AEROSPACE ENGINEERING (LM52)

(Brindisi - Università degli Studi)

Teaching SPACE PROPULSION MOD. 2

GenCod A003310

Owner professor Maria Grazia DE GIORGI

Teaching in italian SPACE PROPULSION MOD. 2

Course year 1

Teaching SPACE PROPULSION MOD. 2

Language ENGLISH

SSD code ING-IND/07

Curriculum Percorso comune

Reference course AEROSPACE ENGINEERING

Course type Laurea Magistrale

Location Brindisi

Credits 6.0

Semester First Semester

Teaching hours Front activity hours: 54.0

Exam type Oral

Assessment

For enrolled in 2019/2020

Taught in 2019/2020

Course timetable https://easyroom.unisalento.it/Orario

BRIEF COURSE DESCRIPTION	This course presents aerospace propulsive devices with particular focus on rocket engine
REQUIREMENTS	-Fluid dynamic and fluid machinery
COURSE AIMS	1 Gain knowledge of different types of aero-engines (turbojets, turbofans, ramjets) and to understand the aerodynamic and thermodynamic characteristics of major rocket components. 2 Develop the knowledge and skills to analytically and numerically solve problems related to aerospace propulsion systems. 3 Develop skills in working independently. 4 Develop skills in critical evaluation of scientific literature. 5 Develop skills in planning and presentation of scientific talks and reports.
TEACHING METHODOLOGY	Theory and practical activities
ASSESSMENT TYPE	The final exam consist of two part: 1)Written and oral examination covering all material covered in course 2)assignments and individual project

FULL SYLLABUS

Rocket Nozzles and Thrust
Performance and nozzle design. Convective Heat Transfer

Combustion and Thermochemistry
Perfect gas law and thermodynamics review,equilibrium Thermochemistry, adiabatic flame temperature calculations, non-Equilibrium Flows. Rocket nozzle thermochemistry.

Solid Rocket Motors
General description, interior ballistics, component design goals and constraints.

Liquid Rocket Motors
General description, engine cycles, power balance calculations, component design fundamentals. Combustion of Liquid Propellants ; Injection and Mixing ; Stability; Pressurization and Pump Cycles; Turbomachinery Performance

Trajectory Analysis and staging
The rocket equation, vertical trajectories, multistage rockets.

Electric Propulsion
General description and classification of electric propulsion systems, performance analysis.

Hybrid rockets
Classification, Challenges, and Advantages of Hybrids

REFERENCE TEXT BOOKS

- Aerothermodynamics of Gas Turbine and Rocket Propulsion Gordon C. Oates eISBN: 978-1-60086-134-5 print ISBN: 978-1-56347-241-1 DOI: 10.2514/4.861345
- Hill, P., and Peterson, C., Mechanics and Thermodynamics of Propulsion, Addison-Wesley Publishing Co., 1992,
- George P. Sutton, Oscar Biblarz, Rocket Propulsion Elements, 7th Edition John-Wiley & Sons, Ltd., ISBN: 0-471-32642-9
- Course note