UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2016/2017
MASTER'S DEGREE (MSC)	ENVIRONMENT ENGINEERING
SUBJECT	URBAN WATER SUPPLY AND DRAINAGE
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50372-Ingegneria per l'ambiente e territorio
CODE	10070
SCIENTIFIC SECTOR(S)	ICAR/02
HEAD PROFESSOR(S)	LA LOGGIA GOFFREDO Professore a contratto in quiescenza Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**LA LOGGIA GOFFREDO** Monday 10:00 11:00 Nel proprio studio, secondo piano DICAM - Idraulica, da prenotare su appuntamento Tuesday 10:00 11:00 Nel proprio studio, secondo piano DICAM - Idraulica, da prenotare su appuntamento Thursday 11:00 12:00 Nel proprio studio, secondo piano DICAM-Idraulica Friday 11:00 12:00 Nel proprio studio, secondo piano DICAM-Idraulica

DOCENTE: Prof. GOFFREDO LA LOGGIA

PREREQUISITES	Basic knowledge of hydraulics, allowing to understand the relationships between the theoretical aspects and the constructive applications of the discipline.
LEARNING OUTCOMES	Knowledge and understanding The student at the end of the course will have knowledge of the problems concerning the distribution of water resources and the drainage of rainwater and waste water in the urban environment. The student in particular will understand all interactions between urban hydraulic infrastructures and the environmental and socio-economic context, and will have knowledge of management actions that can be taken to mitigate the environmental impact. Applying knowledge and understanding The student will be able to use tools of analysis of distribution networks and urban drainage, regarding the hydraulic aspects and the ones related to the quality of water. The student will be able to design interventions for environmental impact mitigation of water infrastructure in urban areas. Making judgments The student will be able to evaluate the efficiency of urban hydraulic systems and to select the most appropriate management interventions to improve the operation of existing infrastructure. The student will also be able to evaluate multiple design options in relation to environmental, technical, operational and socio-economic in order to identify the best solution for a specific application. Communication skills The student will acquire the ability to communicate and express issues concerning the object of the course. He will be able to hold conversations on issues related to urban hydraulic systems and their operation by offering effective and contextualized solutions. Learning ability The student will learn the interactions between technical hydraulic issues and environmental issues and this will allow him to continue his engineering studies with greater autonomy and discernment.
ASSESSMENT METHODS	The exam will be oral. The candidate will have to answer at least two / three questions posed orally, on all parties covered by the program, with reference to the recommended texts, and the elaborate developed during practical classes. Final assessment aims to evaluate whether the student has knowledge and understanding of the topics, has acquired jurisdiction to interpret and independent judgment of concrete cases. The pass mark will be reached when the student shows knowledge and understanding of the subjects at least in general terms, and has domain expertise in order to solve concrete cases; It will also have presentation skills and argumentative as to allow the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient. The more, however, the examinee with its argumentative and presentation skills can interact with the examiner, and the more his knowledge and application capabilities go into detail on the subject of discipline occurs, the more the assessment is positive. The assessment is carried out of thirty. Details of the valuation methods: Excellent - 30-30 laude Outcome: excellent knowledge of the topics, excellent properties of language, good analytical ability, the student is able to apply knowledge to solve problems proposed Very good - 26-29 Outcome: Good control of the subjects, full ownership of the language, the student is able to apply knowledge to solve problems proposed Good - 24-25 Outcome: Basic knowledge of the main topics, discrete properties of language, with limited ability to independently apply the knowledge to the solution of the proposed problems Satisfactory - 21-23 Outcome: It does not have full command of the main teaching subjects but it has the knowledge, satisfactory property language, poor ability to independently apply the knowledge acquired Enough - 18-20 Outcome: Minimum basic understanding of the main teaching and technical language issues, very little or no ability to independently apply the knowledge acquired Insufficient Outcome: it does not have an acceptable knowledge of the contents of the topics covered in the teaching
EDUCATIONAL OBJECTIVES	The educational objectives refer to the autonomous ability to interpret and evaluate the problems related to urban water infrastructure, and define design solutions that achieve maximum results in terms of user satisfaction, taking into account aspects related to the environmental impact of studied solutions. Also adequate space is left to the introduction of new technologies, and the relationship with the technical and professional world, in order to develop an

	updated course of study.
TEACHING METHODS	The teaching will be organized by conducting lectures, exercises for the preparation of a project, in groups, and consequent revision of the topics.
SUGGESTED BIBLIOGRAPHY	V. Milano: “Acquedotti - guida alla progettazione “, ed. Hoepli, Milano, 1996. Centro Studi Deflussi Urbani: “Sistemi di fognature - manuale di progettazione”, ed. Hoepli, Milano, 1997. G. Becciu, A. Paoletti: “Fondamenti di costruzioni idrauliche”, ed. UTET, 2010. L. Da Deppo, C. Datei, V. Fiorotto, P. Salandin: “Acquedotti”, ed. Libreria Cortina, Padova, 2000. L. Da Deppo, C. Datei: “Fognature”, ed. Libreria Cortina, Padova, 1997. D. Butler, J. Davis: “Urban Drainage”. Ed. Spon Press, 2003

SYLLABUS

Hrs	Frontal teaching
2	Introduction to the course. Defining Urban Hydraulic System. Galli law and ATO. Components of an aqueduct. Service life of the works. Project scheme. Demography. Allocations. quantitative and qualitative characteristics of the resource. Types of sources. Character of drinking water.
2	water supply systems. Main elements of an aqueduct system. demographic forecasts. Requirements. Consumption. Water allocations, maximum and minimum. Characterization of consumption and meeting the demand levels. Models DDSM HDSM. intake structures
2	Works taken from sources. Description and conformation. Illustration of various types of intake structures. Taken from shallow and deep aquifers. filtering tunnels, shafts. Digging of wells. excavation mode. Uptake of surface water. By rivers, by lakes. construction details.
3	pressurized transport: hydraulic recalls. External aqueduct: trends elevation and planimetric. Constraints on the minimum pressure in the duct. Insertion of the pressure reducing valves. Materials. the route chosen. Artifacts and works of art. Works of art such as: drain and vent wells; Junction under pressure; divider open channel and disconnection tanks; road crossings, rail, inland waterway; anchorages; artifacts exhaust.
2	lifting equipment for aqueducts. Characteristics of Installations. Types of pumps. Characteristic curves: pump and system. Pumps in series and parallel. Installation of pumps. Design of a pumping plant. economic calculations.
2	citizens tanks: classification; positioning elevation, hydraulic sizing (volume compensation, stock and Fire); types (basement tank, cave, wall unit), operating rooms, spillway and bottom, closing devices, devices (valves, vents, shutters ..).
3	Design and verification of the water networks. Tracking of pipelines. Led approach, major networks, distribution. Sizing. verifying the functioning criteria. Water scarcity. Methods for containment of consumption.
3	Design of a distribution network. verifying the functioning criteria of distribution networks. Equipment for aqueducts. Definition and classification in relation to the function, to the material, the type of shutter. Location in external aqueducts and networks. Drains, vents, shutters. taking charge. Counters. Mounting details of the nodes.
1	Water losses: causes and types. Classification of losses and related components.
2	Materials and internal systems diagrams for aqueducts; dual networks. storage tanks, lifting plants: positioning and sizing
2	Introduction to urban drainage systems. Motives of the project sustainability. unit and separate systems. planimetric patterns. Innovation in the project. infiltration systems, porous pavements.
2	the flow calculation into sewer: black-course, white and eddy flow. References to net rainfall patterns and to project hyetographs. The rainfall-runoff models: physically based, conceptual, black-box.
2	The sizing of the channels: channel forms. The longitudinal profile. Limits to the degree of filling and the speed. Jumps down.
2	art type for sewers. Dischargers. BMP
1	Retention basins and first rain: types, hydraulic and sizing.

Hrs	Practice
10	Design, dimensioning and checking of an external water supply. Sizing of a city reservoir.
10	dimensioning and verification of a distribution network
15	design and verification of a sewer
10	Design of a retention tank