UNIVERSITÀ DEGLI STUDI DI PALERMO

SCHOOL	POLYTECHNIC SCHOOL
ACADEMIC YEAR	2016/2017
SECOND CYCLE (7TH LEVEL) COURSE	AEROSPACE ENGINEERING
SUBJECT	AEROSPACE ENGINES
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50350-Ingegneria aerospaziale ed astronautica
CODE	12658
SCIENTIFIC SECTOR(S)	ING-IND/07
HEAD PROFESSOR(S)	LOMBARDO GIUSEPPE Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	12
INDIVIDUAL STUDY (Hrs)	192
COURSE ACTIVITY (Hrs)	108
PROPAEDEUTICAL SUBJECTS	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**LOMBARDO GIUSEPPE** Tuesday 9:00 13:00 M010

DOCENTE: Prof. GIUSEPPE LOMBARDO

TEACHING METHODS	Lectures, classroom exercises
ASSESSMENT METHODS	Written and oral examinations
LEARNING OUTCOMES	LEARNING OUTCOMES Knowledge and understanding: Knowledge of the solutions of typical problems of aerospace propulsion, knowledge of the technologies adopted for in preliminary studies and in development of aeronautical and space propulsion systems, knowledge of elements driving the project of the engine. The student will be able to understand performance analysis with reference to the physical and chemical phenomena that mostly influence the behavior of the engine. Capacity to apply knowledge and understanding: Capacity to apply performance prediction methods and analysis of the behavior of aeronautical and space engines and their components. Capacity to analyze transients, automatic controls, capacity to evaluate noise and pollutant emissions. Making judgments: Ability to assess the real behavior and performance of aeronautical and space engines and their components. The student will have the ability to find appropriate solutions for the engine project. Communication: Communication ability by means of technical reports and result analysis concerning aeronautical and space propulsion systems. The student will have the ability to communicate and interact in a multidisciplinary team at aircraft or spacecraft level. Lifelong learning skills: The knowledge acquired allow the access and understanding of specialist publications and may allow admission to courses at doctoral level or allow access to research centers in the sector.
EDUCATIONAL OBJECTIVES	EDUCATIONAL OBJECTIVES The student will learn solutions and techniques of aerospace propulsion, architecture details, specific technologies, forecasting performance methods and design methods and analysis for aircraft engines and rockets.
PREREQUISITES	Knowledge of Gasdynamics
SUGGESTED BIBLIOGRAPHY	Jack L. Kerrebroch, “Aircraft Engines and Gas Turbines”, The MIT Press, Cambridge Massachusetts. George P. Sutton, Oscar Biblarz, “Rocket Propulsion Elements”, John Wiley & Sons.

SYLLABUS

Hrs	Frontal teaching
1	Course Introduction
1	Aircraft Engines
1	Rocket Propulsion: space and missiles
4	The Ramjet: ideal and real analysis
3	The turbojet and the turbojet with afterburner: ideal and real analysis
6	The turbofan and the turbofan with afterburner: ideal and real analysis
2	The turboprop: ideal and real analysis
2	Subsonic and Supersonic Inlets
3	Combustors and Afterburners of Aircraft Engines
2	Nozzles of Aircraft Engines
4	Compressors and Fans
4	Turbines
3	The ideal rocket
3	Rocket Nozzles
4	Analysis of Real Solid Propellant Rocket Motors
4	Analysis of Real Liquid Propellant Rocket Engines
2	Turbopumps
6	Combustion Stability in Solid Propellant Rocket Motors and Liquid Propellant Rocket Engines
2	Automatic Controls of Aircraft Engines and Rocket Engines

Hrs	Practice
4	The Ramjet
6	The Turbofan

Hrs	Practice
3	The turbofan with afterburner
4	Subsonic and Supersonic Inlets
6	Compressores and Fans
4	Turbines
7	Solid Propellant Rocket Motors
7	Liquid Propellant Rocket Engines
7	Combustion Stability in Solid Propellant Rocket Motors and Liquid Propellant Rocket Engines