Laboratory classes:** 1. Physical properties of minerals and parent rocks of soils. 2. Division of soil material into fractions and granulometric groups, properties of fractions and granulometric groups. Determination of granulometric composition of soil by the Casagrande method in the modification of Prószyński. Evaluation of the results of the experiment. 3. Determination of soil pH by electrometric method, exchange acidity and mobile aluminum using the Sokołów method. Evaluation of the results of the experiment. 4. Determination of exchangeable sorption capacity of cations (CEC) in the soil: sums of alkaline cations by Kappen metod (B), hydrolytic acidity by Kappen method, calculation of sorption capacity of soil (CEC) and degree of saturation with alkalis (BS), calculation of soil liming needs. Evaluation of the results of the experiment. 5. Determination of the content of carbonates in the soil by the Scheibler method. Evaluation of the results of the experiment. 6. Determination of organic carbon and humus content in soil by Tiurin metod. Evaluation of the results of the experiment. 7. Basic physical properties of soils: soil sampling, determination field bulk density, bulk density, particle density, total, capillary and non-capillary porosity, current soil moisture. Evaluation of the results of the experiment. 8 The units of Polish Soil Taxonomy, morphology profiles of the main types of soils. 9. Basics of cartography and soil usage classification, soil maps. 10. Preparation for field exercises. **Field exercises:** description of soil profiles in the field, report on field exercises.  |
| Formal prerequisites16): | Unorganic chemistry |
| Initial requirements17): | Student owns knowledge in range of unorganic chemistry. |
| Learning outcomes18): | 01 – student knows the basic phenomena and processes occurring in the soil environment. 02 – student defines, classifies and assesses the basic features and factors determining the properties of the soil environment and correctly interprets the relationship between the soil environment, the plant and the ekosystem. 03 – student has basic knowledge of soil environment protection and understands the need to protect soils. 04 – student designs and performs scientific experiments in the field of soil science under supervision.  | 05 – student can measure and evaluate parameters and design a modification of the soil environment in order to improve the growth conditions of plants and the natural environment.06 – student is open to individual work and cooperation and work in a group, assume various roles in it, aiming to achieve the assumed goal. 07 - student is aware of the importance of social, professional and ethical responsibility for the state of the soil environment. |
| Assessment methods19): | Outcomes 01, 03, 06 – written work Outcomes Efekt 02, 03, 04, 05 – periodic tests |
| Formal documentation of the learning outcome20): | Executed work, periodic tests, written work  |
| Elements impelling final grade21): | Identification of rocks – 10%, periodic tests – 40%, written work – 50% |
| Teaching base22):  | Didactic halls |
| Obligatory and supportive materials23): * Buckman H. and Brady N. 1969: The nature and properties of soils.
* Lavkulich L. M. 1981: Methods manual pedology laboratory.
* Houba V. J. G. et al. 1986: Soil and plant analysis. Part 5: Soil analysis procedures.
* Amonette J. E. and Zelazny L. W. 1994: Quantitative Methods in Soil Mineralogy.
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| Annotations24): The following grading scale is used to evaluate partial and final grade: 100-91% – 5,0 grade; 90-81% – 4,5 grade; 80-71%. – 4,0 grade; 70-61%. – 3,5 grade; 60-51% – 3,0 grade; <51% – 2,0 grade (no passing) |

Quantitative summary of the module25):

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| Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes of the module18) - base for quantifying ECTS2: Lectures Laboratory classes Field exercisesReport on field exercisesPreparation for classes Participation in consultations Presence on examination Preparation for test Preparation for examination Total | 30 h25 h5 h5 h20 h2 h2 h10 h15 h**109 h****4,0 ECTS** |
| Total ECTS points, accumulated by students during contact learning:  Lectures Laboratory classesField exercises Participation in consultations Presence on examination Total | 30 h25 h5 h2 h2 h**64 h****2,4 ECTS** |
| Total ECTS points, accumulated by student during practical classes (laboratories, projects, seminars, etc.): Laboratory classes Field exercises Total | 25 h5 h**30 h****1,1 ECTS** |

Learning outcomes of the module relative to the learning outcomes of the field study 26):

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| Outcome No / symbol  | Learning outcomes:  | Relative to the learning outcomes of the field study:  |
| 01 | student knows the basic phenomena and processes occurring in the soil environment. | K\_W06 |
| 02 | student defines, classifies and assesses the basic features and factors determining the properties of the soil environment and correctly interprets the relationship between the soil environment, the plant and the ekosystem. | K\_W06K\_W05  |
| 03 | student has basic knowledge of soil environment protection and understands the need to protect soils. | K\_W10  |
| 04 | student designs and performs scientific experiments in the field of soil science under supervision. | K\_U06  |
| 05 | student can measure and evaluate parameters and design a modification of the soil environment in order to improve the growth conditions of plants and the natural environment. | K\_U12 K\_U14  |
| 06 | student is open to individual work and cooperation and work in a group, assume various roles in it, aiming to achieve the assumed goal. | K\_S02  |
| 07 | student is aware of the importance of social, professional and ethical responsibility for the state of the soil environment. | K\_S04  |