MEDITERRANEA UNIVERSITY OF REGGIO CALABRIA

Subject Code	**56T011**
Subject Name	**Hydraulics & Hydrology**
Professor	**Felice Arena (Hydraulics)**
	Vincenzo Fiamma (Hydraulics)
	Giuseppe Barbaro (Hydrology)

Department:	**DICEAM**
Degree course:	**Civil-Environmental Engineering**
Class:	**L7**
Type of educational activity:	**Characterizing**
Disciplinary Area:	**Safety engineering and civil protection, environmental and land**
Scientific-Disciplinary Sector:	**ICAR/01 (Hydraulics)**
	ICAR/02 (Hydrology)

Compulsory preliminary exams:	**Mathematical analysis II, Physics**
Course Year:	**II**
Semester:	**I, II**

ECTS:	**12 (6 Hydraulics, 6 Hydrology)**
Hours:	**96**

Synthetic description:
Knowledge of the analytical and methodological practices aimed at investigating the rainfall phenomena. Adequate knowledge of runoff generation and of hydraulic protection facilities.

Acquisition of knowledge on:
Ability to estimate the critical discharge of the watershed, starting from the measured rainfall heights.
Ability to delineate the catchments in terms of divides, stream network and outlet identification.
Ability to design flood prevention facilities inside the riverbed.

Evaluation method:
Written and oral.

Student's independent work
Exercises.

Detailed course program
The atmosphere (1 credit)
Structure of the atmosphere
Heating dynamics of the atmosphere
Thermal balance between hearth and atmosphere
Adiabatic processes in the atmosphere
Vertical distribution of the temperatures across the atmosphere

Atmospheric stability
Air circulation

Statistic Hydrology (1 credit)
Random variables
Return period, probability distribution function of continuous variables
Basic processing of rainfall data
Statistic distribution of hydrological variables: log-normal and Gumbel
Parameter estimation of probability distributions: method of moments
Gumbel cartogram
Pearson good of fitness test
Hydrological risk

Rainfall (1 credit)
Rainfall classification and short description
Rainfall measurement
Hydrologic annual registry
Short and high-intensity rainfall events
Two-components extreme values probability distribution function
Evaluation of rainfall heights for precipitations shorter than 1 hour

Design events (1 credit)
Relationship among rainfall height, duration and spatial distribution
Spatial representation of rainfall: isohyets and Thiessen polygons
Rainfall depth vs. duration curves
Least square methodology for the estimation of Rainfall depth vs. duration curve Parameters
Design hyetograph
Maximum probability rainfall: physical and statistical approaches
Rational formula

Runoff generation (1 credit)
Hydrograph components
Hydrograph subdivision into its components
Effective rainfall
Curve Number approach
Kinematic method for maximum runoff estimation given a return period
Empirical approaches for maximum runoff estimation
Discharge and height measurement
Current meter
Quick variable level measurements

Attenuation tank design (1 credit)
Attenuation tank classification
Building strategies
Hydraulic jump
Hydraulic jump location
Hydraulic jump length estimation and evaluation of the conjugate depths

Resources and main references
MOISELLO U., Idrologia Tecnica, Libreria Cortina.

BECCIU G. e PAOLETTI A., Esercitazioni di Costruzioni Idrauliche, Ambrosiana.
MAIONE U.,. Le piene fluviali, La Goliardica Pavese.