UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	BUILDING ENGINEERING
SUBJECT	CONSTRUCTION SEISMIC DESIGN
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50355-Edilizia e ambiente
CODE	10044
SCIENTIFIC SECTOR(S)	ICAR/09
HEAD PROFESSOR(S)	CAVALERI LIBORIO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	147
COURSE ACTIVITY (Hrs)	78
PROPAEDEUTICAL SUBJECTS	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CAVALERI LIBORIO** Thursday 15:00 17:00 studio personale

DOCENTE: Prof. LIBORIO CAVALERI

TEACHING METHODS	Classroom lessons and exercises
ASSESSMENT METHODS	Oral test: it will have the aim to know the capacity of students to solve the problems that will be proposed and the capacity of using a proper technical language while speeking. The vote is expressed in thirtieths with possible praise, according to the scheme reported at the bottom of the degree program homepage, i.e. "Metodi di valutazione"
LEARNING OUTCOMES	Knowledge and understanding: basic aspects of the structural behaviour under seismic actions of ordinary r.c. framed structures and ordinary masonry structures Applying knowledge and understanding: design of ordinary r.c. framed structures and ordinary masonry structures R.C. framed structures -prediction of response, -structural safety, -technical codes, -design methods for dissipative structures Masonry structures - definition of the mechanich characteristics of materials - formulation of analysis models - load assign and calculus of internal forces - structural safety - technical codes Making judgements: Design of ordinary r.c. framed structures Communication: Capacity of describing design methods and safety assesment of r.c. structures and methods for the safety assesment of ordinary masony structures Learning skills Seismic design of ordinary and non ordinary structures made of materials different from masonry and reinforced concrete
EDUCATIONAL OBJECTIVES	The aim of the course is to create experts in the assesment of the seismic response of ordinary r.c. framed and masonry structures. Further the course gives the bases for the design and the safety assesment of the above type of structures.
PREREQUISITES	Students should know reinforced concrete cross-section behaviour/analysis, frame structure analysis, reinforcement design for beam elements.
SUGGESTED BIBLIOGRAPHY	G. Muscolino. Dinamica delle strutture. – Ed. McGraw Hill (2001) L. Petrini et al. Criteri di progettazione antisismica degli edifici. - Ed. Iuss Press, Pavia, 2004. E. Cosenza, G. Maddaloni, G. Magliulo, M. Pecce, R. Ramasco - Progetto antisismico di edifici in c.a. – Ed. Iuss Press. A. Ghersi, P. Lenza – Edifici antisismici in cemento armato – Dario Flaccovio Editore E. Cosenza, G. Manfredi, M. Pecce – Strutture in cemento armato – Ed. Hoepli N. Augenti. Il calcolo sismico degli edifici in muratura. Ed. Utet., Torino, 2000 L. Cavaleri, V. Radice - Specificita' nella valutazione della capacita' delle strutture murarie di nuova costruzione, Aracne Editrice, 2012.

SYLLABUS

Hrs	Frontal teaching
8	Sismology basics: origin of earthquakes, seismic waves, intensity measure scales of earthquakes, seismic hazard. Interaction soil-structure and wave amplification . Elastic response spectrum and modal analysis. Design spectra. Ductility and behaviour factor, static action equivalent to seismic action.
6	Modelling of the seismic action. Structural requisites for the equivalent static analysis. Regularity in plan and height. Combination of sesimic action with the ordinary actions.
14	Geometry design of beams and columns. Safety assesment at the damage limite state and at the ultimate limit state. Capacity design. Details of structural elements. Methods for the analysis of existing structures.
6	Phisical and mechanical characteristics of masonry: mortar, artificial and natural units. Laboratory tests
4	Structural system. Level and distribution of the vertical loads, level and distribution of the sesimic load. System modelling by equivalent frames.
4	Safety assesment by the semi probabilistic limite state method. Global safety assesment, local safety assesment, shear, bending and vertical forces in the walls. Safety assesment of masonry beams. Technical code rules.

Hrs	Practice
2	Sismology basics: origin of earthquakes, seismic waves, intensity measure scales of earthquakes, seismic hazard. Interaction soil-structure and wave amplification . Elastic response spectrum and modal analysis. Design spectra. Ductility and behaviour factor, static action equivalent to seismic action.
2	Modelling of the seismic action. Structural requisites for the equivalent static analysis. Regularity in plan and height. Combination of sesimic action with the ordinary actions.
9	Geometry design of beams and columns. Safety assesment at the damage limite state and at the ultimate limit state. Capacity design. Details of structural elements. Methods for the analysis of existing structures.
5	Safety assesment by the semi probabilistic limite state method. Global safety assesment, local safety assesment, shear, bending and vertical forces in the walls. Safety assesment of masonry beams. Technical code rules.
9	Design and safety assesment of a multistory r.c. framed buliding
9	Design and safety assesment of a multistory masonry buliding