



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	
ACADEMIC YEAR	
ANNO ACCADEMICO EROGAZIONE	
SUBJECT	
CODE	
SCIENTIFIC SECTOR(S)	
HEAD PROFESSOR(S)	LAUDICINA VITO Professore Ordinario Univ. di PALERMO ARMANDO
OTHER PROFESSOR(S)	
CREDITS	
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	
TERM (SEMESTER)	
ATTENDANCE	
EVALUATION	
TEACHER OFFICE HOURS	LAUDICINA VITO ARMANDO Wednesday 11:00 14:00 Dip. SAAF, 1° piano, studio 142

DOCENTE: Prof. VITO ARMANDO LAUDICINA

PREREQUISITES	Basic knowledge of plant biology, general and organic chemistry.
LEARNING OUTCOMES	<p>Knowledge and understanding At the end of the course the student will have acquired the chemical and biochemical tools useful for understanding the functioning of the soil-plant system as well as for the knowledge of the metabolic processes that regulate life. In particular, the student will know:</p> <ul style="list-style-type: none">- the molecular composition of ecosystems.- the molecular explanation of some of the biotic and abiotic phenomena that occur in them.- the mechanisms that regulate the availability of nutrients. <p>Ability to apply knowledge At the end of the course the student will be able to:</p> <ul style="list-style-type: none">- forecast the availability of nutrients for plants, given the characteristics of the soil, the environmental conditions and the characteristics of the plant.- plan the actions necessary to know the properties of the soils of a farm.- solve simple problems concerning the soil-plant system. <p>Judgment autonomy The student will be able to formulate an opinion on the physical, biological and chemical fertility of the soils of a farm and to manage the cycle of nutrients in the soil-plant system.</p> <p>Communication skills At the end of the course the student will be able to:</p> <ul style="list-style-type: none">- use an appropriate language inherent to the soil-plant system.- write a professional report on the characteristics of a soil.- understand and explain scientific concepts in a simple way even to a non-expert audience.
ASSESSMENT METHODS	<p>The assessment of learning is done through intermediate written tests and an oral exam at the end of the course on the dates established by the academic calendar. The intermediate written tests and the oral exam include the discussion of the topics developed during the Course. The student will be assessed taking into account the level of knowledge achieved and the ability to apply the level of knowledge and understanding achieved. The assessment will take into account the student's ability to use both the technical-scientific language of agricultural chemistry and biochemistry, and a language understandable to non-experts. The assessment expressed in thirtieths, with a minimum score of 18 for sufficiency and a maximum of 30 cum laude, follows the following assessment scheme: 1) knowledge of the topics, ability to deduce and process information, ability to apply and analyze, ability to present assessed as just sufficient (grade 18-21); 2) knowledge of the topics, ability to deduce and process information, ability to apply and analyze, ability to present assessed as fair (grade 22-25); 3) knowledge of the topics, ability to deduce and process information, ability to apply and analyze, ability to present the topic rated from good to high (grade 26-28); 4) knowledge of the topics, ability to deduce and process information, ability to apply and analyze rated, ability to present the topic rated from excellent to advanced (grade 29-30 cum laude). Compensatory tools and dispensatory measures will be guaranteed by the Disability and Neurodiversity Center - University of Palermo (Ce.N.Dis.) to students with disabilities and neurodiversity, based on specific needs and in implementation of current legislation.</p>
EDUCATIONAL OBJECTIVES	<p>In line with the academic objectives of the degree programme in the field of plant production, this course contributes to the preparation of graduates capable of increasing the efficiency of agricultural practices and promoting the environmental sustainability of agricultural systems. In particular, the course will provide students with the necessary fundamental knowledge regarding the main constituents of soil and its biotia, and will allow students to understand the main biotic and abiotic processes that regulate the biogeochemical cycling of nutrients in soil-plant systems.</p>
TEACHING METHODS	Lectures (48 hours) and laboratory activities (20 hours)
SUGGESTED BIBLIOGRAPHY	<ol style="list-style-type: none">1. Violante (2002) Chimica del suolo e della nutrizione delle piante. Edagricole. ISBN-13 978-88506541782. Marinella Bosetto, Irene Lozzi, Elementi di biochimica agraria. ARACNE editrice S.r.l., Roma. ISBN 88-548-0724-93. Paolo Sequi, Claudio Ciavatta, Teodoro Miano, Fondamenti di chimica del suolo, Pàtron editore Bologna, ISBN: 97888555336214. Roberto Pinton, Maurizio Cocucci, Paolo Nannipieri, Marco Trevisan, Fondamenti di biochimica agraria. Patron editore Bologna, ISBN: 9788855533225

SYLLABUS

Hrs	Frontal teaching
10	Introduction to the study of biochemistry. Biomolecules: carbohydrates, amino acids, proteins, nucleotides and nucleic acids, lipids. The enzymes.
2	Principles of bioenergetics.
6	The respiratory process. The citric acid cycle. Oxidative phosphorylation. Gluconeogenesis and the pentose phosphate pathway.
6	Photosynthesis.
2	Lipid metabolism.
2	Secondary metabolites
2	The concept of soil. Soil functions in the ecosystem. Soil formation factors. The processes of transformation, translocation, addition, loss.
4	The inorganic component of the soil. Primary and secondary minerals. The processes of physical alteration of minerals. The processes of chemical alteration of minerals.
4	The organic component of the soil. The decomposition of soil organic matter (mineralization, humification, fermentation or carbonification). Functional groups of humic substances. Soil colloids: mineral, organic and organo-mineral colloids.
2	The liquid phase of the soil: relationship between water content and water potential. Forms of water in soil and hydrological constants. Movement of water in the soil-plant-atmosphere system. The gaseous phase of the soil.
4	Physical properties of the soil: real and apparent texture, state of aggregation of soil particles, porosity, real and apparent density. The absorbent power of the soil: mechanical absorption, physical absorption, chemical absorption, biological absorption, chemical-physical absorption (ion exchange).
2	Soil reaction. Particular soils (submerged, saline, saline-sodic and sodium soils) and their reclamation and management.
2	The chemical elements of soil fertility: nitrogen, phosphorus and potassium. Notes on fertilizers.
Hrs	Workshops
4	Soil sample preparation and Soil sieving.
8	Determination of the reaction, electrical conductivity, total limestone and texture of the soil.
8	Determination of soil organic matter and of total soil nitrogen.