UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura
ACADEMIC YEAR	2020/2021
MASTER'S DEGREE (MSC)	ARCHITECTURE
SUBJECT	MECHANICS OF MATERIALS AND THEORY OF STRUCTURES
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50667-Analisi e progettazione strutturale per l'architettura
CODE	06313
SCIENTIFIC SECTOR(S)	ICAR/08
HEAD PROFESSOR(S)	PALIZZOLO LUIGI Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	8
INDIVIDUAL STUDY (Hrs)	128
COURSE ACTIVITY (Hrs)	72
PROPAEDEUTICAL SUBJECTS	06636 - STATICS
MUTUALIZATION	
YEAR	3
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**PALIZZOLO LUIGI** Thursday 10:00 12:00

DOCENTE: Prof. LUIGI PALIZZOLO

PREREQUISITES	Knowledge of the following concepts and/or subjects: static and kinematic theory for rigid and deformable systems; constitutive behaviour of materials and structures; structiral safety; virtual work principle.
LEARNING OUTCOMES	Knowledge and understanding skills: aim of the course is the knowledge of the solid and structure mechanics and the comprehension of the structural conception of the more utilized structures for architectural constructions. Ability to apply knowledge and understanding: the knowledge of the structural mechanics and the comprehension of the structural conception must produce the ability for dimensioning and verifying structural systems. It represents a fundamental cultural and professional baggage in order to knowingly perform design and/or restoration of architectural artifacts. Autonomy of judgment: students must be able to associate a suitable structural model at each analyzed architectural artifact. Communicative skills: students must be able to expose the results of their work with Logical rigor and language properties. Learning ability: students must be able to indipendently improve their knowledge.
ASSESSMENT METHODS	Written test and oral discussion
EDUCATIONAL OBJECTIVES	Understanding of the structural behaviour of the most usual structures for civil and industrial buildings and related analysis and design.
TEACHING METHODS	Lecture hours and exercise sessions
SUGGESTED BIBLIOGRAPHY	1)Benvenuto E., La Scienza delle Costruzioni e il suo sviluppo storico, Sansoni, Firenze, 1981. 2)Giambanco F., Lezioni di Statica, D. Flaccovio, Palermo, 1999. 3)Polizzotto C., Scienza delle Costruzioni, Centro Stampa Siciliana, Palermo, 1980. 4)Corradi Dell'Acqua L., Meccanica delle Strutture, Vol. I,II,III, McGraw-Hill, Milano, 2010. 5)Viola E., Lezioni di Scienza delle Costruzioni, Pitagora, Bologna, 2003. 6)Viola E., Esercitazioni di Scienza delle Costruzioni, Vol. I,II,III, Pitagora, Bologna, 1985. 7)Casini P., Vasta M., Scienza delle Costruzioni, Citta' Studi edizioni, 2016. 8)Dispense del corso.

SYLLABUS

Hrs	Frontal teaching
8	Analysis methods for continuous bodies: 3D bodies, compatibility, elasticity and equilibrium equations,mechanical and kinematical actions, the elastic analysis problem, displacement and force method; continuous beams, close form of the displacement method. Metodi di analisi elastica del continuo: solidi tridimensionali, equazioni di compatibilita, di elasticita' e di equilibrio, azioni meccaniche e cinematiche, il problema dell'equilibrio elastico; soluzioni cinematicamente ammissibili e staticamente ammissibili, esistenza ed unicita' della soluzione, metodo dell'equilibrio e metodo della congruenza, equazioni di Navier ed equazioni di Beltrami; sistemi piani di travi, deformazioni elastiche ed anelastiche, distorsioni concentrate e distribuite, cedimenti elastici ed anelastici dei vincoli; carichi termici; metodo della linea elastica.
5	Principle of virtual work. Theorem of Clapeyron, Betti, Maxwell, computation of displacements through the virtual work.
15	Analysis methods for discrete structures: displacement and force method for trusses and frames; fundamentals of finite element method.
3	Buckling analysis of rigid and deformable beams, critical buckling force, Euler buckling stress.
2	Fundamentals on optimal design of structures: static, quasi-static and dynamic loads; the analysis and the design problem; limit behaviours of a structure within and above the elastic limit; objective functions and constraints of the design problem; the Bree diagram
4	Truss and frame plane structures. Shear type frame. Masonry structures. Seismic and wind actions. Sharing with respect to the stiffness.
8	Behaviour of materials and structures beyond the elastic limit. The different limi states of the structures. The plastic flow rules. The step by step elastic plastic analysis.

Hrs	Practice
4	Displacement method for continuous elastic beams.
6	Determination of displacements and rotations of frame structure sections.
10	Displacement and force method. Applications for trusses and frames.
7	Safe analysis for structures subjected to buckling loads.