



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2019/2020
BACHELOR'S DEGREE (BSC)	AGRICULTURAL SCIENCES AND TECHNOLOGIES
SUBJECT	PLANT MORPHOLOGY AND PHYSIOLOGY
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50122-Discipline biologiche
CODE	18803
SCIENTIFIC SECTOR(S)	BIO/03
HEAD PROFESSOR(S)	GIANGUZZI LORENZO Professore Associato Univ. di PALERMO ANTONINO
OTHER PROFESSOR(S)	
CREDITS	7
INDIVIDUAL STUDY (Hrs)	115
COURSE ACTIVITY (Hrs)	60
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	GIANGUZZI LORENZO ANTONINO Monday 9:00 14:00 Dipartimento di Scienze Agrarie, Alimentari e Forestali Universita degli Studi di Palermo - Viale delle Scienze, ed. 5 (studio del docente, piano terra), I- 90128 - Palermo

DOCENTE: Prof. LORENZO ANTONINO GIANGUZZI

PREREQUISITES	Basic knowledge of the key biological processes of plants.
LEARNING OUTCOMES	<p>Knowledge and ability to understand Acquisition of basic knowledge about Plant Morphology, and Physiology. Ability to use the specific language of the basic subject, but also of the more specialized ones. Ability to approach the disciplines of the course that will take Plant Biology as a cognitive base.</p> <p>Applying knowledge and understanding The student will be able to recognize and make observations on Plant Cytology, Histology, Anatomy and Physiology.</p> <p>Making judgments The knowledge and methodological competences provided by the course will be useful for the interpretation of scientific texts and reports, with the possibility of transferring the results in professional activity (forest management, environmental regeneration, nature conservation, etc.).</p> <p>Communicative skills The course creates the premises for exposure of concepts of General Botany and and Physiology.</p> <p>Learning ability The student will be able to understand related disciplines, as well as in-depth courses and specialized seminars of General Botany and and Physiology; the student will also be able to understand the disciplines of the curriculum that use Plant Biology as basic knowledge.</p>
ASSESSMENT METHODS	<p>The assessment of learning level will be done through two tests, one in progress (written) and another ex-post (oral).</p> <p>1) Test in progress (for attending students) - To facilitate an ongoing commitment of the students, during the course there will be a partial test (6 questions about the arguments of Plant Cytology and Histology). Each question will be evaluated with a score ranging from 0 to 5 points, with overall scores of thirty.</p> <p>2) Final test (for attending students) - For attending students the oral examination will be structured in three questions and one of them concerning the test in progress. Each of them will be evaluated from a minimum of 0 to a maximum of 10 points; the final evaluation will be calculated as the mean value of the two tests, with overall scores of thirty.</p> <p>3) Final test for other students - The oral examination will be structured in five questions, each of them will be evaluated from a minimum of 0 to a maximum of 6 points.</p> <p>The following evaluation criteria will be used: a) deep knowledge and ability to apply its concepts promptly and correctly, excellent capacity of synthesis and analysis (rating 30-29; the "lode" will be assigned to those students that will show excellent knowledge and complete mastery of the material); b) in-depth knowledge of the studied topics and ability to analyze the proposed questions, good capacity of synthesis and exposition of the followed procedures (rating 28-26); c) good knowledge of the studied topics, ability to link these and to apply their content, discrete capacity of analysis of the presented questions and exposure of the procedures followed (rating 25-22); d) basic knowledge of the main topics, limited capacity to apply the gained knowledge and sufficient exposure of the procedures followed (rating 21-18).</p>
EDUCATIONAL OBJECTIVES	The course aims to provide a general review of the concepts of Morphology and Plant Physiology and an insight into ultrastructure, anatomy and functional aspects of Cormophytes. Will be studied in detail various topics of Cytology (the plant cell, the nucleus, cytoplasm, plastids, cell wall, vacuole), Histology (meristematic tissues, parenchymatic, tegumental, mechanical, conductors) Organography (root, stem, leaf, flower and fruit) and Plant Physiology (the transport of water and other substances in the plant; hormones; energy and life processes; the role of plants in the biosphere; the photosynthesis).
TEACHING METHODS	Frontal lessons and laboratory exercises.
SUGGESTED BIBLIOGRAPHY	Arrigoni O., 1973 – Elementi di Biologia vegetale. – Casa Editrice Ambrosiana, Milano. Evert R.F. & Eichhorn S.E, 2013 – Biologia delle piante di Raven. – Zanichelli, Bologna.

SYLLABUS

Hrs	Frontal teaching
2	Introduction to Botany - Comparison among plants and animals. Autotrophs and heterotrophs organisms. Prokaryotes and eukaryotes.

SYLLABUS

Hrs	Frontal teaching
2	Citology - The plant cell. Protoplasm. Endoplasmic reticulum.
2	The nucleus. Mitosis. Golgi apparatus. Mitochondria.
2	Plastids (classification, ultrastructure and function) - Chloroplasts: origin, role, structure and chemical composition. Proplastids and ezioplasts. Amyloplasts. Chromoplasts.
2	Vacuoles (origin, development and function) - Tonoplast. The vacuolar juice. The osmotic phenomena.
2	The cell wall - Role, biogenesis and cellular cell chemical composition. Median lamella. The primary wall and the secondary wall. Punctuations and plasmodesmata.
2	Histology - Cell aggregates. Tissues and pseudotissues. Classification of tissues.
2	Plant tissues - Meristematic tissues: apical meristems, meristemoids, lateral meristems (vascular cambium and phellogen).
2	Plant tissues - Tegumentary tissues (epidermal tissue; stomata; hairy coatings). Mechanical tissues (collenchyma and sclerenchyma tissues). Secretor tissues.
2	Plant tissues - Parenchymatic tissues (or fundamental tissues). Vascular tissues.
2	Anatomy of the root - Root apex and primary structure. Meristematic region (root cap, apical meristems; theories on organization of meristems). Region of elongation. Region of maturation (hair region).
2	Anatomy of the root - Secondary structure area (cambium vascular and phellogen). Secondary xylem. Secondary phloem. Lateral and adventitious roots.
2	Anatomy of the stem - Primary structure (epidermis, bark, collenchyma and sclerenchyma tissues, central cylinder).
2	Anatomy of the stem - Secondary structure area (cambium vascular and phellogen). Secondary xylem. Secondary phloem.
2	Anatomy of the stem in the secondary structure (comparison between Monocotyledons, Dicotyledons and Gymnosperms). Alburnum. Duramen.
2	Anatomy of the leaf - Morphology and adaptations to the environment (dorsiventral and isolateral leaf). Blade (epidermis, mesophyll, vascular system, stomatal types) and petiole.
2	Water absorption and ascent of sap - Imbibition; diffusion; osmosis; plasmolysis. Water movement from the plant to the atmosphere through the stomates. Stomatal physiology. Transpiration.
2	Ontogenetic cycle of the plant. Fertilization. Meiosis. Seed formation, maturation and accumulation of reserves. Seed germination and seedling development. Annuals, biennials and perennials plants.
2	Plant growth and development. The hormonal regulation: Auxin, Gibberellic acid, Cytokinin, Ethylene and abscisic acid. Physiology of flowering: photoperiodism and vernalization.
2	Photosynthesis (definition and its significance). Photosynthetic requirements: chloroplast and its pigments, absorption of light energy, excitation of atom or molecules. Plants C3, C4 and CAM. Translocation of organic solutes.
Hrs	Practice
2	Observations under the microscope or by computer (images, slides) of biological samples - Plant cell and the cellular organelles (nucleus, protoplasm, endoplasmic reticulum, Golgi apparatus, mitochondria, plastids).
2	Observations under the microscope or by computer (images, slides) of biological samples - Plant tissues.
2	Observations under the microscope or by computer (images, slides) of biological samples - The root: function and organization of the root system; comparison between the roots of the Monocotyledons, Dicotyledons and Gymnosperms.
4	Observations under the microscope or by computer (images, slides) of biological samples - Anatomy of the root: transverse sections (comparison between Monocotyledons, Dicotyledons and Gymnosperms).
2	Observations under the microscope or by computer (images, slides) of biological samples - The root: modifications and adaptations to the environment of the stem; bulb, rhizome and tuber; structure of the shoot apex.
2	Observations under the microscope or by computer (images, slides) of biological samples - Anatomy of the stem: transverse sections of Monocotyledons, Dicotyledons and Gymnosperms stems.
2	Observations under the microscope or by computer (images, slides) of biological samples - Anatomy of the leaf (dorsiventral and isolateral): blade (epidermis, mesophyll, vascular system, stomatal types) and petiole.
2	Observations under the microscope or by computer (images, slides) of biological samples - Flower and fruit.
Hrs	Workshops
2	Test in progress about the topics covered (Plant Cytology and Plant Histology)