Agricultural Soil Physics (1st Year of study, 1st Semester)

Credit value (ECTS) 7

Course category
Domain - foundation course (Imposed)

Course holder:
Assist. Prof. Dr. Denis ȚOPA

Discipline objectives (course and practical works)

This course addresses the topic of soil's physical properties and processes with particular reference to agricultural applications. The aim of the course is to give to graduate students an image of the soil as a three-phase system (solid, liquid, gas). The objectives are: to understand fundamental aspects of soil systems relevant for soil physics, knowledge of the main concepts and parameters of soil physics (density, bulk density, penetration resistance, water stable aggregates, soil structure, texture, porosity, soil hydraulic parameters), knowledge about the behavior of some soil parameters.

Contents (syllabus)

Course (chapters/subchapters)
1. INTRODUCTION - The object of study. Importance of Soil Physics. Basic Definitions and Concepts. Soil Physics, Agriculture, and the Environment
2. SOIL STRUCTURES – Definitions. Types of Soil Structure. Structure of Aggregated Soils. Characterization of Soil Structure. Aggregate Size Distribution. Aggregate Stability
3. SOIL COMPACTION - The Concept of Soil Strength and its Measurement. Penetration resistance. Bulk density. Control of Soil Compaction
4. SOIL WATER - "Infiltration Capacity" or Infiltrability. Basic Infiltration Theory. Soil moisture. The Concept of "Field Capacity". Water regime. Remote Sensing of Surface Soil Moisture
5. SOIL PHYSICAL PROPERTIES AS PART OF SOIL FERTILITY - Optimizing the physical condition of the soil. The spatial variability of the physical parameters of soil fertility and plant requirements to these factors.

Practical works
1. Presentation of Soil Physics Laboratory and The Institute of Research for Agriculture and Environment. Standard Operating Procedure (SOPs). General Laboratory Safety procedures.
2. Sampling tools - Probes and augers. Sampling Instructions for Routine Soil Analysis. Sample preparation.
3. Soil's moisture content. Direct and indirect methods (gravimetric, TDR, Profile Probe, tensiometer)
4. The hydraulic conductivity of the soil - Hauben water permeameter
5. Determination of water infiltration into the soil – double ring method
6. Determination of penetration resistance and shear force
7. Determination of water stable aggregates - Kemper & Rosenau method

Bibliography

1. Bryan Davies, D. Eagle, B.Finey, 1993 - Soil management. Farming Press, U.K.
2. Canarache, A., 1990 – Fizica solurilor agricole. Editura Ceres, Bucureşti.
3. Guş, P., Lăzureanu, A., Sandoiu, D., Jităreanu, G., Stancu, I., 1998 – Agrotehnica. Editura Risoprint, Cluj – Napoca.
4. Hillel Daniel - Introduction To Environmental Soil Physics. 2004, Elsevier Science (USA)
5. Onisie T., Jităreanu G., 2000 – "Agrotehnica". Ed. Ion Ionescu de la Brad Iaşi.
6. Țopa D., Jităreanu G., Raus L., Ailincăi C. - Impactul unor sisteme minime asupra producției și fertilității solului. Ed. Ion Ionescu de la Brad, 2013, ISBN 978-973-147-122-8.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Final test - writing	60%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and essay	40%

Contact

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