Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: HYDRAULIC WORKS DESIGN			
ACADEMIC YEAR: 2016/2017			
TYPE OF EDUCATIONAL ACTIVITY: Characterizing [6 ECTS] and Affine [3 ECTS]			
TEACHER: Prof. GIUSEPPE OLIVETO			
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phone: +39 0971 205142		mobile (optional): –	
Language: Italian/English			
ECTS: 9	n. of hours: 81 [48 hours of lessons and 33 hours of tutorials]	Campus: Potenza Dept./School: School of Engineering Program: Master's Degree in Civil Engineering	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The overall objective of this course is to familiarize students with criteria, methods, and models for design of hydraulic structures and plants. The main knowledge areas cover theoretical, methodological and practical aspects of modelling of complex hydraulic systems like: (i) water pipe networks, (ii) stormwater and sewer pipe networks, (iii) river networks, (iv) hydraulic structures for water-flow storage and diversion, and (v) hydraulic works to control or mitigate river floods. At the end of the course and when the exam has been passed, the student shall be able to identify the main parameters that control many complex hydraulic systems and recognize suitable methods and models to design significant hydraulic structures. The main abilities the student will acquire consist of planning, designing, and controlling the following hydraulic systems: (i) hydraulic systems for water-flow storage and distribution, (ii) stormwater and sewage systems, (iii) hydraulic systems to control or mitigate river floods, and (iv) hydraulic systems for water-flow storage and diversion.

PRE-REQUIREMENTS

Course prerequisites include: Fluid Mechanics and Hydraulic Structures I. Students should be familiar with fundamental aspects of: (i) static and kinematic of fluids; (ii) flows in open-channels and pressurized pipes; (iii) statistical analysis of precipitation and runoff data; and (iv) rainfall-runoff modelling.

SYLLABUS

Watershed and water resource budgets [4 hours of lessons + 2 hours of tutorials]: the hydrological cycle. **Hydrologic engineering methods for water resources management** [8 hours of lessons + 4 hours of tutorials]. **Hydraulic structures for water-flow storage and diversion** [4 hours of lessons + 2 hours of tutorials]**:** basic hydrologic and hydraulic concepts and methods on dams and water diversions. **Water power plants** [4 hours of lessons + 2 hours of tutorials]**:** planning and design criteria, hydraulic calculations, waterhammer analysis and control. **Pumping plants** [4 hours of lessons + 2 hours of tutorials]**:** planning and design criteria, types of water pumps, waterhammer analysis and control. **River flood controls** [3 hours of lessons + 3 hours of tutorials]**:** hydrologic and hydraulic fundamentals on flood lamination structures and strategies. **Water distribution piping systems** [10 hours of lessons + 8 hours of tutorials]**:** types of water piping systems, planning and design criteria, design features, hydraulic modeling and management, valves and devices. **Sewer systems** [5 hours of lessons + 4 hours of tutorials]**:** types of sewer systems, planning and design criteria for combined, sanitary, and storm sewers, design features, hydrologic and hydraulic modelling and management, overflow devices. **Earth-channel hydraulics** [3 hours of lessons + 3 hours of tutorials]**:** sediment transport models, hydrologic and hydraulic modeling and management. **Water-structures interaction** [3 hours of lessons + 3 hours of tutorials]**:** bridge hydraulics, local and contraction scour at bridges.

TEACHING METHODS

The course is concerned with lectures and a suite of practical applications for a total of 81 hours. In particular, it consists of 48 hours of theoretical lessons and 33 hours of classroom tutorials.

EVALUATION METHODS

The evaluation method consists of an oral examination based on the topics covered in the course. The examination aims to evaluate the degree to which student learning outcomes meet the educational goals of the course with particular attention to the student's skill in designing hydraulic structures in urban and fluvial environments. The oral

examination will last approximately 1 hour. The maximum grade is 30, the lowest is 18 out of 30. Brilliant exams are graded as 30 “cum laude”.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

(1) F. Arredi. Costruzioni Idrauliche, UTET, Torino; **(2)** G. Ippolito. Appunti di Costruzioni Idrauliche, Liguori Editore, Napoli; **(3)** V. Milano. Acquedotti, Hoepli Editore, Milano; **(4)** AA.VV. Sistemi di Fognatura – Manuale di Progettazione, Hoepli Editore, Milano; **(5)** U. Moisello. Idrologia Tecnica, La Goliardica Pavese, Pavia; **(6)** G. Evangelisti. Impianti Idroelettrici (Volumi I e II), Pàtron Editore, Bologna; **(7)** V.T. Chow, Open-Channel Hydraulics, McGraw-Hill, Singapore; **(8)** P. Novak et al., Hydraulic Structures, Taylor & Francis, Abingdon, UK; **(9)** W.H. Hager, Wastewater Hydraulics, Springer-Verlag, Berlin, Germany; **(10)** W.H. Graf, Fluvial Hydraulics: Flow and Transport Processes in Channels of Simple Geometry, John Willey and Sons, England.

INTERACTION WITH STUDENTS

After describing educational goals, syllabus, teaching and evaluation methods, textbooks and on-line educational materials will be made available to the students at the beginning of the course. A students class list containing: student IDs, name, surname, and e-mail address will be set concurrently.

Professor’s office hours are as follows: Tuesday 3:00 P.M. – 5:00 P.M. and Friday 9:00 A.M. – 11:00 A.M. at *Macchia Romana* Campus – Engineering Building (on the 5th Floor, room #6). However, students can contact the professor via email at any hour of the day.

EXAMINATION SESSIONS (FORECAST)[1]

18/07/2017, 25/07/2017, 12/09/2017, 17/10/2017, 14/11/2017, 12/12/2017, 13/02/2018, 17/04/2018, 12/06/2018

SEMINARS BY EXTERNAL EXPERTS YES × NO □

FURTHER INFORMATION

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.