

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 **Course year** 1
MOD. 2

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 Second Semester

Teaching hours Front activity hours:
54.0

Exam type Oral

For enrolled in 2020/2021

Assessment

Taught in 2020/2021

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