COURSE DESCRIPTION

Course code	Volume in ECTS credits	Institution	Faculty	Department
8009	7	VMU, Agriculture Academy	Agronomy	Agroecosystems and Soil Sciences

Course title in Lithuanian

ŽEMDIRBYSTĖ

Course title in English

SOIL MANAGEMENT FOR SUSTAINABILITY

Study methods	Volume in ECTS credits
Lectures	2
Consultations	1
Seminars	
Individual work	4

Short course annotation in Lithuanian (up to 500 characters)

Dalyko paskirtis - suteikti žinių apie tvaraus dirvožemio naudojimo ir su tuo susijusio įvairaus intensyvumo žemės dirbimo poveikį agroekosistemoms, sąsajas su biologiniais, cheminiais bei fizikiniais dirvožemio ekosistemų komponentais, agroekosistemų ekologinį intensyvinimą ir adaptaciją klimato kaitai.

Short course annotation in English (up to 500 characters)

This course will provide knowledge of the effects of sustainable soil management and related diverse soil tillage in agroecosystems, interrelations with the biological, chemical, and physical components of soil ecosystems, ecological intensification and adaptation to climate change of the agroecosystems.

Relevance of the course

After the course graduation students will have enough knowledge and abilities to plan and perform the fundamental and applicable research of soil management systems, to process the obtained results and with regard to it to create new knowledge and ideas; with reference to novel research results to analyze the effects of different intensity soil tillage on soil sustainability and environmental quality, considering changing climate conditions; to design strategic technological solutions for agroecosystem sustainability.

Course aims

To develop the system of knowledge, skills, abilities that assure complex assessment and management of soil management systems.

Content (topics) and methods

1. Introduction.
2. Environmental factors for crop growth and their management.
3. Soil degradation and erosion. Soil compaction.
4. Soil quality indicators and their management.
5. Management of crop rotation.
6. Catch cropping and green manure.
7. Straw and other crop residue management.
8. Weed ecology and weed control system.
9. Effect of soil tillage intensity on agroecosystem components.
   - 9.1. The role of soil tillage intensity on soil structure, water capacity and other physical properties.
   - 9.2. Soil tillage and soil microbial community.
   - 9.3. Soil tillage and sustainable nutrient management.
   - 9.4. Implications of soil tillage for crop, weed seeds and weed communities.

9.5. Influence of cultivation practices on arable crop diseases, earthworms and other fauna.
10. Peculiarities of organic, precision and conservation farming systems. Complex assessment and management of soil management systems.
11. Maintenance of ecosystem state, productivity and biodiversity, their integrity over time and in the context of human activity and intensity of use.
12. Sustainability of agroecosystems, ecological intensification and adaptation to climate change.

Structure of cumulative score and value of its constituent parts

Homework - 40%;
Final exam - 60 %.

Compulsory reference materials

No.	**Authors of publication, title, publishing house, year of publication.**
1.	Rattan Lal, B.A. Stewart. Principles of Sustainable Soil Management in Agroecosystems. - CRC Press, 2013. – 568 p.
2.	Rainer Horn, Heiner Fleiner, Stephan Peth, Xinhau Peng (Editor). Soil management for Sustainability. 2006. -497 p.
3.	Karl Heinrich Hartge, Rainer Horn. Essential Soil Physics: An introduction to soil processes, functions, structure and mechanics. Schweizerbart Science Publishers 2016. 389 p.
4.	C.J. Baker, K.E. Saxton, W.R. Ritchie, W.C.T. Chamen, D.C. Reicosky, M.F.S. Ribeiro, S.E. Justice, P.R. Hobs. No-tillage seeding in conservation agriculture. CAB International and FAO, 2007. - 326 p.
5.	Adel El Titi (Editor). Soil tillage in Agroecosystems. 2003. -367 p.
6.	Håkansson I. Machinery-induced compaction of arable soils. Inicidence – consequences – counter-measures. Swedish University of Agricultural Sciences. 2005. 153 p.
7.	Maren Oelbermann. Sustainable Agroecosystems in Climate Change Mitigation. - Wageningen Academic Publishers, 2014. – 164 p.
8.	Patrick J. Bohlen, Gar House. Sustainable Agroecosystem Management: Integrating Ecology, Economics, and Society. - CRC Press, 2009. – 328 p.
9.	Sven E. Jørgensen, Liu Xu, Robert Costanza. Handbook of Ecological Indicators for Assessment of Ecosystem Health. - CRC Press, 2010. – 498 p.
10.	Managing cover crops profitably. Editor Andy Clark. - Sustainable Agriculture Network, 2007. – 244 p.

Supplementary reference materials

No.	**Authors of publication, title, publishing house, year of publication.**
1.	Bučienė A. Žemdirbystės sistemų ekologiniai ryšiai. 2003. -180 p.
2.	Špokienė N., Povilionienė E. Piktžolės. Kaunas, 2003, 200 p.
3.	Michael A. Fullen, John A. Catt. Soil management: problems and solutions. 2004. -269 p.
4.	Benjaminas Kiburys. Dirvožemio mechaninė erozija. V.: Mokslas. 1989. 175 p.
5.	Jankauskas B. (1990). Dirvų apsauga nuo erozijos. V., 85 p.
6.	Soane B.D., C. van Onwerkerk (Editors). Soil Compaction in Crop Production. Elsevier, 1994. - 662 p.
7.	Soil biological fertility. Edited by Lynette Abbott, Daniel Murphy. – Springer, 2007. - 264 p.
8.	Lampkin N. (2002) Organic farming. Old Pond Publishing, 748 p.
9.	Noureddine Benkeblia. Agroecology, Ecosystems, and Sustainability. - CRC Press, 2014. – 393 p.
10.	John M. Kimble, Charles W. Rice, Debbie Reed, Sian Mooney, Ronald F. Follett, Rattan Lal. Soil Carbon Management: Economic, Environmental and Societal Benefits. - CRC

	Press, 2007. – 280 p.

Course programme designed by

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1.	Vaclovas Bogužas	VMU	prof., dr.	vaclovas.boguzas@vdu.lt
2.	Virginijus Feiza	Lithuanian Research Centre for Agriculture and Forestry	dr.	virginijus.feiza@lammc.lt

Approval at the Institute: 19 04 2019 protocol No. 6(6)

Approval at the program doctoral committee:

Course description valid until: