COURSE "SOIL SCIENCE" DESCRIPTION

Course code	Volume in ECTS credits	Institution	Faculty	Institute
AGR8005	7	Vytautas Magnus University	Faculty of Agronomy	Institute of Agroecosystems and Soil Sciences

Course title in Lithuanian

Dirvotyra

Course title in English

Soil Science

Study methods	Volume in ECTS credits
Consultations	1.0
Individual project	2.0
Individual work	4.0

Short course annotation in Lithuanian (up to 500 characters)

Studijuodami dalyką „Dirvotyra" doktorantai įgyja žinių apie dirvožemio svarbą žemės ūkio ir miško ekosistemose, supranta geologinius ir mineralų dūlėjimo procesus bei dirvodaros veiksnius, adaptuoja ir taiko dirvožemio vertinimo metodus, nustato dirvožemio fizikines, chemines ir biologines savybe, žinoti tvaraus dirvožemio naudojimo principus, sprendžia agronomijos ir miškininkystės veiklos strateginio pobūdžio uždavinius.

Short course annotation in English (up to 500 characters)

Studying the course "Soil Science" PhD students obtaining knowledge on the consequences of soil in agricultural and forest ecosystems, getting to understand the geological and mineral weathering processes and soil formation principles, adapting and applying soil assessment methods, evaluating soil physical, chemical and biological properties, identifying the principles of sustainable soil principles, implementing soil sustainability in agronomy and forestry technologies.

Relevance of the course

The course helps PhD student to present, analyze, synthesize and critically evaluate new knowledge on soil science, to find out an original scientific solutions, to solve the complex of environmental problems in agronomy and forest practice, to plan fundamental and applied research.

Course aims

The aim of the course is to provide PhD student with knowledge on soil general science research in order to develop technologies to increase or sustain natural and efficient soil fertility, to model the soil ecosystem sustainability and preservation strategies.

Content (topics) and methods

Subject content:

Peculiarities of soil science. Soil science development in the world and in Lithuania. Soil mineral composition, origin, structure and consistence. Peculiarities of rock and mineral formation. Rock weathering and link to plant productivity. Soil parent material, geological classification and impact on weathering and soil formation. Soil formation theory. Soil formation factors and peculiarities for cultivation. Composition of soil phases. Soil granulometry and link to plant productivity. Soil mineral part and chemical composition. Soil organic part and sources from agriculture.

Soil status and properties. Soil colloids and sorption peculiarities. pH value, oxidation and reduction considerations in soil and methods to sustain the regimes. General soil physical properties. Soil moisture and air, warm conditions. Soil fertility status in agriculture and forestry.

Soil structure and morphology. Soil systematics, classification and diagnostic principles. Soil

diagnostic materials, properties and horizons. Soil cover. Main patterns of soil distribution (latitude and vertical zonality). The main soil groups in World and distribution properties. Lithuanian and international soil classification principles and soil valuation peculiarities in agriculture and forestry. Structure of soil cover and contrasting soil distribution. Research on soil cover evaluation. Theoretical and practical aspects of sustainable soil use. **Learning methods:** Lecture with discussion, report, individual task (analysis of scientific research data), brainstorming.

Structure of cumulative score and value of its constituent parts

A ten-point criterion-based scale and cumulative assessment system is applied. **Framework of cumulative assessment:** Individual project – 30 % (17-20 week; project presentation during an examination). Examination – 70 % (17-20 week).

Compulsory reference materials

No.	Authors of publication, title, publishing house, year of publication.
1.	Motuzas A., Buivydaitė V., Vaisvalavičius R., Šleinys R. Dirvotyra: 2-asis atnauj, papild. ir patais. leid. Vilnius: Enciklopedija, 2009. 335 p.
2.	Buivydaitė V., Butkus V., Motuzas A., Pečkytė A., Vaisvalavičius R., Vaišvila Z., Zakarauskaitė D. Geologijos pagrindų ir dirvotyros laboratorinių darbų aprašas: sąsiuvinis: studijų priemonė / Lietuvos žemės ūkio universitetas. Agronomijos fakultetas. Dirvotyros ir agrochemijos katedra. 3-iasis atnaujintas, papild. ir pataisytas leid. Akademija, 2009. 90 p.
3.	Eidukevičienė M. Lietuvos gamtinė geografija: [vadovėlis]. Klaipėda, 2009. 162 p.
4.	Mažvila J., Vaičys M., Buivydaitė V. Lietuvos dirvožemių makromorfologinė diagnostika: [monografija]. Akademija (Kėdainių r.): Lietuvos žemdirbystės institutas. 2006. 283 p.
5.	Miško augaviečių tipai: [metodinė priemonė] / Sudarytojas prof. habil. dr. M. Vaičys. Kaunas, Lututė, 2006. 95 p.
6.	Buivydaitė V., Motuzas A., Vaičys M. Naujoji Lietuvos dirvožemių klasifikacija (1999) / Metodinė priemonė laboratoriniams darbams atlikti. Akademija, 2001. 86 p.

Supplementary reference materials

No.	Authors of publication, title, publishing house, year of publication.
1.	Baltrėnas P., Butkus D., Oškinis V., Vasarevičius S., Zigmontienė A. Aplinkos apsauga: [vadovėlis]. Vilnius: Technika, 2008. 576 p.
2.	Managing Soil Quality: challenges to modern agriculture / edited by P. Schjønning, S. Elmholt and B.T. Christensen. – 2004, 344 p.
3.	Huang P.M., Li Y., Sumner M.E. (Eds.). Handbook of soil sciences: resource management and environmental impacts. CRC Press, 2011, 2155 p.
4.	Mol G., Keesstra S.D., 2012. Soil sciences in a changing world. Current Opinion in Environmental Sustainability, 4(5), 473-477.
5.	Rowell D.L. Soil science: Methods & applications. Routledge, 2014, 368 p.
6.	Paul E.A. Soil microbiology, ecology and biochemistry. Academic press, 2014, 598 p.
7.	Keesstra S., Bouma J., Wallinga J., Tittonell P., Smith P., Cerda A. The significance of soils and soil science towards realization of the United Nations Sustainable Development Goals, 2017, 352 p.
8.	Simonson R.W., 2018. Soil Classification. In Handbook of Soils and Climate in Agriculture (pp. 103-130). CRC Press.

Course program designed by

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Approval at the Institute:

Approval at the program doctoral committee:

Course description valid until: