

# AEROSPACE ENGINEERING (LM52)

(Brindisi - Università degli Studi)

## Insegnamento SPACE PROPULSION MOD. 2

GenCod A003310

Docente titolare Maria Grazia DE GIORGI

**Insegnamento** SPACE PROPULSION MOD. 2

**Insegnamento in inglese** SPACE PROPULSION MOD. 2

**Settore disciplinare** ING-IND/07

**Corso di studi di riferimento** AEROSPACE ENGINEERING

**Tipo corso di studi** Laurea Magistrale

**Crediti** 6.0

**Ripartizione oraria** Ore Attività frontale: 54.0

**Per immatricolati nel** 2022/2023

**Erogato nel** 2022/2023

**Anno di corso** 1

**Lingua**

**Percorso** Percorso comune

**Sede** Brindisi

**Periodo**

**Tipo esame** Orale

**Valutazione**

**Orario dell'insegnamento**

<https://easyroom.unisalento.it/Orario>

### BREVE DESCRIZIONE DEL CORSO

This course presents aerospace propulsive devices with particular focus on rocket engine

### PREREQUISITI

-Fluid dynamic and fluid machinery

### OBIETTIVI FORMATIVI

- 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.

### METODI DIDATTICI

Theory and practical activities

### MODALITA' D'ESAME

- The final exam consist of two part:
- 1)Written and oral examination covering all material covered in course
  - 2)assignments and individual project

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## PROGRAMMA ESTESO

### *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

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## TESTI DI RIFERIMENTO

- 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