

## Equipment and chemical-physical field and laboratory tests for diagnosing the fertility status of agricultural soils (2<sup>nd</sup> Year of study, 3<sup>rd</sup> Semester)

**Credit value (ECTS) 5**

### Course category

Domain – foundation course (Imposed)

### Course holder:

Scientific researcher Irina Gabriela CARA

### Discipline objectives (course and practical works)

The *Equipment and chemical-physical field and laboratory tests for diagnosing the fertility status of agricultural soils* course, in accordance with analytical program, has aims to acquire specialized knowledge and the formation of students skills regarding the use of equipment for laboratory analysis or field study.

Practical works seek to familiarize students with primary and basic operation of research equipment, mastering the calibration methodologies, equipment installation and initialization of field study procedures and interpretation of the results obtained.

### Contents (syllabus)

Course (chapters/subchapters)
<b>Introduction. General approaches to the concept of soil fertility.</b> The main indicators of characterization and appreciation of soil fertility and productivity, their importance in agricultural technological systems
Negative effects and processes manifested on the soil in intensive cultivation systems – Degradation of soil structure. Crusting. Compaction. Erosion. Agrochemical degradation. Biological degradation. Aridification and desertification
Research methodology. Specificity of soil and water physico-chemical analyzes.
The main agrochemical indicators for assessing soil fertility - Soil reaction. Nitrogen. Phosphorus. Potassium. Organic matter and humus.
Identification and quantification of chemical elements from Be (K) to U in environmental samples, by X-ray fluorescence dispersive sequential wavelength spectrometry (WDXRF)
Lysimeters - History. The purpose of research in lysimeter stations. Types of lysimeters.
Computerized microtomography - tool for determining soil porosity

Practical works
Presentation of the General Microbiology laboratory; labor protection rules; laboratory apparatus and utensils; correct working practices in the microbiology laboratory.
1. Presentation of the laboratories of Soil Management and Agricultural Techniques, Physics of agricultural soils - Research Institute for Agriculture and Environment (ICAM), Chemical analysis - ICAM, Lysimeter Station. Labor protection rules; laboratory apparatus and utensils; good working practices in research laboratories.
2. Sampling and qualitative and quantitative determination of components of interest
3. Water sampling (Botanical Garden Lake - Iasi). Determination of turbidity. Peristaltic pumps
4. Determination of electrical conductivity (EC) of soils
5. Determination of pH in the field and laboratory. Calibration / operation of pH meters
6. Determination of the Leaf Chlorophyll Content Index (CCI)

7. Sensors for monitoring soil moisture, conductivity, and temperature. Configuration, mounting, calibration, download / interpretation of data.
8. Sensors for measuring water level and temperature in rivers / lakes / wells. Configuration, mounting, calibration, download / interpretation of data.
9. Determining water stress in the plant - Plant Water Status Console configuration
10. Studies on soil / plant / insect fragments - Computed Tomography, Bruker - SKYSCAN 1172
11. Elaboration of soil studies. Operational flow in physico-chemical analysis laboratories (OSPA Iași)
12. Urban wastewater treatment technology (APAVITL treatment / treatment plant - Iași)
13. Statistical data processing

### **Bibliography**

1. Bryan Davies, D. Eagle, B.Finey, 1993 - Soil management. Farming Press, U.K.
2. Canarache, A., 1990 – Fizica solurilor agricole. Editura Ceres, București.
3. 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.
4. Stătescu F., Pavel V.L., 2015 – Tehnici moderne de cercetare a solului. Ed. Politehniun Iași.
5. Stătescu F., Pavel V.L., 2011 – Știința solului. Ed. Politehniun Iași.
6. Faithfull N.T. 2002 - Methods in Agricultural Chemical Analysis
7. Fizica, hidrofizica, chimia și respirația solului, 2007 – Rusu T., Paulette Laura, Horea C., Turcu V. Ed. Risoprint Cluj-Napoca.
8. Hillel Daniel - Introduction To Environmental Soil Physics. 2004, Elsevier Science (USA).

### **Evaluation**

<b>Evaluation form</b>	<b>Evaluation Methods</b>	<b>Percentage of the final grade</b>
Exam	Written test	60%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	40%

### **Contact**

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