



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	AGROENGINEERING AND FORESTRY SCIENCES AND TECHNOLOGIES		
INTEGRATED COURSE	WATER RESOURCES MANAGEMENT AND SOIL DEFENCE		
CODE	21735		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	AGR/08		
HEAD PROFESSOR(S)	AUTOVINO DARIO	Ricercatore a tempo determinato	Univ. di PALERMO
OTHER PROFESSOR(S)	BAGARELLO VINCENZO	Professore Ordinario	Univ. di PALERMO
	AUTOVINO DARIO	Ricercatore a tempo determinato	Univ. di PALERMO
CREDITS	9		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p>AUTOVINO DARIO</p> <p>Wednesday 11:00 13:00 Si riceve per appuntamento. Viale delle scienze Ed. 4, Ingresso - E, Piano - primo, Studio - 129</p> <p>Thursday 11:00 13:00 Si riceve per appuntamento. Viale delle scienze Ed. 4, Ingresso - E, Piano - primo, Studio - 129</p> <p>BAGARELLO VINCENZO</p> <p>Monday 11:00 13:00 studio docente - edificio 4 Dipartimento SAAF - identificativo Ed.4.A.-E.P1-48</p> <p>Wednesday 11:00 13:00 studio docente - edificio 4 Dipartimento SAAF - identificativo Ed.4.A.-E.P1-48</p>		

DOCENTE: Prof. DARIO AUTOVINO

PREREQUISITES	To have acquired the principles of hydraulics (pressure stream and free surface flow) and know the irrigation techniques.
LEARNING OUTCOMES	<p>-Knowledge and understanding: Acquisition of the ability to set suitable design choices for the sizing of a storage tank in relation to the available resource. Be able to evaluate the water needs of crops. Ability to use the specific language of the topics covered. Ability to recognize, and independently organize, the surveys and processing necessary for the design of small water distribution networks.</p> <p>-Making judgements: Be able to prepare the design lines of the works for water supply and water distribution.</p> <p>-Communication skills: Knowing how to present the projects carried out to an expert and non-expert audience. Be able to support the importance and highlight the environmental impact of the proposed interventions. Ability to update with the consultation of scientific publications specific to the sector.</p> <p>-Learning skills: Ability to follow, using the knowledge acquired in the course, both first-level masters, in-depth courses, and specialized seminars related to water supply and distribution.</p>
ASSESSMENT METHODS	<p>The exam will consist of an oral test, with two or three questions on the topics covered and on the exercises carried out in the classroom, aimed at ascertaining the possession of the disciplinary knowledge required by the program and the ability to use the specific language of the subject. The evaluation is expressed in thirtieths. The threshold of sufficiency will be reached when the student shows knowledge and understanding of the topics, at least in general terms and has basic application skills in solving the proposed cases; he will also have to possess presentation and argumentative skills such as to allow the transmission of his knowledge. Below this threshold, the exam is insufficient. On the other hand, the more the examinee with his argumentative and expository skills will be able to interact with the examiner and the more he will be able to express knowledge and application skills in detail, the more positive the evaluation will be.</p> <p>The evaluation will be expressed out of thirty, with a minimum score of 18 for sufficient and a maximum of 30 cum laude, following the following evaluation scheme:</p> <ol style="list-style-type: none">1) knowledge of the topics, ability to deduce and process information, ability to apply and analyze, ability to explain just sufficient (grade 18-21);2) knowledge of the subjects, ability to deduce and process information, ability to apply and analyze it, ability to present a fair evaluation (grade 22-25);3) knowledge of the topics, ability to deduce and process information, ability to apply and analyze, ability to present, evaluated from good to high (grade 26-28);4) knowledge of the topics, ability to deduce and process information, ability to apply and evaluate evaluation, excellent to advanced presentation ability (grade 29-30 cum laude).
TEACHING METHODS	Frontal lessons. Practical design exercises in the classroom. Technical visits.

**MODULE
WATER RESOURCES MANAGEMENT**

Prof. DARIO AUTOVINO

SUGGESTED BIBLIOGRAPHY

Pumo D. 2008. L'approvvigionamento idrico per l'agricoltura. Aracne Ed. ISBN 9788854817081
 INEA. Apparecchiature idrauliche per impianti irrigui a pressione (<https://www.yumpu.com/it/document/view/13653295/apparecchiature-idrauliche-per-impianti-irrigui-a-pressione-inea>) .
 Diapositive ed appunti relativi agli argomenti trattati a lezione.

AMBIT	50562-Discipline della difesa e del riassetto del territorio
INDIVIDUAL STUDY (Hrs)	86
COURSE ACTIVITY (Hrs)	64

EDUCATIONAL OBJECTIVES OF THE MODULE

Acquire 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 for the plants. Students should also be able to evaluate crop water needs.

SYLLABUS

Hrs	Frontal teaching
1	Introduction of the course. Content and scope. Description of final exam and evaluation criteria.
4	Water sources in Sicily. Irrigation Association and irrigation districts. Distribution networks with pipes and channels. Materials and tools for distribution networks.
18	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.
12	Management of water sources at district and farm levels. Irrigation scheduling based on the control of soil and crop water status. Plant deficit indicators. Irrigation under regulated deficit conditions. Agro-hydrological models and application of FAO-56.
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.
Hrs	Practice
24	Design of a water pond for irrigation. Design of pumping systems and evaluation of energetic consumes. Design of a small irrigation network operating on turn or on demand.

**MODULE
AGRICULTURAL SOIL HYDRAULIC PROTECTION**

Prof. VINCENZO BAGARELLO

SUGGESTED BIBLIOGRAPHY

Bagarello V., Ferro V. (2006). Erosione e conservazione del suolo. McGraw-Hill, Milano, 539 pp., ISBN 88-386-6311-4. Appunti delle lezioni.

Suggeriti per approfondimenti - Suggested for more details

Bagarello V., Iovino M. (2010) Conducibilità idraulica del suolo – Metodi di misura nelle applicazioni idrologiche. Ulrico Hoepli Editore S.p.A., Milano, ISBN 978-88-203-4411-5, 382 pp.

Angulo-Jaramillo R., Bagarello V., Iovino M., Lassabatere L. (2016) Infiltration Measurements for Soil Hydraulic Characterization. Springer International Publishing, Switzerland, ISBN 978-3-319-31786-1, 978-3-319-31788-5 (eBook), doi: 10.1007/978-3-319-31788-5, 386 pp.

Bagarello V., Iovino M. (2012) 5. Qualità Fisica del Suolo. In "Monitoraggio della qualità dei suoli e rischio di desertificazione", a cura di V.Ferro e V.Bagarello, McGraw-Hill, Milano, ISBN 978-88-386-7326-9, 131-159.

AMBIT	50562-Discipline della difesa e del riassetto del territorio
INDIVIDUAL STUDY (Hrs)	43
COURSE ACTIVITY (Hrs)	32

EDUCATIONAL OBJECTIVES OF THE MODULE

The course aims to allow the student to (i) interpret and mathematically simulate the soil erosion phenomena occurring at the plot and field scales, (ii) assess soil physical quality, and (ii) plan and realize soil conservation measures.