

COURSE OF STUDY Management of green spaces, forests and protected areas
ACADEMIC YEAR 2023-2024
ACADEMIC SUBJECT ENVIRONMENTAL BOTANY – Module (Integrated course
 Applied botany and land monitoring)

General information	
Year of the course	First year
Academic calendar (starting and ending date)	I SEMESTER (9 October 2023 - 26 June 2024)
Credits (CFU/ETCS):	6 ECTS
SSD	BIO/03 – ENVIRONMENTAL BOTANY
Language	ITALIAN
Mode of attendance	Recommended Attendance

Professor/ Lecturer	
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Virtual room	Microsoft Teams Code: w57re8n
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Use email messages to establish appointments

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
150	48		102
CFU/ETCS			
6	6		

Learning Objectives	The course aims to provide students with basic theoretical knowledge related to plant biology and environmental botany, and the methodological tools for the analysis, evaluation and interpretation of the plant landscape, the relationships between form and function, and between species and environment, aimed at urban design. The course also provides knowledge and skills on plant organisms in the primary range (original distribution in nature) and in the secondary range (artificial distribution) with special reference, in the latter case, to gardens and urban green landscaping.
Course prerequisites	There are no specific prerequisites other than those required for admission to the degree course.

Teaching strategies	Blended learning: The topics of the course will be treated with the help of Power Point presentations, with the support of movies.
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Expected learning outcomes in terms of	
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge of basic information on biodiversity and the morphological, functional and physiological organization of plant species of forest interest that can also be used in the design of green spaces in the city.
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Ability to describe and characterize the main species of forest and ornamental interest, potentially usable in urban environments.
Soft skills	<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Ability to understand and process information gained from the study of environmental botany by evaluating its implications on forest system, green spaces, and protected areas, with a focus on eco-friendly and sustainable resource management. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to communicate effectively, orally and in writing, knowledge gained from the study of environmental botany, including using modern communicative systems, Italian and a European Union language other than one's own, usually English. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to use the methodological tools and knowledge necessary to successfully undertake the studies envisaged in the Master's degree courses of reference.
Syllabus	
Content knowledge	<p><u>Elements of General Botany (16 hours = 2 ECTS)</u>. Molecular composition of plant cells: organic molecules, carbohydrates, lipids, proteins, nucleic acids, secondary metabolites. Prokaryotes and Eukaryotes. Autotrophy and Heterotrophy. The plant cell: plastids, vacuoles, cell wall. Characteristics of the secondary wall and its modifications. Functions; growth and differentiation of plant cells; meristems and plant tissues. Stem, root and leaves: morphology, anatomy and functions in Angiosperms (Monocotyledons and Dicotyledons) and Gymnosperms. Flower, fruit, seed, germination and dissemination. Absorption and transport. Mycorrhizae and Wood Wide WEB.</p> <p><u>Biochemistry and Metabolism (8 hours= 1 ECTS)</u>. Transpiration. Photosynthesis: light phase and dark phase. C4 cycle and CAM. Photorespiration. Nitrogen cycle. Plant hormones: regulatory role and general properties. Tropisms.</p> <p><u>Elements of Systematic Botany (8 hours= 1 ECTS)</u>. Systematics and Taxonomy. Classification systems. Concept of species and binomial nomenclature. International code of botanical nomenclature. Classification of living things. The Kingdom Fungi. Lichens. The major divisions of the Plant Kingdom: Thallophytes and Chlorophytes: general characteristics, evolutionary importance, life cycle, ecology, distribution and applied importance. The Spermatophytes: Gymnosperms and Angiosperms, their evolutionary importance and ontogenetic cycle. Systematics of major families of forest and ornamental interest. Role and function of Botanical Gardens, Herbaria and Germplasm Banks.</p> <p><u>Elements of Geobotany (16 hours= 2 ECTS)</u>. Environmental factors and plant adaptations: hydrophytes, halophytes and xerophytes. Biological forms. Chorology: range types; geographic and taxonomic relicts; endemism; geographic and ecological vicariance. Chorotypes of the Italian flora. Naturalized, adventitious, invasive exotic plants. Biodiversity: concept and evaluation criteria; specific richness and variety, gradients of diversity in space and time. IUCN Categories. Biomes. Principles and methods of vegetation study. The Braun - Blanquet phytosociological method. The dynamism of vegetation. Concepts of dynamic stage and succession. Primary and secondary successions.</p>

	The concept of climax. Altitudinal zonation of vegetation: vegetation belts in Italy. Parks and Gardens as elements of urban greenery. Ecological-environmental function of green spaces. Eco-systemic services of the forest.
Texts and readings	<p>LONGO C., 1986 – Biologia vegetale: Morfologia e fisiologia. UTET.</p> <p>GEROLA F., 2006 – Biologia vegetale vol. 2 - Sistematica filogenetica. UTET.</p> <p>STRASBURGER E., 2007 – Trattato di botanica vol.2 - Evoluzione sistematica ed ecologia. Delfino Ed.</p> <p>PASQUA G., ABBATE G., FORNI C., 2011 – Botanica Generale e Diversità Vegetale. II edizione, Piccin.</p> <p>ARRIGONI O., 1973 – Elementi di Biologia Vegetale. Casa Editrice Ambrosiana.</p> <p>UBALDI D., 2003 – Flora, fitocenosi e ambiente - Elementi di geobotanica e fitosociologia, Ed. CLUEB Bologna.</p>
Notes, additional materials	Different editions of the reference texts above can also be used.
Repository	Teaching materials will be available on the Teams class: w57re8n

Assessment	
Assessment methods	<p>For students enrolled in the year in which the course is taught, there is a non-compulsory exemption test. The exoneration, which takes place on the dates published in the intermediate assessment test diary, consists of a written test in which the student will have two hours to answer multiple-choice and open-ended questions on topics from both modules covered in the first half of the integrated course. The outcome of this test contributes to the evaluation of the final oral examination.</p> <p>Specifically, the waiver test for the Environmental Botany module, consists of a test with 25 multiple-choice and 5 open-ended questions: 1 point for each correct answer, 0 points for each wrong or not given answer. The student, who correctly answers at least 18 out of 30 questions passes the test and is "eligible." Students who are not interested in taking the exemption test will take the final oral examination on the entire program as stipulated in the Didactic Regulations of the Course of Study.</p>
Assessment criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ competence in the use of the student's specialized vocabulary and expository skills. ○ knows the relationship between plant morphology and the environment and the main management problems of green spaces, forests and protected areas. • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ knows the morpho-physiological characteristics of species of shade-tolerant forest systems, drought, low soil fertility, to major soil pollutants (e.g., heavy metals), salinity and saltiness (coastal urban areas). • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ can assess their own potential and limitations and work towards improvement. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ ability to communicate effectively, knowledge gained from the study of environmental botany, including using modern communicative systems, Italian and a European Union language other than one's own, usually English. • <i>Communication skills</i> <ul style="list-style-type: none"> ○ can evaluate the cytological, histological, and anatomical difference of the different organs of tracheophytes. Can evaluate also ecosystem

	<p>services of green spaces of forests and protected area.</p> <ul style="list-style-type: none"> • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ assessment of progress against baseline levels
Final exam and grading criteria	<p>The single, comprehensive and collegial profit examination for C.I .Applied Botany and Land Monitoring consists of an oral test on the topics developed during the theoretical lecture hours of both modules of the integrated course. Only the successful completion of the oral test will result in the final examination grade, which will be expressed as the arithmetic mean of the oral tests of the two modules.</p> <p>For students who were successful in the written exemption test, the subject of the oral test will be only the topics taken in the period following the test itself. In this case, the evaluation of the profit examination is expressed as the average of the grade given in the exoneration and the grade given in the oral test.</p> <p>The profit examination of foreign students may be conducted in English.</p>
Further information	
	<p>The exemption test is valid until the close of the last examination session of that academic year, is not mandatory and failure to pass it does not affect the conduct of the final examination.</p>