



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Architettura		
ACADEMIC YEAR	2023/2024		
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: centroid and moments of inertia, static and kinematic theory for rigid and deformable systems; constitutive behaviour of materials and structures; virtual work principle, generalized stress distribution.
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 independently improve their knowledge.
ASSESSMENT METHODS	The assessment takes place through written tests and oral discussion. During the class two intermediate tests are developed. These tests propose applications and/or more theoretical questions. The results of these tests are utilized for the final evaluation. The students obtaining results not less of the sufficiency (18/30) in both tests are directly admitted to the oral discussion. In this case the final evaluation will be the average between the evaluation reached with the tests and the one related with the oral discussion. If the student did not undergo the intermediate tests or he did not obtain a sufficient evaluation or he is not satisfied with the obtained evaluation, then the student will undergo both the final written tests and oral discussion. Both the tests will be evaluated in the field 18-30 and the final evaluation will represent the average of the related single evaluations. An indispensable condition for having a sufficient evaluation is to show elementary knowledge of the topics covered in the course and to know their possible practical applications. The evaluation between 18/30 and 21/30 will be assigned to students who show at least an elementary knowledge of the topics covered in the course and the possible practical applications. The attribution of a grade in this interval is a function of the demonstrated mastery and the property of language. The evaluation between 22/30 and 24/30 will be assigned to students who show a fair knowledge of the topics covered in the course and are able to manage simple practical applications. The attribution of a grade in this interval is a function of the demonstrated mastery and the property of language. The assessment between 25/30 and 27/30 will be awarded to students who show a good knowledge of the topics covered in the course and are able to manage complex practical applications. The attribution of a grade in this interval is a function of the demonstrated mastery and the property of language. The evaluation between 28/30 and 30/30 (with possible laude) will be assigned to students who show excellent knowledge of the topics covered in the course, are able to manage complex practical applications and show particular scientific maturity. The attribution of a grade in this interval is a function of the demonstrated mastery and the property of language.
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. ISBN 8877582294. 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. ISBN 8837113412. 6) Viola E., Esercitazioni di Scienza delle Costruzioni, Vol. I,II,III, Pitagora, Bologna, 1985. ISBN 8837103565. 7) Casini P., Vasta M., Scienza delle Costruzioni, Citta' Studi edizioni, 2016. ISBN 8825174055. 8) Dispense del corso.

SYLLABUS

Hrs	Frontal teaching
3	Analysis methods for continuous bodies: 3D bodies, the elastic analysis problem, displacement and force method; continuous beams, close form of the displacement method.

SYLLABUS

Hrs	Frontal teaching
2	Principle of virtual work. Theorem of Clapeyron, Betti, Maxwell, computation of displacements through the virtual work.
10	Analysis methods for discrete structures: displacement and force method for trusses and frames; fundamentals of finite element method.
2	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.
3	Safety criteria: Galileo, Tresca, Von Mises
1	The De Saint Venant problem for beams
6	Analysis of beams subjected to axial force and bending moment
4	Analysis of beams subjected to shear force: Jourawski theory
2	Analysis of beams subjected to torsion
Hrs	Practice
4	Displacement method for continuous elastic beams.
6	Determination of displacements and rotations of frame structure sections.
15	Displacement and force method. Applications for trusses and frames.
8	Safe analysis for structures subjected to buckling loads.