Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Fluvial Hydraulics			
ACADEMIC YEAR: 2016/2017			
TYPE OF EDUCATIONAL ACTIVITY: B			
TEACHER: Domenica Mirauda			
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Language: Italian and, if needed, English.			
ECTS: (lessons e tutorials/practice) 6	n. of hours: (lessons e tutorials/practice) 54	Campus: Potenza Dept./School: School of Engineering Program: Civil and Environmental Engineering	Semester: 1°

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course aims at providing know-how about:

- steady flow of free surface streams;
- laboratory experiments for the estimation of flow rate in free surface streams;
- unsteady flow of free surface streams;
- evaluation of the forces acting on the structures in free surface flows;
- bed and suspended load transport, and interactions with the engineering constructions along a stream.

The expected learning outcomes are represented by the capability of understanding and solving simple hydraulic problems by numerical or graphical methods, mainly in terms of interaction fluid/engineering constructions; the capability of organizing and performing laboratory experiments for the estimation of flow field and water discharge in free surface streams.

PRE-REQUIREMENTS

Passing the exams of Mathematical Analysis I-II, Physics I-II and Fluid Mechanics before beginning with the Applied Hydraulics classes is highly recommended.

SYLLABUS

Steady flow of free surface streams (6h theoretical lessons + 22h classroom tutorials).

Definition of the geometrical, kinematic and dynamic variables; flow and continuity equations; empirical relationships for the calculation of the drag coefficient; rating curves; flow profiles; hydraulic jump. Exercises on flow profiles for real cases.

Measurement of the water discharge in open channel flows (7h theoretical lessons).

Techniques and methods for the evaluation of the water discharge. Laboratory equipment and experiments for the estimation of water discharge in free surface streams.

Unsteady flow of free surface streams (4h theoretical lessons).

Definition of the geometrical, kinematic and dynamic variables. Flow and continuity equations. Analysis of the flood wave propagation by numerical and graphical methods.

Sediment transport (10h theoretical lessons)

Condition of incipient sediment motion, theories and formulas for the evaluation of the bed load transport. Models for the calculation of the suspended load transport. Direct and indirect methods for the measurement of bed and suspended load transport. Direct and indirect equipments for the measurement of bed and suspended load transport.

Fluid -structure interaction phenomena (5h theoretical lessons)

Numerical modelling and laboratory experiments for the evaluation of the dynamic response (displacements and forces) of bodies immersed in a steady free surface flows. Numerical modelling and laboratory experiments for the analysis of flow fields around structures invested by free surface flows at high Reynolds number.

TEACHING METHODS

The course includes 54 hours of teaching in and classroom tutorials. In particular 32 hours of theoretical lessons and 22 hours of classroom tutorials.

EVALUATION METHODS

The aim of the examination is to verify the achievement of the educational goals.

The student will give the teacher a report about the homework carried out during the course. This report must be delivered to the teacher during the exam.

The exam is oral and concerns the topics of the course. The test intends to evaluate the understanding of the different topics and the ability to link and compare them.

The homework will be discussed during the exam to assess the comprehension of methods and tools used by the student.

The final score depends for 25% on the homework and for the remaining part on the oral examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Lecture notes provided by the teacher.

Specific topics can be explored on the following textbooks:

D. Citrini, G. Noseda, Idraulica, Casa Editrice Ambrosiana – Milano.

A. Ghetti, Idraulica, Edizioni Libreria Cortina - Padova.

E. Marchi - A. Rubatta, Meccanica dei Fluidi, UTET- Torino.

INTERACTION WITH STUDENTS

At the beginning of the course, after the presentation of objectives, program and methods of verification, the teacher collects the list of students who intend to follow the course. In this list the students write down their name, ID number and e-mail so that the teacher can send them by e-mail lecture notes and whatever is useful to prepare the exam.

Office hours: Tuesday 10:30 to 12:30 at office (5th floor School of Engineering).

Additionally, the teacher is available every time to keep in touch with the students by e-mail or business mobile.

EXAMINATION SESSIONS (FORECAST)[1]

9/02/17, 23/02/17, 12/04/17, 15/06/17, 19/07/17, 20/09/17, 22/11/17

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.