UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
FIRST CYCLE COURSE	CIVIL AND BUIDING ENGINEERING
SUBJECT	APPLIED CONSTRUCTIONS
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50278-Ingegneria ambientale e del territorio
CODE	07189
SCIENTIFIC SECTOR(S)	ICAR/09
HEAD PROFESSOR(S)	LA MENDOLA LIDIA Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	06313 - MECHANICS OF SOLIDS ANS STRUCTURES
YEAR	3
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**LA MENDOLA LIDIA** Monday 12:00 14:00 presso la stanza del Prof. La Mendola - sita al secondo piano - Edificio 8 - DICAM

DOCENTE: Prof.ssa LIDIA LA MENDOLA

TEACHING METHODS	Front lessons; exercises in class; visits to the Laboratory of Structures of DICAM.
ASSESSMENT METHODS	Oral examination with discussion on the technical design of structural elements, developed from the student. The interview includes discussion of design criteria and is aimed at determining the student's ability to process the knowledge gained by using them to solve problems and the ability to express the teaching content using a technically correct language. The vote is expressed in thirtieths with possible praise, according to the following scheme: Excellent (30-30 with distinction): Excellent knowledge of the topics and very good language skills. Good analytical skills. The student is able to use the knowledge he/she has acquired to solve problems. Very good (26-29): Good grasp of the topics. Sound language skills. The student is able to use the knowledge he/she has acquired to solve problems. Goog (24-25): Basic knowledge of the main topics. Fair language skills with limited ability to independently use the knowledge acquired to solve problems. Satisfactory (21-23): The student lacks a firm grasp but has some knowledge of the main topics. Satisfactory language skills. Low ability to independently use the knowledge acquired. Sufficient (18-20): Minimum basic knowledge of the main topics and technical language. Very low or no ability to independently use the knowledge acquired. Fail: The student does not have an acceptable knowledge of the topics.
LEARNING OUTCOMES	Knowledge and understanding Knowledges regarding the design and verification of the bearing structure of a construction. Ability in the comprehension of problems regarding structural modeling of a r.c. construction subjected to the most common actions by following the codes containing calculations criteria and execution rules (National Codes and Eurocodes). Applying knowledge and understanding The skills transferred to the student are: - design of most common structural elements in the Civil Engineering, taking into account the behaviour due to acting forces - interpretation of the structural behaviour in order to individuate the required verifications Making judgements - Capacity to acquire and interpret key data needed to assess the structural safety. - Ability to choose and apply the design criteria and most appropriate verification. - Ability to express independent opinions on the effectiveness of different solutions. Communication - Ability to communicate and express issues concerning the structural calculation. - Ability to hold conversations on topics related to the structural safety and design choices. - Ability to envisage ideas and offer solutions to both specialist and non-specialist. Learning skills Learning skills necessary to continue the engineering studies with some autonomy, developed on the basis of knowledge gained in the structural field.
EDUCATIONAL OBJECTIVES	The course has the main objective to provide the most suitable methods for the calculation of some most common structural elements in Civil Engineering. In particular, problems of verification and design of framed systems and of foundation structures, are treated, making reference to reinforced concrete as a material because of more frequent use. Practice exercise is made with reference to the existing legislation on buildings.
PREREQUISITES	Basic knowledge of: Continuum mechanics of elastic systems; De-Saint Venant beam theory; Structural analysis methods.
SUGGESTED BIBLIOGRAPHY	- MAURO MEZZINA, Fondamenti di Tecnica delle Costruzioni, Citta' Studi, Edizioni, 2013. - V. NUNZIATA, Teoria e pratica delle strutture in cemento armato, Voll. I e II, Dario Flaccovio Editore, 2001-2004. - Quaderni didattici disponibili sul sito unipa.

SYLLABUS

Hrs	Frontal teaching
2	Actions on structures. Technical Codes. Combination of the actions.
4	Some elements of Structural Mechanics. Solution methods for continuous beams.

SYLLABUS

Hrs	Frontal teaching
8	Flexure and shear stiffness, axial stiffness for elastic beam. Matrix structural analysis of framed structures. Stiffness matrix of beam. Transfer matrix from local system of reference to the global one and viceversa. Fixed-end forces. Equilibrium equationsat the nodes. The assemblage of the stiffness matrix. Calculus of displacements and forces at the nodes of the frames.
2	Basics for matrix analysis of three-dimensional framed structures. Trussed systems.
2	Reinforced concrete material. Mix design. Physical and mechanic characteristics of concrete and steel. Laboratory tests. Code Rules.
10	Semi-probabilistic safety concept. Ultimate Limit State (ULS) due to normal stresses: equilibrium equations for r.c. cross-sections; interaction M-N domains. Ultimate Limit State due to shear stresses: truss scheme. Ultimate Limit State (ULS) due to torsion stresses. Steel-concrete bond; anchorage length; execution rules.
3	Calculus of normal stresses in the r.c. cross-section in the elastic field. Serviceability Limit States (SLS).
6	Foundations. Types. Dimensioning criteria and reinforcement design for reinforced concrete beam foundations and isolated footings.

Hrs	Practice
2	Illustration of laboratory tests during the visit of the Laboratory of Structures of DICAM.
6	Exsercices on structural analysis of continuous beams and on framed systems.
8	Exsercices on: ULS design and verification of r.c. cross-sections subjected to different types of forces.
6	Design of the longitudinal and transverse reinforcements for the r.c. beam. Design of the longitudinal and transverse reinforcements for the r.c. column.
6	Analysis models and design of:slabs and stairs with bearing slab.
6	Numerical example on: dimensioning, design of reinforcement and execution criteria of r.c. beams and columns of reinforced concrete framed systems.
6	Reinforced concrete beam fondations. Numerical example on dimensioning and calculus of the reinforcement.
4	Numerical example on dimensioning, calculus of reinforcements for a foundation isolated footing.