



UNIVERSITÀ
degli STUDI
di CATANIA

DIPARTIMENTO DI INGEGNERIA CIVILE E ARCHITETTURA
(DICAR)

Corso di laurea magistrale in Ingegneria civile delle acque
e dei trasporti

Anno accademico 2017/2018 - 1° anno - Curriculum Ingegneria
delle acque

HYDROLOGY

ICAR/02 - 9 CFU - 2° semestre

Docente titolare dell'insegnamento

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OBIETTIVI FORMATIVI

The course is an introduction to hydrology and hydrological cycle with particular emphasis on application aspects related to water and environmental engineering.

PREREQUISITI RICHIESTI

Basic knowledge of Hydraulics, use of spreadsheets (e.g. Excel) and programming languages (preferably Matlab).

FREQUENZA LEZIONI

Attendance is strongly suggested.

CONTENUTI DEL CORSO

1. INTRODUCTION

Course presentation. Development of hydrological science.

2 INTRODUCTION TO THE HYDROLOGICAL CYCLE

Hydrological cycle components. Precipitation. Evaporation and evapotranspiration. Runoff and streamflows. Groundwater. Human effects on the hydrological cycle. Distribution of water resources on earth.

3. HYDROLOGICAL INFORMATION

Instruments and methods for measuring hydrological variables. Sources of information. Hydrological and Hydrographic services. Real time data collection networks. Radar and satellites. Reanalysis data.

4. WATERSHED AND DRAINAGE NETWORK CHARACTERIZATION USING GIS

Watershed delineation. Geomorphologic characterization of watersheds. Streamflow network characterization. Horton and Strahler's laws.

5. INTRODUCTION TO PROBABILITY THEORY AND STATISTICS

Statistical description of data. Probability definitions. Probability function. Properties of probability functions. Random variables, cumulative distribution function (cdf) and probability density function (pdf). Discrete parametric cdf. Continuous parametric cdf. Return period and risk. Distribution fitting and goodness of fit assessment. Statistical tests. Regression analysis.

6. PRECIPITATION

Formation of precipitation. Precipitation types. Distribution of precipitation. Estimation of areal precipitation. Extreme precipitation frequency analysis. Intensity duration frequency curves. Regional analysis of extreme precipitation.

7. RUNOFF AND STREAMFLOWS

Streamflow regimes. Streamflow measurements. Flow duration curves. Formation of runoff and streamflows. Infiltration. Hydrograph components. Stochastic modelling of streamflow series. SEAMOD model for monthly streamflow.

8. FLOOD HYDROGRAPH ANALYSIS

Hydrograph separation. Time of concentration estimation. Peak discharge estimation. Regional methods for peak discharge estimation. Design hyetographs. Rainfall-runoff models. Rational method. Unit hydrograph. Instantaneous Unit Hydrograph. Conceptual models (time-area, linear reservoir, Nash, Clark). SCS Unit Hydrograph. GIUH. HEC-HMS software.

9. HYDROLOGICAL ASPECTS OF RESERVOIR ANALYSIS

Types of reservoirs. Design criteria. Simulation of reservoirs. Flood control.

10. DROUGHT ANALYSIS

Drought, aridity and desertification. Characteristics of local and regional droughts. Drought monitoring. Drought mitigation.

TESTI DI RIFERIMENTO

1. DINGMAN, S.L. Physical hydrology, Prentice-Hall, 2002.
2. MAIDMENT, D.(ed.), Handbook of hydrology, McGraw-Hill, New York, 1993.
3. BRAS R., Hydrology: an introduction to hydrologic science, Addison-Wesley Publ. Company, Reading Ma, 1990.

Handouts and other material will be distributed in class and made available on this website

ALTRO MATERIALE DIDATTICO

Handouts can be downloaded from Studium

VERIFICA DELL'APPRENDIMENTO

MODALITÀ DI VERIFICA DELL'APPRENDIMENTO

The exams are oral and either English or Italian language can be used. In order to take the exam, students must complete the homeworks.
