UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2018/2019
BACHELOR'S DEGREE (BSC)	CIVIL AND BUIDING ENGINEERING
SUBJECT	BUILDING CONSTRUCTION TECHNIQUE
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50278-Ingegneria ambientale e del territorio
CODE	16000
SCIENTIFIC SECTOR(S)	ICAR/09
HEAD PROFESSOR(S)	CAVALERI LIBORIO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	9
INDIVIDUAL STUDY (Hrs)	144
COURSE ACTIVITY (Hrs)	81
PROPAEDEUTICAL SUBJECTS	06313 - MECHANICS OF MATERIALS AND THEORY OF STRUCTURES
MUTUALIZATION	
YEAR	3
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CAVALERI LIBORIO** Thursday 15:00 17:00 studio personale

DOCENTE: Prof. LIBORIO CAVALERI

PREREQUISITES	The continuum mechanics and the Bernoulli Navier beam model is requested
LEARNING OUTCOMES	Knowledge and understanding: -basic aspects of the structural behavior under vertical and horizontal loads of ordinary r.c. framed structures -strategies for the evaluation of the response and safety assessment -evaluation of the loads - actual codes Applying knowledge and understanding: design of ordinary r.c. framed structures: definition of the mechanical characteristics of the materials, formulation of calculus schemes/models, dimensioning of structural elements, stress calculus, steel bars design, safety assessment by means of the Semi Probabilistic Method, executive drawings. Making judgments: About the design of ordinary r.c. framed structures Communication: The capacity of describing design methods and safety assessment of r.c. structures Learning skills Design of ordinary assessment/design of structures made of materials different from reinforced concrete
ASSESSMENT METHODS	Oral exam. Referring to r.c. framed structures or elements of r.c. framed structures, the exam will deal with a simulation of real applications of design or of capacity assessment. It will be verifîed the student capability of properly expressing the contents of the course and the ability in the communication with the examiner. The vote is expressed in thirtieths with possible praise, according to the following scheme: - excellent 30 - 30 with praise (optimal knowledge of the course topics, optimal language ability; the student is able to apply the knowledge to solve the proposed problems) - very good 26-29, (good knowledge of the course topics, good language ability, the student is able to solve the proposed problems) - good 24- 25 (basic knowledge of the main course topics and limited capability of autonomous solving of the proposed problems) - satisfactory 21-23 (not completely conscious of the course topics) - sufficient 18-20 (minimum knowledge of the course topics and very low capacity of autonomous solving of the proposed problems) - insufficient (the student does not have an acceptable knowledge of the course topics)
EDUCATIONAL OBJECTIVES	The aim of the course is to make students learn the linear analysis of framed systems and the design of reinforced concrete members of ordinary framed structures.
TEACHING METHODS	Classroom lessons and exercises
SUGGESTED BIBLIOGRAPHY	- Dispense a cura del docente - Normativa tecnica per le costruzioni in vigore. - L. Cavaleri, V. Accidenti – I solai latero-cementizi ed il metodo semiprobabilistico agli stati limite. Aracne Editrice, 2012. - E. Cosenza, G. Manfredi, M. Pecce – Strutture in cemento armato. Basi della progettazione. Hoepli, 2008

SYLLABUS

Hrs	Frontal teaching
8	1) Structural analysis: force method, Displacement method. End rotations of members and end bending moments in the framed systems, bending moments at fixed ends.
9	2) Matrix calculus of linear framed plane systems: Axial, shear and flexural stiffness of a member, stiffness matrix of a member, joint equilibrium equations, local coordinates and general coordinates of beam ends, system stiffness matrix obtained by combining the member stiffness matrix, joint displacements, and internal force diagrams.
4	Foundation beams on Winkler soil
6	4) Reinforced concrete systems: physical and mechanical characteristics of materials, shrinkage, and viscosity of concrete. Linear analysis of member cross-sections under axial load and bending moment Calculus of r.c. member strains in the cracked state and in the uncracked state. Assessment of the width of the cracks.
8	5) Nonlinear analysis of r.c. member cross-sections under axial load and bending moment, cross-section collapse domain, design and distribution of the longitudinal reinforcement bars. The shear models; shear-bending interaction; the bond between rebars and concrete.

Hrs	Practice
3	1) Structural analysis: force method, displacement method. End rotations of members and end bending moments in the framed systems, bending moments at fixed ends.
3	2) Matrix calculus of linear framed plane systems: Axial, shear and flexural stiffness of a member, stiffness matrix of a member, joint equilibrium equations, local coordinates and general coordinates of beam ends, system stiffness matrix obtained by combining the member stiffness matrix, joint displacements, and internal force diagrams.
2	4) Reinforced concrete systems: physical and mechanical characteristics of materials, shrinkage and viscosity of concrete. Linear analysis of member cross-sections under axial load and bending moment Calculus of r.c. member strains in the cracked state and in the uncracked state. Assessment of the width of the cracks.
2	5) Nonlinear analysis of r.c. member cross-sections under axial load and bending moment, cross-section collapse domain, design and distribution of the longitudinal reinforcement bars. The shear models; shear-bending interaction; the bond between rebars and concrete.
8	6) Safety assessment by the limit state semi probabilistic method; service limit states: stresses limit, strain limit, crack width limit;
10	7) Ultimate limit states: limits in axial load and bending moment, shear limit, torsion limit, the limit in second order effects
4	8) Foundations: beams on Winkler elastic soil: design of the geometry and of the reinforcement.
4	9) Design of framed r.c. structures: dimensioning
12	10) Floor design; stairs, balconies; structural details.