UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
FIRST CYCLE COURSE	CIVIL AND BUIDING ENGINEERING
SUBJECT	HYDROLOGY
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50278-Ingegneria ambientale e del territorio
CODE	03787
SCIENTIFIC SECTOR(S)	ICAR/02
HEAD PROFESSOR(S)	CANNAROZZO MARCELLA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	03769 - HYDRAULICS
YEAR	3
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CANNAROZZO MARCELLA** Monday 9:30 13:30 ex DIIA di fronte F140. Mandare una mail qualche giorno prima ed attendere risposta di conferma Tuesday 9:30 13:30 ex DIIA di fronte F140. Mandare una mail qualche giorno prima ed attendere risposta di conferma Thursday 15:30 18:30 ex DIIA di fronte F140. Mandare una mail qualche giorno prima ed attendere risposta di conferma

TEACHING METHODS	The course consists of lectures and practical exercises aimed at writing a final paper which will be evaluated at the end of the course. The paper will be submitted in the form of a technical report with all tables and figures needed to justify the results.
ASSESSMENT METHODS	At the end of the course students will be required to take an oral exam when they will be asked three questions: two about flood hydrology and water resources and one about the hydraulic design of the structures studied during the course. When calculating the final grade the teacher will also take into account the quality of the paper written by the student during the course, paying particular attention to the following parameters: method correctness, quality of the report which accompanies the data and quality of editing. The student will pass the exam with the lowest possible grade if he/she is able to answer all the questions correctly (even with some help) and the paper he/she submitted is formally correct, even in case of poor writing and editing. To pass the exam with full grades the student will need to answer autonomously and using the appropriate technical language and the correct methodology and to turn in a paper which is not only correct in terms of data and calculations but also well-written and carefully edited.
LEARNING OUTCOMES	Knowledge and understanding At the end of the course, if the student attends regularly, he/she is expected to have acquired quantitative and conceptual knowledge of all the issues pertaining to the behavior of urban and natural catchment areas in case of rainfall, i.e. the processes that lead to a flood. The student will also be able to use a certain amount of hydrological models to calculate the surface water resources of a given site and to simulate the management of a simple water system that uses surface water resources. He/she will also be familiar with dams structural characteristics and with how the safety devices of artificial reservoirs function and are designed. Ability to apply the acquired knowledge The student will be able to identify and design a watershed, to apply the most common methods used to estimate heavy rain given a certain return period and the related flood runoff, to analyze the regulation of water resources by means of a reservoir (taking into account all the variables involved, such as the water resources themselves, outflow, evaporation and so on) as well as to determine the appropriate size of special devices used in catchment works. Ability to perform independent assessments The student will be able to collect the necessary data for a hydrological survey and to assess the adequacy and reliability of a formula or an empirical method. He/she will also be able to select the best model to adopt for the estimation of a given resource and to identify the most promising design solutions for the construction of a water resources exploitation system that will then be examined from a financial standpoint. Communication skills The student will acquire the ability to draft a hydrological report and a technical report on the design of hydraulic structures, supported by clarifying graphs, figures and tables. Ability to learn The course will enable the student to acquire further knowledge on the topic by giving him/her a sound understanding of the nature and characteristics of the natural processes involved in the occurrence of rainfall and its transformation into runoff as well as of the basic mechanisms involved in the modelling of water resources and in the assessment of model performances. Once completed the course, the student will be able to independently approach the study of further models that were not part of the course material, to identify possible design alternatives and to design hydraulic devices and facilities.
EDUCATIONAL OBJECTIVES	This hydrology course aims at teaching the student about the problems of simple and complex water systems, with special focus on hydrological models for the estimation of surface water resources and of the flood of a watercourse and on the methods to analyze the regulation of water resources by means of a reservoir (taking into account all the variables involved). During the course, the student will also learn the operating principles and design criteria of the security devices of a dam.
PREREQUISITES	Basic hydraulic concepts such as hydrostatics, pipe flow, open channel flow and weir flow.
SUGGESTED BIBLIOGRAPHY	• U. Maione U. Moisello – Elementi di statistica per l'idrologia. ed. La Goliardica Pavese • MAIONE U.: Le piene fluviali, ed. La Goliardica Pavese • U. Moisello Idrologia tecnica. ed. La Goliardica Pavese Lecture notes provided by the teacher

SYLLABUS

Hrs	Frontal teaching
1	The water cycle in the atmosphere
2	methods for the measurement of rainfall and flood - rainfall and runoff distribution in the year - runoff coefficient - watershed
2	basic statistical concepts such as statistical indices, probability and frequency and laws of probability distribution
3	intensity-duration functionfor a given return period
3	effective rainfall models
2	flood estimation methods
3	flood models
5	definition of surface and of deep and unconventional water resource. Facilities and devices for the exploitation of water resources: dams, spillways, wells and springs.
4	models for the generation of synthetic runoff series
5	study of the regulation of water resources by means of a reservoir
6	how to build a reservoir plant: bottom outlet, diversion canal, spillway, stilling basin.
2	laws and regulations on dams

Hrs	Practice
8	hydrological survey aimed at reconstructing a flood event with given return time for a natural catchment area
8	calibration of a model to generate synthetic runoff series and simulation of the management of an artificial reservoir