Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Structural Strengthening			
ACADEMIC YEAR: 2016-2017			
TYPE OF EDUCATIONAL ACTIVITY: (Characterizing)			
TEACHER: Prof. Felice Carlo Ponzo, Eng. Marco Vona			
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Language: ITA / ENG			
ECTS: 9	n. of hours: 32+16=48 (lessons) 22+11=33 (tutorials and practice)	Campus: Potenza School of Engineering	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

To provide students with the tools for understanding the static and dynamic behaviour of masonry and reinforced concrete existing buildings and for designing the strengthening of complex structures, even in seismic prone area, using classic and innovative techniques.

The main skill (namely, the ability to apply the knowledge gained) will be:

- to understand the static and dynamic behaviour of the structures, with particular reference to the masonry and reinforced concrete ones;
- to manage complex phenomena related to the particular type of considered materials and structures;
- to evaluate the safety requirements for the considered structural types;
- to use computational tools for assessment, monitoring and design for even complex structures, considering classic and innovative approaches .

PRE-REQUIREMENTS

The students must have passed the following exams: “Strength of Materials” and “Reinforced Concrete Structures”.

SYLLABUS

The course provides basic knowledge and specialized information on the techniques for the assessment of reinforced concrete and masonry existing structures, on the techniques for in situ tests on materials and on the methodologies for the strengthening design of existing buildings using classical and innovative approach.

In particular the main topics considered are:

- Reference standards: Existing Buildings, Assessment, Safety and verification criteria, Level of knowledge.
- Masonry Buildings: Behaviour of masonry structures under seismic action, Hierarchy of failure modes, Break-up of wall texture, collapse mechanisms of the wall outside of the plan, collapse mechanisms of the wall in the plane, horizontal structures and roofing, construction details, properties of materials, laboratory tests and in situ test, destructive testing, moderately destructive testing, non-destructive testing, assessment, classic and innovative upgrading techniques.
- Reinforced concrete Buildings: characteristics of the structure and structural details, definition of suitable investigation programs, material properties, non-destructive methods, processing of test results (Sonreb Method), investigations on steel reinforcements, structural assessment, seismic protection levels and safety factors, seismic action and load combination, methods of structural analysis and conditions of applicability, structural seismic upgrading considering classical and innovative techniques (base isolation, dissipative bracings, DIS-CAM, FRP).
- Health monitoring of structures and dynamic identification.

TEACHING METHODS

The course is organized as following:

- Theoretical lessons (48 hours);
- Tutorials in classroom and in laboratory (33 hours);
- Technical visits.

EVALUATION METHODS

The main goal of the examination is to verify the learning level reached by the student with reference to the educational expected goals.
The exam is divided in two parts held on the same day.

- Discussion of a project work drawn up in the classroom during tutorials, regarding the design and verification of a multi-story or industrial building and its details. The test is passed with a score higher than 18/30;
- Oral examination aimed at evaluating the capacity of the student of connecting and comparing the different topics covered in the course. The test is passed with a score higher than 18/30;
- The final vote is provided by the average of the two previous partial votes.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Sisto Mastrodicasa, Dissesti Statici delle Strutture Edilizie, diagnosi e consolidamento, HOEPLI.
- Manfredi G., Masi A., Pinho R., Verderame G., Vona M., 2007, Valutazione di edifici esistenti in C.A., Collana di manuali di progettazione antisismica, IUSS Press, Pavia.
- Dolce M., Ponzo F., Di Cesare A. Arleo G., (2010), Progetto di edifici con isolamento sismico, IUSS Press, Pavia.
- Normative:
  - DM 14.01.2008, Nuove norme tecniche per le costruzioni
  - CIRCOLARE 2 febbraio 2009 , n. 617, Istruzioni per l'applicazione delle «Nuove norme tecniche per le costruzioni» di cui al decreto ministeriale 14 gennaio 2008.
  - Norme UNI e CNR per le prove in situ ed in laboratorio
- - Linee guida per FRP, 2009

Notes supplied are available on the course website:
Ponzo: http://www2.unibas.it/ponzo/Sito/Costruz._in_Acciaio_e_Legno.html.
Vona: http://oldwww.unibas.it/utenti/vona/Didattica.htm

INTERACTION WITH STUDENTS

During the first lesson the Professor, after describing the goals of the course, the program and the evaluation methods, provides to the students the website where they can find the on-line educational material and the recommended books. At the same time, he collects the list of the students, complete of all significant information (i.e. name, surname, email, badge number and so on..).
Office hours (Ponzo): Tuesdays from 15:00 to 17:00.
Office hours (Vona): Wednesday from 10:30 to 12:30 and Thursday from 10:30 to 12:30
In any case the professor is always contactable through the following email: felice.ponzo@unibas.it / marco.vona@unibas.it

EXAMINATION SESSIONS (FORECAST)[1]

21/02/2017, 28/03/2017, 25/04/2017, 23/05/2017, 20/06/2017, 25/07/2017, 26/09/2017, 24/10/2017, 28/11/2017

SEMINARS BY EXTERNAL EXPERTS YES X NO □

FURTHER INFORMATION

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