



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali		
ACADEMIC YEAR	2019/2020		
BACHELOR'S DEGREE (BSC)	FORESTRY AND ENVIRONMENTAL SCIENCES		
SUBJECT	PRINCIPLES OF HYDRAULICS AND HYDROLOGY		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50120-Discipline dell'ingegneria agraria, forestale e della rappresentazione		
CODE	02877		
SCIENTIFIC SECTOR(S)	AGR/08		
HEAD PROFESSOR(S)	FERRO VITO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	8		
INDIVIDUAL STUDY (Hrs)	132		
COURSE ACTIVITY (Hrs)	68		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	FERRO VITO Monday 11:00 13:00 Dipartimento SAAF, Edificio 4, ingresso E, primo piano, stanza 141 Wednesday 11:00 13:00 Dipartimento SAAF, Edificio 4, ingresso E, primo piano, stanza 141 Friday 11:00 13:00 Dipartimento SAAF, Edificio 4, ingresso E, primo piano, stanza 141		

DOCENTE: Prof. VITO FERRO

PREREQUISITES	A basic knowledge of Mathematics and Physics is required.
LEARNING OUTCOMES	KNOWLEDGE AND UNDERSTANDING Knowledge of the fundamentals of Hydraulics, with special reference to open channel flow, and of the hydrological processes occurring in the water cycle. Capability of using nomenclature of Hydraulics and Hydrology. APPLYING KNOWLEDGE AND UNDERSTANDING Capability to apply the acquired knowledge for solving practical cases dealing with hydraulic design and testing of streams and the estimate of magnitude and probability of extreme hydrological events (rainfalls, floods) at different temporal and spatial scales. MAKING JUDGEMENTS Capability to establish the best hydraulic solution taking into account the environmental constraints. Critical ability in the choice of the hydrological method which is appropriate to the examined runoff formation process and its propagation along the river network. COMMUNICATION Ability to present the selected solution for an hydraulic or hydrological problem, using verbal and written tools, using the nomenclature of the discipline and a language understandable to a no-skilled stakeholder. LIFELONG LEARNING SKILLS Achievement of a learning method to be used for obtaining a self knowledge update by reading scientific papers or attending to masters and specialistic workshops.
ASSESSMENT METHODS	Verbal exam. The exam is also based on the presentation of the case study developed during the Course. The student will be evaluated taking into account the obtained level of knowledge, the ability of applying knowledge and understanding to the case study developed during the course. The ability of applying knowledge will be also tested by numerical examples developed during the exam. The assessment of the exam will take into account the ability of the student to use both the scientific-technical language used in Hydraulics and Hydrology and a language understandable to a no-skilled stakeholder. The evaluation (minimum grade is 18 and maximum is 30 cum laude) is stated using the following scheme: 1) Knowledge of the topics, capability to apply the learned knowledge, capability to analyze the studied problem, ability to present the topic is judged sufficient (18-21) 2) Knowledge of the topics, capability to apply the learned knowledge, capability to analyze the studied problem, ability to present the topic is judged fair (22-25) 3) Knowledge of the topics, capability to apply the learned knowledge, capability to analyze the studied problem, ability to present the topic is judged good-high (26-28) 4) Knowledge of the topics, capability to apply the learned knowledge, capability to analyze the studied problem, ability to present the topic is judged high-advanced (29-30 cum laude)
EDUCATIONAL OBJECTIVES	The course develops the basic knowledge which is useful to understand the topics related to the technician expertise in soil conservation problems and watershed management. The Course is divided into two parts. The first part has the aim of introducing the knowledge of Hydraulics, with special reference to the open channel flows. This knowledge is useful to study the river restoration of mountainous streams. The second part of the course develops the study of the physical processes occurring in the hydrological cycle of the water. The course also develops the methods for estimating the magnitude and the return period of the flood events.
TEACHING METHODS	The teaching method is based on lessons and numerical applications at study cases.
SUGGESTED BIBLIOGRAPHY	FERRO V. (2013). Elementi di Idraulica e Idrologia. Ed. McGraw-Hill, Milano, 344 pp. Per ulteriori approfondimenti FERRO V. (2006). La sistemazione dei bacini idrografici – seconda edizione. Ed. McGraw-Hill, Milano, 848 pp. CITRINI D., NOSEDA G. (1981). Idraulica. Ed. Ambrosiana, Milano.

SYLLABUS

Hrs	Frontal teaching
2	Aims of the course and its subdivision in topics.
4	Physical properties of liquids. Special terms of Hydraulics.
4	Water pressure distribution in a liquid. Local equation of hydrostatics. Instruments for measuring water pressure.
4	Water force. Examples of water force calculation.
6	Bernoulli's Theorem. Flow resistance. Characteristic lines (piezometric and total head loss line).
2	Applying the Bernoulli's Theorem

SYLLABUS

Hrs	Frontal teaching
8	Open channel flows. Uniform open channel flow. Stage-discharge relationship for an uniform open channel flow. Problems of design and testing for an open channel flow.
2	Stage-discharge relationships for gates and weirs
3	Basin. River network and hillslopes. Process of surface runoff. Direct and indirect methods for estimating the flood events
4	Rain-gauge. Recording rain-gauge. Hydrological data available for a basin hydrological study.
7	Return period; Frequency analysis of the maximum annual values of the rainfall depth having a known duration; rainfall-depth duration relationship of given return period
2	Rational method for estimating the peak flow discharge of given return period
Hrs	Practice
12	Case studies of Hydraulics solved using a PC
8	Case study on the estimate of the peak flow discharge of given return period solved using a PC