



ACADEMIC YEAR: 2016-2017

COURSE: Agricultural Chemistry and Biochemistry

TYPE OF EDUCATIONAL ACTIVITY: Basic

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[Google Scholar Citation Profile](#)

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Language: Italian

ECTS: (lessons /
tutorials/practice): 6

n. of hours:
32 hours of lessons
16 hours of practice

Campus: Potenza
School: SAFE
Program: Bachelor of Agricultural
Technologies

Semester: I

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Students will learn the main topics of soil chemistry and biochemistry. The Course will include both the basic mechanisms of the effects of soil quality and fertility on crop plants. The study of the topics of soil chemistry and biochemistry will be supplemented by discussions, case studies and laboratory exercises. At the end of the course, the student will know the main chemico-physical soil properties, also in relation to pollution and global climate change. the student will be able to recognize the alterations of microbial communities and of the chemico-physical soil properties as a result of the release of xenobiotic substances and of the adoption of different agronomic practices, due to human activities. the student will learn the concept of "biogeochemical cycle", that determines the environmental fate of the chemical elements, especially in agro-ecosystems.

- **Knowledge and understanding:** knowledge and ability to understand the general principles governing both the quality and quantity of macroscopic soil and plant behavior and the reactivity of their inorganic and organic compounds, the behaviour of pure phases, physical and chemical equilibrium, The structure of phyllosilicates, the properties of macronutrients and micronutrients, the chemical bonds as well as the intermolecular and interparticle interactions of the soil. Knowledge and ability to understand the key relationships between structure and properties in the case of the most important functional groups of the inorganic and organic molecules constituting the soil and the plants. Knowledge and ability to understand the application aspects of the concepts studied, in particular that relating to the soil and nutrition of cultivated plants.
- **Applying knowledge and understanding:** ability to read and write the formulas of the most common inorganic and organic compounds of soil and plants. Ability to apply the fundamental laws of soil chemistry and plant biochemistry to solving simple numerical and application problems. Ability to identify the main physical and chemical properties of the soil in the gaseous, liquid and solid phases. Ability to handle appropriately, both qualitatively and quantitatively, the general properties of soil and plant-level balances. Ability to recognize the principal models of degradation, decomposition, adsorption and soil exchange capability, and to identify the main properties of the organic substance and its influence on the soil. Ability to properly handle the main aspects of plant metabolism for the purpose of interpreting soil, plant and microorganism relationships. Ability to identify the degradation mechanisms of cultivated soils and the adverse effects on the environment due to mismanagement of agricultural soils. Ability to recognize and describe the essential factors that control the kinetics of chemical and biochemical reactions in soil and plant. Ability to recognize and interpret the main structure/property relationships of the main classes of soil studied.
- **Making judgements:** ability to evaluate and apply the most appropriate procedure to solve simple numerical and application problems. Ability to build the main relationships between macroscopic and



microscopic properties of plant-soil relationships. Ability to discriminate between the different macroscopic properties of soil and plants and to apply the correct microscopic interpretation. Ability to predict the main physical properties and the most marked differences in the reactivity of the classes of inorganic and organic compounds studied.

- **Communication skills:** ability to organize in a logical way and to communicate, using an appropriate and correct language and mathematical and graphical tools as well, the acquired knowledge.
- **Learning skills:** ability to collect and organize in a functional way the information coming from class lectures, suggested books, and literature data.

PREREQUIREMENTS

- Inorganic and organic chemistry
- Botany

SYLLABUS

Lessons

The Soils Around Us
Formation of Soils from Parent Materials
Soil Architecture and Physical Properties
Soil Water: Characteristics and Behavior
Soil and Hydrologic Cycle
Soil Air and Temperature
Soil Colloids: Chemical and Physical Activity
Soil Acidity, Alkalinity and Salinity
Organisms and Ecology of the Soil
Soil Organic Matter
Nutrient Cycles and Soil Fertility
Soil Quality and Pollution

Practices

Case studies on forest and soil systems. Laboratory training regarding chemical and biochemical plant and soil measurements.

TEACHING METHODS

32 hours of lessons 16 hours of laboratory and field practices. During practices, students will be asked to analyze specific case studies and to work in the laboratory.

EVALUATION METHODS

Groupwork + written examination at the end of the course. If the score of the writing exam is not enough (< 18/30), an oral examination is mandatory.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Pietro Violante. Chimica del Suolo e della Nutrizione delle Piante. Edagricole, Bologna.

Roberto Pinton, Maurizio Cocucci, Paolo Nannipieri, Marco Trevisan. Fondamenti di Biochimica agraria. Pàtron Editore.

[Optional] Nyle Brady and Ray Weil. The Nature and Properties of Soils. Pearson.

Reviews and articles provided during the course.



INTERACTIONS WITH STUDENTS

- in the office at planned days/hours (usually on Tuesday, Wednesday and Thursday)
 - email, skype (every time)
 - mobile (every time)
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EXAMINATION SESSIONS (Forecast)

Calendar online:

<https://unibas.esse3.cineca.it/Home.do>

Usually, the third Wednesday of every month (except August)

EVALUATION BOARD

Adriano Sofo
Antonio Scopa
Maria Nuzzaci

SEMINARS BY EXTERNAL EXPERTS: SI
