UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2019/2020
MASTER'S DEGREE (MSC)	FORESTRY AND AGRO-ENVIRONMENTAL SCIENCE AND TECHNOLOGY
SUBJECT	STREAM RESTORATION
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50562-Discipline della difesa e del riassetto del territorio
CODE	18458
SCIENTIFIC SECTOR(S)	AGR/08
HEAD PROFESSOR(S)	PAMPALONE VINCENZO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	100
COURSE ACTIVITY (Hrs)	50
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**PAMPALONE VINCENZO** Tuesday 09:00 11:00 Studio docente, identificativo 13, Edificio 4, ingresso E-Dipartimento SAAF e Piattaforma Teams Wednesday 09:00 11:00 Studio docente, identificativo 13, Edificio 4, ingresso E-Dipartimento SAAF e Piattaforma Teams Friday 11:00 13:00 Sede del corso di Studi in Viticoltura ed Enologia e Piattaforma Teams.

DOCENTE: Prof. VINCENZO PAMPALONE

PREREQUISITES	Basics on mathematics, physics and hydraulics
LEARNING OUTCOMES	Knowledge and ability to understand Acquisition of advanced tools for designing hydraulic-forestry works. Ability to use the specific language of this specialized discipline. Ability to apply knowledge and understanding Ability to recognize, and independently organize, the surveys and elaborations necessary for the design of hydraulic-forestry works. Judgment autonomy Being able to evaluate the implications and results of the designed hydraulic-forestry works. Communicative Skills Ability to expose the results even to an unskilled audience. To be able to support the importance and highlight the environmental impacts of hydraulic-forestry interventions. Learning Skills Upgrade skills by consulting the scientific publications of the hydraulic-forestry sector. Ability to attend, using the knowledge acquired during the course, second-level master, advanced courses and specialized seminars in the hydraulic-forestry field.
ASSESSMENT METHODS	The final exam is an oral exam with at least three questions aimed at verifying the candidate's capability of reasoning and linking acquired knowledge. The grades are on a scale of 30. The questions, which are prepared for testing the expected learning results, will be aimed at verifying a) acquired knowledge; b) processing capabilities; c) the capability to present and discuss results. a) For testing knowledge, the capability to connect the course contents will be required. b) For testing processing capabilities, the achievement of the three subsequent objectives will be tested: b1) to provide autonomous judgements about the course contents; b2) to understand their applications or implications on the treated subjects; b3) to place the course contents within the reference professional context; c) with reference to the capability to present and discuss technical results, the candidate has to demonstrate suitable language skills to the reference professional context. The candidate will have the minimum mark of 18/30 when he demonstrates both suitable knowledge acquisition and language skills but these are not extensive enough, whereas the maximum mark (30/30 with laud) can be achieved by the candidate who demonstrates full mastery of the course contents and the sectorial language and the full achievement of the three objectives listed at point b).
EDUCATIONAL OBJECTIVES	The objective of the course is to deepen some issues related to open channel flows and provide the student with the knowledge of unconventional works for river restoration. The insights of open channel flow will be about uniform and steady flow conditions, with reference to complex geometries and in the presence of vegetation and coarse elements at the channel bottom, the sediment transport in mountain streams and the characterization of the hydraulic jump, even on a rough bed, aimed at designing energy dissipation works. The open check-dams, the rock chute channels, the boulder check-dams and bed-sills and the block ramps, which are increasingly widespread as grade control structures in mountain streams, will be studied. Conventional hydraulic works, such as gabions check dams and the wooden and stone ones, having a recognized environmental value, will be also studied. Finally, techniques used for the reconversion, integration and maintenance of existing works are studied.
TEACHING METHODS	Lectures and individual exercises
SUGGESTED BIBLIOGRAPHY	FERRO V. (2006). La sistemazione dei bacini idrografici – seconda edizione. Ed. McGraw-Hill, Milano, 848 pp. FERRO V; DALLA FONTANA G; PAGLIARA S; PUGLISI S; SCOTTON P (2004). Opere di sistemazione idraulico-forestale a basso impatto ambientale. Ed. McGraw-Hill, Milano, 413 pp.

SYLLABUS

Hrs	Frontal teaching
1	Objectives and contents of the course

SYLLABUS

Hrs	Frontal teaching
4	Uniform open channel flow for streams having cross sections with varying roughness along the wetted perimeter. Channels of compound sections. Computation of uniform flow. Applicative examples.
3	Flow velocity distribution and flow resistance law in a mountain stream. Flow velocity distribution in a vegetated channel. Flow resistance law in a vegetated channel.
6	Steady open channel flows. Plot of the flow profiles. Application of the direct step method
2	Hydraulic jump on smooth and rough beds. Hydraulic jump on a sloping bed. Length of the hydraulic jump. Applicative examples.
2	Wooden check-dams and wooden and stone check-dams: materials, construction typologies, calculation criteria, examples.
2	Boulder check-dams and bed-sills: calculation criteria, examples, scour on the bed downstream of grade control structures.
6	Block ramps: hydraulic behaviour of the open channel flow on a block ramp, the energy dissipation process, hydraulic design, stability criteria, examples.
6	Open check-dams. Functioning of open check-dams for sediment retention and design criteria. Examples.
3	Rock chute channels. Channel protection by gabions. River bank protection by boulders. Applicative examples.
3	Gabion check-dams: analysis of the forces acting on the structure and stability tests. Applicative examples.
2	Reconversion, integration and maintenance of existing works.

Hrs	Practice
3	Plot of the steady flow profiles by the application of the direct step method
2	Stability tests for a gabion check-dam
5	Reconversion design (draft) of a check-dam into a block ramp