Master's degree in Aerospace Science and Technology (MAST)

The **master's degree in Aerospace Science and Technology** provides advanced training in the sciences and technology that are currently most widely used and applied in the fields of aeronautics and space exploration. Graduates of this master's degree will have been trained in an interdisciplinary area of knowledge that includes the study of theoretical and practical groundwork, techniques, methods and processes, and will be skilled at promoting, defining and managing innovative research projects.

GENERAL DETAILS

Duration and start date

1.5 academic years, 90 ECTS credits. Starting September and February

Timetable and delivery

Mornings and afternoons. Face-to-face

Fees and grants

Approximate fees for the master's degree, excluding other costs, €4,149 (€6,224 for non-EU residents).
This master's degree has been selected for the **Masters of Excellence grant programme of the Catalunya La Pedrera Foundation**. More information on the award criteria is available on the Foundation's website.
More information about fees and payment options
More information about grants and loans

Language of instruction

English

Location

Castelldefels School of Telecommunications and Aerospace Engineering (EETAC)

Official degree

Recorded in the Ministry of Education's degree register

ADMISSION

General requirements

Academic requirements for admission to master's degrees

Specific requirements

- A degree in Physics, Chemistry, Mathematics, Biology or Geology.
- A degrees in Engineering (Telecommunications, Civil Engineering).
- A diploma in Engineering (Aeronautical Engineering).
- A pre-EHEA degree in Aeronautical or Industrial Engineering.
- Another pre-EHEA engineering degree.

Admission criteria

Applicants will be assessed according to the following points, in this order:

- A letter explaining the applicant's motivation to follow this course of study and his or her research interests.
- A curriculum vitae.
- The academic record.
- Proof of good knowledge of English.
- Two reference letters.

The admission of students with foreign degrees will be evaluated by the corresponding committee.

Places

30

Pre-enrolment

Pre-enrolment closed (consult the new pre-enrolment periods in the academic calendar).
How to pre-enrol

Enrolment

How to enrol

Legalisation of foreign documents

All documents issued in non-EU countries must be legalised and bear the corresponding apostille.

DOUBLE-DEGREE AGREEMENTS

Double-degree pathways with universities around the world

- Master's degree in Aerospace Science and Technology + one of the following master's degrees from Cranfield University:
  - *Master in Aerospace Dynamics*
  - *Master in Aerospace Manufacturing*
  - *Master in Aerospace Vehicle Design*
  - *Master in Air Transport Management*
  - *Master in Automotive Engineering*
  - *Master in Autonomous Vehicle Dynamics and Control*
  - *Master in Computational Fluid Dynamics*
  - *Master in Aerospace Computing*

PROFESSIONAL OPPORTUNITIES

Professional opportunities

Graduates from this master’s degree will be experts qualified to work in:

- University departments, institutes or research centres in order to produce a doctoral thesis.
- R&D departments in industry in the aerospace field or similar.

Competencies

Generic competencies

Generic competencies are the skills that graduates acquire regardless of the specific course or field of study. The generic competencies established by the UPC are capacity for innovation and entrepreneurship, sustainability and social commitment, knowledge of a foreign language (preferably English), teamwork and proper use of information resources.

Specific competencies

On completion of the course, students will be able to:

- Demonstrate in-depth knowledge of the theoretical and experimental tools used in different areas within the aerospace field.
- Use scientific programming techniques and basic and advanced numerical methods competently.
- Demonstrate advanced knowledge of the most relevant physical aspects of aerospace systems.
- Demonstrate in-depth knowledge of the different types of materials used in the construction of aerospace vehicles.
- Demonstrate knowledge of the tools, devices and systems that enable the analogue or digital conditioning of signals.
- Demonstrate an up-to-date awareness of the main characteristics of international aerospace research.
- Demonstrate broad knowledge of R&D&I activities in the companies in the sector in this region.
- Define the context and the variables that affect research projects.

- Approach research problems consistently and with good scientific working methods.
- Show initiative and originality in considering new approaches to an open problem and in considering new problems.
- Produce a doctoral thesis.
- Understand the dynamic of the artificial satellites orbiting the Earth and have a detailed and objective vision of the capacities of very low-mass satellites.
- Calculate interplanetary trajectories.
- Understand the concepts of analysis and design of controllers for uncertain systems.
- Demonstrate detailed knowledge of the basic structure of the data bus of artificial satellites and the atmospheric phenomena that most affect aerial operations.
- Demonstrate knowledge of the differences in behaviour of materials on a macro- and a nanoscale and identify the specific characteristics of nanoscale processes for the conceptual design of sensors, materials and support systems for life in space.
- Understand the characteristics of platforms for obtaining microgravity and the behaviour of different physical systems in microgravity.
- Design an experiment to carry out in parabolic flight.
- Understand the operation of UAVs and the rigorous formulation of measurement algorithms and how to guarantee their quality.
- Design and implement automatic measuring systems and show knowledge of the tools, devices and systems that enable the conditioning of analogue and digital signals.
- Demonstrate knowledge of the systems that support human life on inter-planetary missions and the main elements of the design of a life support system.
- Design electronic on-board equipment in which microtechnologies play an important role.
- Categorise satellite communication systems and demonstrate knowledge of the characteristics of DVB-S, DVB-S2 and DVB-RCS systems.

ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

UPC school

Castelldefels School of Telecommunications and Aerospace Engineering (EETAC)

Participating institutions

Universitat Politècnica de Catalunya (UPC)
Centre National d'Études Spatiales (CNES)
European Space Agency (ESA)
Universitat Autònoma de Barcelona (UAB)

Academic coordinator

Ricard González

Academic calendar

General academic calendar for bachelor's, master's and doctoral degrees courses

Academic regulations

Academic regulations for master's degree courses at the UPC

CURRICULUM

Subjects	ECTS credits	Type
FIRST SEMESTER		
Aerospace Materials	5	Compulsory
Aerospace Seminars	5	Compulsory

Subjects	ECTS credits	Type
Analog and Digital Signal Processing in Aerospace Applications	5	Compulsory
Broadening of Fundamentals in Aerospace Science and Technology	5	Compulsory
Numerical Methods for Systems of Aerospace Engineering	5	Compulsory
Space Systems Engineering	5	Compulsory
SECOND SEMESTER		
Architecture of Nano and Picosatellites	5	Optional
Astrodynamics	5	Optional
Aviation Weather	5	Optional
Life-Support Systems in Space	5	Optional
Modern Control Systems	5	Optional
Radio Navigation	5	Optional
Satellite Communications Systems	5	Optional
Science in Microgravity	5	Optional
Test and Instrumentation Systems in Aerospace Applications	5	Optional
Unmanned Aerial Vehicles	5	Optional
THIRD SEMESTER		
Master's Thesis	30	Project