

## **Tárgy neve: Basics of soil science, hydrology, and agriculture**

**Tárgyfelelős neve:** dr. Jung András

**Tárgyfelelős tudományos fokozata:** PhD, habil.

**Tárgyfelelős MAB szerinti akkreditációs státusza:** AT

### **Purpose of education**

#### **a) Knowledge**

- Students have basic knowledge about the processes of soil formation and the characteristics of different soil types. Starting from the fundamentals, they understand how soil develops, what factors influence soil quality, and recognize the characteristics of various soils.
- Students possess general hydrological knowledge, including the areas of water movement, water balance, and water management. They understand surface and subsurface water processes and their effects on the environment and agriculture.
- Students have theoretical and practical knowledge in the field of agricultural science. They understand the principles of sustainable crop cultivation and animal husbandry, and are able to apply these principles in practice. Through their foundational knowledge of various aspects of agriculture, they can reflect on agricultural economic challenges.

#### **b) Abilities**

- Students are capable of analyzing the structure, composition, and factors affecting soils with an analytical approach. They are familiar with various soil classification systems and practical applications in agriculture. They can conduct soil sampling and plan laboratory tests to determine soil nutrient content.
- Students understand the fundamental processes of the hydrological cycle and its connection to agricultural management. They can choose modeling tools for analyzing water movement and water balance, comprehend the challenges of water management, and propose more efficient water management strategies.
- Students have knowledge of sustainable agricultural methods and their application.

#### **c) Attitude**

- Students are aware of the role of soil and water in environmental conservation. They consider sustainable agricultural management important and are committed to practices that minimize environmental impacts.
- Students are curious and motivated towards soil science and hydrological research, and they are open to new scientific findings related to agriculture. They seek opportunities for scientific exploration and actively participate in projects or research groups.
- Students appreciate the economic impacts of agricultural practices and the importance of sustainability in agricultural operations.

#### **d) Autonomy and responsibility**

- Students are capable of learning independently and acquiring information in the fields of soil science, hydrology, and basic agricultural knowledge. They actively engage in self-improvement, such as studying literature and participating in further training.
- Students take responsibility for applying the knowledge they acquire, especially in the areas of agricultural economics and environmental conservation. They are dedicated to sustainable agriculture and efficient management of natural resources, contributing to the development of agriculture through their activities.
- Students recognize the social role of agriculture and are willing to participate in initiatives that promote rural development and food security. They are aware of the social and ethical issues that may arise in the agricultural sector and take responsibility for supporting sustainable, socially accepted practices.

### **Content of education**

Students become familiar with the fundamental concepts of soil science, hydrology, and agriculture. In acquiring soil science knowledge, they analyze the physical, chemical, and biological properties of soil, understand soil formation processes, and study methods of soil conservation. In the field of hydrology,

they learn about the water cycle, soil moisture, and water movement processes, as well as grasp the fundamentals of water use planning and water management strategies. As part of basic agricultural knowledge, they review the principles of agricultural economics and rural development, establish connections between natural resources and agricultural production, and gain insight into sustainable agricultural practices. The subject offers practical applications and project-based learning opportunities, aiming to provide students with a solid foundation for professional preparation in agriculture and agricultural environmental protection.

**Topics:**

Basics of Soil Science  
Soil Formation and Development  
Soil Water Management  
Soil Conservation and Land Use  
Soil Cultivation and Agricultural Production  
Impact of Livestock on Soil  
Fundamentals of Hydrology  
Precipitation and Evaporation  
Groundwater Resources  
Water Quality and Water Use  
Hydrometeorological Analyses  
Ecological Perspectives  
Water Management Strategies  
Impact of Climate Change  
Integrated Agriculture and Water Management

**Evaluation system:** oral and/or written exam.

**Literature:****Obligatory:**

- Brady, N. C., Weil, R. R., & Weil, R. R. (2016). The nature and properties of soils, ISBN 9780133254488, Pearson publishing,
- SoilWeb200. 2014. On-line teaching tool for the APBI (formerly SOIL) 200 course, developed by Dr.Krzic's team available at <http://soilweb200.landfood.ubc.ca/>
- Tim Davie. 2008. ISBN 0-203-93366-4. Fundamentals of Hydrology. Internet: [https://web.archive.org/web/20160804121158id\\_/http://www.univpgri-palembang.ac.id:80/perpus-fkip/Perpustakaan/Geography/Geografi%20Fisik/Hidrologi%20Dasar.pdf](https://web.archive.org/web/20160804121158id_/http://www.univpgri-palembang.ac.id:80/perpus-fkip/Perpustakaan/Geography/Geografi%20Fisik/Hidrologi%20Dasar.pdf)
- Tühnen Institute. Agricultural Production: [https://literatur.thuenen.de/digbib\\_extern/dn059499.pdf](https://literatur.thuenen.de/digbib_extern/dn059499.pdf)
- Bayer: The Future of Agriculture and Food. Internet: <https://www.bayer.com/sites/default/files/factbook.pdf>

**Recommended:**

- Soil Science Crash Course: <https://www.youtube.com/watch?v=zD3zaootOkQ>
- W. Lee Daniels, Kathryn C. Haering. Chapter 3. Concepts of Basic Soil Science. Internet: <http://www.soilphysics.okstate.edu/teaching/soil-4683-5683/references/concepts%20of%20basic%20soil%20science.pdf>
- Introduction to Soil Science. Internet: [https://lfs-ubcfarm-clone-2018.sites.olt.ubc.ca/files/2019/06/2016\\_Winter\\_APBI-200-1.pdf](https://lfs-ubcfarm-clone-2018.sites.olt.ubc.ca/files/2019/06/2016_Winter_APBI-200-1.pdf)
- David R. Maidment. Handbook of hydrology. Internet: [http://dl.watereng.ir/HANDBOOK\\_OF\\_HYDROLOGY.PDF](http://dl.watereng.ir/HANDBOOK_OF_HYDROLOGY.PDF)