



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	
<b>ACADEMIC YEAR</b>	
<b>ANNO ACCADEMICO EROGAZIONE</b>	
<b>SUBJECT</b>	
<b>CODE</b>	
<b>SCIENTIFIC SECTOR(S)</b>	
<b>HEAD PROFESSOR(S)</b>	LA BELLA SALVATORE Professore Associato Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	
<b>CREDITS</b>	
<b>PROPAEDEUTICAL SUBJECTS</b>	
<b>MUTUALIZATION</b>	
<b>YEAR</b>	
<b>TERM (SEMESTER)</b>	
<b>ATTENDANCE</b>	
<b>EVALUATION</b>	
<b>TEACHER OFFICE HOURS</b>	LA BELLA SALVATORE Wednesday 10:00 12:00 studio docente

DOCENTE: Prof. SALVATORE LA BELLA

<b>PREREQUISITES</b>	Agronomy, Cartography and herbaceous cultivations
<b>LEARNING OUTCOMES</b>	<p>Knowledge Acquisition of basic knowledge regarding Territorial Agronomy for the understanding and the drafting of agronomic studies of the area; acquisition of specific skills regarding the valorisation and utilization of wastewater of various types in agronomy and its treatment using constructed wetlands. The ability to use language specific to this specialized subject area.</p> <p>Comprehension Ability to apply skills and understanding Ability to organize and explain data and analyses required for the design of projects in territorial agronomy. Ability to apply knowledge when choosing a wetlands system for the treatment of wastewater and wastewater management systems to use in the field of agronomy. Autonomous evaluation Ability to assess the implications and results of agronomic studies on the area in order to define the principal characteristics of the environment in question and to apply relevant agronomic techniques. Capacity to assess and manage the use of wastewater from various origins in order to rationalize farm activities in an effort to avoid losses and waste.</p> <p>Communicative ability. Ability to present the results of the agronomic studies to an expert/non-expert audience. Ability to demonstrate the importance and environmental impact of territorial agronomy. Learning capacity Ability to keep abreast of the latest developments by reading scientific journals in the field of Territorial Agronomy. Ability to follow master's courses, seminars and specialized meetings using the skills learn on the course. Ability to understand textbooks and transfer knowledge within a work context.</p>
<b>ASSESSMENT METHODS</b>	Students will be evaluated by one final oral exam on topics lectured in the course programme. Score ranges from 18 (minimum, elementary knowledge) to 30 cum laude (perfect knowledge and excellent ability of communication). Exam will start with a brief oral communication on a topic decided by the student, and will proceed with 4-6 questions randomly asked by the committee. Student knowledge will be evaluated considering answer correctness, language pertinence, ability in expressing logical connections among topics of soil science. Exam score will take into consideration the achievement by the students of the learning outcomes and educational objectives as described in the following paragraphs.
<b>EDUCATIONAL OBJECTIVES</b>	The courses seeks to provide students with the basic study method skills for the agronomic and environmental analysis of the territory and of agricultural ecosystems. Agronomic aspects relating to territorial management will be examined and the main agronomic techniques will be presented. Practical sessions will take place on the use of GIS and GPS and a number of case studies will be considered. The course will be completed with concepts linked to the agronomic valorisation of wastewater from agricultural and domestic activities through the use of traditional and innovative agronomic techniques. The main characteristics of the wastewater will be examined, also within the relevant legislative framework, and agronomic aspects related to its reuse will be discussed, with particular reference to constructed wetlands systems. The final part of the course will focus on case studies linked to the use of constructed wetlands.
<b>TEACHING METHODS</b>	The course (90 hours) is organised as follow: 64 hours of lectures in classroom, 26 hours of exercises in classroom and in field. Reading materials and slides of lecture presentations will be provided in course. While lecturing a selection of some short educational video documentaries and multimedia resources will be projected and commented to stimulate learning capacity of students. Integral part of the course is a field trip in a suitable location where students have chance to survey, classify and evaluate a Phytodepuration plant
<b>SUGGESTED BIBLIOGRAPHY</b>	<p>- Materiale bibliografico distribuito dal docente (Reference materials provided by the lecturer) - Appunti delle lezioni (Lesson notes)</p> <p>Bonari E., Ceccon P. Verso un approccio integrato allo studio dei sistemi colturali. Edizioni Franco Angeli. Bonciarelli F. Fondamenti di Agronomia generale. Edagricole, Bologna, ultima edizione.</p> <p>Borin M. Fitodepurazione. Edagricole, Bologna 2003.</p> <p>Brix H. Wastewater treatment in constructed wetlands system design, removal process and treatment performances. In Moshiri G.A. (ed.): Constructed wetland for water quality improvement. 1993. F.J. Pierce, D. Clay. GIS Applications in Agriculture. CRC Press.</p> <p>Giardini. Agronomia generale, aziendale e ambientale. Patron, Padova.</p> <p>Leone A. Ambiente e territorio agroforestale. Linee guida per la pianificazione sostenibile e gli studi di impatto ambientale. Edizioni Franco Angeli. Ministero delle Politiche Agricole, Alimentari e Forestali. Edoardo A.C. Costantini. Metodi di valutazione dei suoli e delle terre. Edizioni Cantagalli.</p> <p>Floriana Romagnoli. Fitodepurazione. Gestione sostenibile delle acque.</p>

P.J. Bohlen, G. House. Sustainable Agroecosystem Management.  
 Materiale delle lezioni e siti web di interesse tematico.  
 Pisante, M. Agricoltura BLU. La via italiana dell'agricoltura conservativa.  
 Principi, tecnologie e metodi per una produzione

## SYLLABUS

Hrs	Frontal teaching
2	Introduction: definition of the subject and objectives
4	The plant-soil-atmosphere system in the design of parks and gardens. Agronomic characteristics and soil regulations for technical applications in the design of green areas.
4	Agronomic issues in the creation and management of green systems in rural areas (bioparks, sports facilities, protected areas, nature parks), urban areas (parks, gardens, urban road networks) and road networks (traffic islands)
4	Main methods for the evaluation of the environmental impact of the principal ornamental, recreational and sports green systems in the area.
6	Rudiments of cartography for analysis of the territory. Thematic maps. Rudiments of GIS
6	Herbaceous cover crops for anti-erosion measures in the design and management of green areas with aesthetic, technical and recreational functions.
6	Air pollution as a territorial process: main sources of pollutions (ploughing dust, pest control, pollen, smells, crop-residue burning etc.). Water pollution as a territorial process: point sources, diffuse or nonpoint sources. Main agronomic practices for the management of the main sources of territorial pollution.
3	Principal legislation regarding territorial management. Territorial plan and planning
3	Rudiments of territorial agronomic classifications
2	Water resources: analysis of the context and general issues
5	Wastewater: definitions, typologies, rudiments on the purification system
8	General characteristics and agronomic use of various types of waste (civil, olive mills, wine-making etc).
2	Main legislative framework relating to wastewater of domestic and agricultural origin
2	Innovative technologies for the valorization of wastewater: constructed wetlands
3	Classification and operating principles of the main constructed wetlands systems
2	Rudiments of designing a constructed wetlands system
2	Purifying plant species: classification, morphological characteristics and purification yields
Hrs	Practice
4	Agronomic report on recovered green areas (quarries, landfills and degraded areas).
2	Constructed wetlands using domestic wastewater: case study
2	Constructed wetlands using agricultural wastewater: case study
12	Reading the coordinates in Italian maps. Attribution of coordinates to a point. Map orientation. Creation of thematic maps (altimetric maps, slope maps) Creation of thematic maps using reference maps (1:25000 e 1:10000) Applications of the Region of Sicily's Agrometeorological Information System Case studies
6	Elaboration of Phytoremediation project for a cheese factory