UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	AEROSPACE ENGINEERING
SUBJECT	AERONAUTICS STRUCTURES
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50350-Ingegneria aerospaziale ed astronautica
CODE	07140
SCIENTIFIC SECTOR(S)	ING-IND/04
HEAD PROFESSOR(S)	DAVI' GIUSEPPE Professore a contratto in quiescenza Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
YEAR	1
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	

DOCENTE: Prof. GIUSEPPE DAVI'

TEACHING METHODS	Frontal lectures Class practicals
ASSESSMENT METHODS	Oral examination and discussion of the exercises completed during the course. The examination will assess the knowledge of the methods and techniques introduced in the course and the capability to critically describe and interpret the main aspects of structural mechanics with special reference to lightweight structures for aeronautical applications. The examination will comprise two or three questions (input) and the candidate will be engaged in average for about thirty minutes. The candidate will have to present a written report with all the exercises developed during the course and one of the questions will always be focused on discussing and deepening the topics developed in there. The final score is given out of thirty. The minimum score will be achieved by the candidate who will demonstrate a basic knowledge of the course topics and the appropriate use of the relevant technical language. The score will be tuned, up to the maximum (30/30 cum laude), according to the ability of the student to demonstrate: • confidence and mastery of the course topics; • ability to establish links among the course topics and with relevant topics of other disciplines; • ability to solve complex problems; • presentation skills; • mastery of th erelevant technical language;
LEARNING OUTCOMES	Knowledge and comprehension The course will introduce the student to the knowledge of the Finite Element Method (FEM) for the analysis of structural problems and the basic knowledge for modelling two-dimensional structural elements (panels) for aerospace applications. The course will introduce the fundamentals of the FEM and its application to one- and two-dimensional structural elements. Capability to apply knowledge and comprehension Capability to apply the FEM for structural analysis of truss structures, beam frames, membranes and plates. Independent thinking The student will acquire the capability to analyze the static equilibrium of aerospace structures, making the sensible modelling choices with the FEM and will acquire the ability to assess the level of accuracy and reliability of the obtained solution. Presentation skills The student will acquire the ability to present, through technical reports, the results of the performed analyses. The student will moreover develop specific team presentation and interaction skills. Lifelong learning skills The student will acquire the ability to apply the FEM for structural analysis. In turn, the student will mature the capability to deepen the knowledge of the introduced topics through the access and interpretation of the relevant scientific literature.
EDUCATIONAL OBJECTIVES	The objective of the course is to provide the student with the knowledge and skills for the analysis and design of aerospace structures, by the use of the Finite Element Method.
PREREQUISITES	Fundamentals of strength of materials.
SUGGESTED BIBLIOGRAPHY	Dispense del corso J. S. Przemieniecki - "Theory of matrix structural analysis" –Dover C. A. Brebbia, J.J. Connor - "Fondamenti del metodo degli elementi finiti" - Clup Milano V. Giavotto - "Strutture aeronautiche" - Clup Milano

SYLLABUS

Hrs	Frontal teaching
1	Aeronautical structures and their modelling;
4	The Finite Element Method (FEM)

SYLLABUS

Hrs	Frontal teaching
3	FEM analysis of truss structures
4	FEM analysis of beam frames
4	Membranes and in-plane plates
2	FEM for the analysis of in-plane plates
5	Out-of-plane plates
3	FEM for out-of-plane plates
2	Plate instability

Hrs	Practice
4	FEM analysis of truss structures
10	FEM analysis of beam frames
4	FEM analysis of beam frames
4	FEM for the analysis of in-plane plates
4	FEM for out-of-plane plates
2	Structure of a computational code for structural analysis and introduction to the main commercial software packages for structural analysis.