UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2023/2024
BACHELOR'S DEGREE (BSC)	CIVIL 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)	142
COURSE ACTIVITY (Hrs)	83
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	3
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**LA MENDOLA LIDIA** Monday 11:00 13:00 Modalita telematica su Microsoft teams: team "Prof. Lidia La Mendola", codice di accesso m4p5j4u

DOCENTE: Prof.ssa LIDIA LA MENDOLA

PREREQUISITES	Basic knowledge of: Continuum mechanics of elastic systems; De-Saint Venant beam theory; Structural analysis methods.
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.
ASSESSMENT METHODS	Oral examination consisting of an interview that comes from the discussion of the design works of structural elements developed by the student. The design work consists in exercises addressed to: solve a plane frame and design three structural elements assigned between: slab, continuous beam, foundation plinth, foundation beam, staircase, cantilever. The interview will include discussion of the chosen project criteria and will be addressed to assess the student's ability to process the acquired knowledge by using them to overcome the problems that are being posed and the ability to express himself with a technically correct content language teaching. The evaluation is expressed in thirty with any distinction, according to the following scheme: Excellent (30-30 and distinction): excellent knowledge of subjects, excellent language skills, good analytical ability, the student is able to apply the knowledge to solve the proposed problems, also different from those discussed in the exserices. The student understands the calculation models on which the technical rules are based. Very good (26-29): good grasps of the topics, full language skills, the student is able to apply knowledge to solve the proposed problems. The student knows the design criteria and the calculation models on the basis of which he developed the design work. Good (24-25): Basic knowledge of the main topics, discrete language skills, with limited ability to apply knowledge to the problem solving itself. The student knows the design criteria and the calculus models on which he developed the design work, but in finding the solutions he needs a guide. Satisfactory (21-23): He is not fully mastered in the main subjects of the teaching but possesses knowledge, satisfactory language property, poor ability to apply the acquired knowledge independently. The student does not show the ability to transfer the knowledge applied to the design works to similar cases, remaining very anchored to the specific cases processed in his design works. Sufficient (18-20): minimum basic knowledge of the main subjects of teaching and technical language, very little ability to apply the acquired knowledge independently. The student shows difficulties in identifying the design solutions for which he needs a continuous guidel during the interview. Insufficient: Does not have an acceptable knowledge of the contents of the topics covered in the teaching.
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.
TEACHING METHODS	Front lessons; exercises in class; visits to the Laboratory of Structures of the

	Engineering Department.
SUGGESTED BIBLIOGRAPHY	- MAURO MEZZINA, Fondamenti di Tecnica delle Costruzioni, Citta' Studi, Edizioni, 2013, ISBN 978-88-251-7379-6 - V. NUNZIATA, Teoria e pratica delle strutture in cemento armato, Voll. I e II, Dario Flaccovio Editore, 2001-2004, vol. 1: ISBN 88-7758 vol. 2: ISBN 88-7758-564-1;o ISBN 13: 978-88-7758-564-6 - Quaderni didattici disponibili sul sito docente di 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.
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.
8	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 .
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.
8	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.
6	Numerical example on dimensioning, calculus of reinforcements for a foundation isolated footing.