UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	
ACADEMIC YEAR	
ANNO ACCADEMICO EROGAZIONE	
SUBJECT	
CODE	
SCIENTIFIC SECTOR(S)	
HEAD PROFESSOR(S)	PROVENZANO GIUSEPPE Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	
TERM (SEMESTER)	
ATTENDANCE	
EVALUATION	
TEACHER OFFICE HOURS	**PROVENZANO GIUSEPPE** Wednesday 11:00 13:30 Studio Prof. Provenzano, Ed. 4 stanza 127 Thursday 11:00 13:30 Studio Prof. Provenzano, Ed. 4 stanza 127

DOCENTE: Prof. GIUSEPPE PROVENZANO

PREREQUISITES	Having knowledge of the fundaments of hydraulic (pressure pipes and open channels) and on farm irrigation systems.
LEARNING OUTCOMES	Ability to design small ponds according to the available water sources. Be able to evaluate the crop water needs. Ability to use the specific language of the discipline. Ability to apply the aquired knowledge and understanding in occupational contexts. Learning skills: Be able, with autonomy, to follow further studies related to the management of water sources and small distribution systems. Communication skills: Be able to explain the treated problems to experienced and not experienced audit. Be able to support the importance and highlight the environmental impacts of the proposed solutions. Be able to update the acquired knowledge by consulting scientific publications and thematic seminars. Ability to follow specialized seminars in the fields of water sources and water distribution systems.
ASSESSMENT METHODS	The exam consists of an oral test, with two or three questions, aimed to verify the disciplinary knowledge, as well as the ability to use the language of the discipline. Evaluation is expressed in thirtieths. The minimum threshold mark will be reached form students who show, in general terms, a limited knowledge and comprehension of the treated topics and minimal skills to solve the proposed problems. Students have also to demonstrate to be able to transmit their knowledge. Below this threshold, the exam will be insufficient. On the other hand, the more the students are able to interact with the examiners andto express in detail their knowledge and application skills, the more positive will be the evaluation.
EDUCATIONAL OBJECTIVES	Acquire the professional skills in the field of land improvement and related to the management of water sources and annexed water distribution networks. After completing the course, the students should be able to design small ponds and the distribution networks, including the choice of the necessary components of the plants. Students should also be able to evaluate crop water needs.
TEACHING METHODS	Lecturers and practical training on design in the classroom
SUGGESTED BIBLIOGRAPHY	Pumo D. 2008. L'approvvigionamento idrico per l'agricoltura. Aracne Ed. Allen R., Pereira L.S., Raes D., Smith M. 1998. FAO Irrigation and Drainage paper n. 56. INEA. Apparecchiature idrauliche per impianti irrigui a pressione. Diapositive ed appunti relativi agli argomenti trattati a lezione.

SYLLABUS

Hrs	Frontal teaching
1	Introduction to the course. Content and scope. Mode for the final exam.
14	Water sources for agriculture. Water ponds and dams. Evaluation of the annual outflow of small watersheds and determination of the maximum discharge. Design of ponds and annexed infrastructures. Use of groundwater.
4	Water sources in Sicily. Irrigation Association and irrigation districts. Distribution networks with pipes and channels. Materials and tools for distibution networks.
8	Management of water sources at district and farm levels. Evaluation of maximum and actual crop evapotranspiration. Climatic factors influencing evapotranspiration. Crop coefficients. Irrigation scheduling based on the control of soil and crop water status. Plant deficit indicators. Irrigation under regulated deficit conditions.
5	Design of pumping systems. Characteristic curves of a pump and operating point. Cavitation. Coupling of pumps in parallel or serial. Maximum suction height of a centrifugal pump. NPSH and operating condition without cavitation. Evaluation of the performance of a pumping system. Energy consumption. Introduction of water hammer and design of the air chambers.
4	Hydraulic engineering of the lowlands area. Maintainance of drainage systems in flat areas.

Hrs	Practice
9	Design of a water pond for irrigation.
9	Design of a small on demand irrigation network.
6	Design of a pumping system and evaluation of energetic consumes.