

# 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**

**Teaching hours** Front activity hours:  
54.0

**Exam type** Oral

**For enrolled in** 2017/2018

**Assessment**

**Taught in** 2017/2018

**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

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## 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

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## 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