Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: HYDROLOGY AND HYDROULIC CONSTRUCTIONS				
TEACHER: SALVATORE MANFREDA				
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Language: Italian				
ECTS: 9.0	n. of hours:90	Academic year: 2014/15	Campus: Matera	Semester: I

TOPICS
Hydrology, Hydraulic Constructions, Pipe lines, Reservoirs, Water Distribution systems, Sewer Systems.

TEACHING METHODS (please tick one or more options)
■ Theoretical lessons
■ Tutorials in classroom
□ Tutorials in laboratory
■ Project works
□ Technical visits
Other activities (please specify) _____

TEXTBOOKS
Ippolito, G., Appunti di Costruzioni Idrauliche, Napoli, Liguori Editore
Manfreda, S., V. Iacobellis, M. Fiorentino, Appunti di Idrologia Superficiale, Aracne Editrice, pp176, 2010 (ISBN: 978-88-548-3203-9).

ON-LINE EDUCATIONAL MATERIAL
web address: http://www2.unibas.it/manfreda

LEARNING OUTCOMES
The course aims to give the project principle for hydraulic constructions and water managment.

REQUIREMENTS
None

EVALUATION METHODS (please tick one or more options)
□ Intermediate verifications
□ Written examination
■ Discussion of a project work
□ Practical test
■ Oral examination
Other methods (please specify) _____

DETAILED CONTENT
Section I: " Hydrology "

Part I - The physics of hydrological processes

The water cycle in nature and its impacts human activities The catchment area ; vertical streams : precipitation , evaporation and evapotranspiration , infiltration , horizontal flows : concentration and the propagation of river runoff , surface erosion of the slopes and the sediment transport , the underground aquifers .

Part II - The collection of data and their statistical processing

Description and operation of sensors , both historical and modern for the measurement of hydrological variables of interest. Meteorological sensors , rain gauges and rainfall recorders recorders, disdrometers , meteorlogici radar ,

polar and geostationary satellites , gauges , piezometers and lysimeters , wavemeters . Statistical criteria and stochastic processing time series of hydrological data (distribution fitting of probability, frequency analysis , analysis of persistence, hydrological simulation) ;

The return time , the Ragguaglio area of precise observations , the regionalization of information hydrology .

Part III - Conceptual models

Hydrologic models for the evaluation of hydrological losses ; Models of concentrated and distributed rainfall-runoff ; hydraulic and hydrological models of propagation of flood waves .

Section II: " Hydraulic Structures "

Part I - the integrated water cycle - Schematic of the conceptual system comprising , in order, from the power source and the relative uptake works , from the supply system , from the tanks located in the vicinity of the use , of the Centers of users , the system water distribution ; system of wastewater collection and meteoric origin , the waste water treatment system , with discharge into the receiving water body constituent , in turn, a new possible source of supply . Power Sources - Their distinction in surface water and groundwater. Types and their characterization both in relation to the quantities of water to be harvested and their intra - annual and inter-annual , and their quality characteristics and intra - annual and inter- annual latter ; Works of uptake : their construction types in relation to sources of supply and related design criteria ; artificial Booms : Information on regulations in force; functional typologies and construction : Dams and cross river - Method of waste accumulated for the identification of any storage capacity to be allocated in an artificial barrier in order to ensure disbursements assigned to multiple users.

Part II - supply systems : Criteria for choosing between free-surface systems or pressure ; construction types - Pipes on the market and the criteria for their selection ; analysis of water requirements for civil users , irrigation , industrial and hydropower , and their comparative analysis . Water allocations and their variability - Information provided by the PRGA on power sources to be used according to the needs identified for civil use; validity of PRGA also in relation to its issue ; updates PRGA - Requirements and their current and future methods of evaluation in relation to the data acquired at the municipal offices and the planning instruments in force or in transit; sizing criteria of the works of adduction - choice of paths - paths interference with the drainage network , with other works in human network (railways , roads , highways, pipelines and gas pipelines , sewers, aqueducts other) , with areas classified by the Basin Authority responsible for the area, as " dangerous " and " at risk" (due to landslides and / or floods) , with areas affected by aggressive soils or presence of water , with denuded areas exposed to strong temperature changes , etc. . - Major works of art: drains , vents, isolating gate valves , control valves flow and / or pressure - motorized valves and non - Flow - pressure gauges

Part III - Tanks for water : Functions of tanks: backup , to compensate, and fire load (minimum and maximum) and disconnection. Evaluation of the volumes to be assigned to the tanks citizens in relation to their functions; plan shapes and the criteria for their selection ; Positioning horizontal and vertical alignment of the tank in relation to such matters geologic , geotechnical , constrictive , maintenance , landscape and environment . Mode of operation

of the tanks - Function of potential wells " the bridging " - Rooms for manoeuvre and their design.

Part IV - Networks of internal water supply to urban centres : Purpose . Types (meshed / ramified / mixed) Design Criteria . Paths. Types of pipes used and the criteria for their selection ; Sizing criteria of the various sections ; Necessity of hydraulic tests and their purpose . Verification methods of water supply in pressure with respect to stationary conditions . Verification, with respect to operating conditions " ordinary " (the tip) , "extra - ordinary " (with one or electromechanical components temporarily excluded from the service) or "extraordinary" (the fire) . Major organs and works of art on the network.

Part V - systems for the collection and subsequent disposal of waste water and water of meteoric origin - Systems "static" and " dynamic " types and the criteria for their choice. Static Systems : Manholes and sewage treatment plants serving small communities - Dynamic systems : sewerage system to "separate" (for the collection, respectively , wastewater and those of meteoric origin) and " unitary " (so-called "mixed") , for the collection and subsequent conveying both wastewater that those of meteoric origin : Advantages and disadvantages of the two types , and the criteria for their choice. Dimensioning the sewerage system to separate and mixed. Method of concentration methods - Method of the reservoir. Input data for the sizing / verification of the ducts . Cumulative Probability Precipitation: their meaning and the possibility of obtaining . Tanks to collect rain water : advantages, disadvantages , construction methods and management problems ; storm drains : description of the main types and their fields of application . Principli works of art in urban drains.

SEMINARS BY EXTERNAL EXPERTS YES ■ NO ☐

FURTHER INFORMATION