Politecnico di Torino

ACADEMIC REGULATIONS

Master's degree programme

in

AEROSPACE ENGINEERING

Department of Mechanical and Aerospace Engineering
Collegio di Ingegneria Meccanica, Aerospaziale e dell'Autoveicolo

Academic Year **2026/2027**

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Art. 1 – Specific learning objectives and career prospects

1.1 Specific learning objectives

The Master's degree programme in Aerospace Engineering aims to deepen and consolidate the specific characteristics of the professional profile already introduced in the corresponding Bachelor's degree programme.

To this end, the typical sector-specific disciplines, previously introduced in the Bachelor's programme, are now explored at a conceptual level that enables graduates to operate with independent judgment in the most advanced scientific and production sectors. These in-depth studies are delivered through a series of compulsory courses, complemented by elective courses organised into thematic tracks, allowing students to specialise in specific topics.

1.2 Career prospects

The Master's degree programme aims to train a variety of professional profiles. The career prospects and the main functions and competencies associated to each profile are illustrated below.

Professional profile	Main functions and competencies
Technical Manager	FUNCTIONS: The technical manager identifies and analyses customer requirements, developing solutions in terms of design; formalises the specifications of components and their interfaces, verifying compliance with solution criteria; ensures traceability of requirements within their disciplinary domain; provides active contributions within design teams thanks to specialised knowledge in different areas of aerospace engineering; formulates general guidelines for technical engineers working at subordinate levels (assisted design). After several years of experience, the technical manager may become a project group coordinator. COMPETENCIES: Sizing and calculation of systems integrating structural, aerodynamic, propulsion, and electro-thermo-mechanical subsystems. Knowledge of design techniques, materials, and technological processes used in the aeronautical and space industry. Ability to use the main scientific programming languages and computational codes commonly employed in the sector. POTENTIAL EMPLOYERS: • Technical departments of large aerospace companies operating at national and European levels; • Technical departments of small and medium-sized enterprises, often supplying the larger industries; • Military aviation and aerospace sectors of other armed forces; • Airlines; • Air traffic management organisations; • Public and private entities for aerospace experimentation; • Technical offices of companies also active outside the aerospace sector.
System Engineer for Product Integration	FUNCTIONS: Based on knowledge of the elements contributing to the aircraft system, the system engineer sets specifications for suppliers of the various components; initially participates in the management and then independently manages the interfaces and integration processes within large and complex programmes, including in the context of international collaborations. After several years of experience in product integration, the system engineer may become a process integrator and subsequently a system designer. COMPETENCIES: Broad understanding of aerospace products and industrial processes, extended to related disciplines (applied electronics or avionics, management, environmental impact, economics, etc.). Good command of English, and possibly other European languages, combined with communication skills in technical contexts and teamwork abilities, often developed through periods of international mobility during studies.

	POTENTIAL EMPLOYERS: • Large aerospace companies operating at national and European levels; • Agencies and companies responsible for aircraft maintenance; • Airlines; • Air traffic management organisations; • Military aviation and aerospace sectors of other armed forces; • Public and private entities for aerospace experimentation.
Aerodynamics Specialist	FUNCTIONS: The Aerodynamics Specialist calculates flow properties around complex configurations in subsonic and supersonic regimes and determines the resulting forces. They manage experimental tests and interpret the results. They engage in applied and advanced research to generate innovation in industrial entities, research centres, and universities, or pursue further studies within doctoral programmes. COMPETENCIES: Mathematical and computational skills, advanced knowledge of fluid dynamics, aerodynamics, gas dynamics, and related experimental techniques. Ability to analyse problems and formulate them mathematically. Ability to plan an experimental measurement campaign or critically use current computational codes. POTENTIAL EMPLOYERS: • Large aerospace companies operating at national and European levels; • Military aviation and aerospace sectors of other armed forces; • Public and private entities for aerospace experimentation; • Universities and fundamental and applied research centres, public and private.
Aerospace Structures and Construction Specialist	FUNCTIONS: The Aerospace Structures and Construction Specialist performs structural analysis on even complex configurations, determining stress states and deformations. They design mechanical components. They manage experimental tests for load, fatigue, and failure, interpreting results. They engage in applied and advanced research to generate innovation in industrial entities, research centres, and universities, or pursue further studies within doctoral programmes. COMPETENCIES: Mathematical and computational skills, advanced knowledge of structural mechanics and related experimental techniques. Ability to analyse problems and formulate them mathematically. Ability to plan an experimental measurement campaign or critically use current computational codes. POTENTIAL EMPLOYERS: • Large aerospace companies operating at national and European levels; • Military aviation and aerospace sectors of other armed forces; • Public and private entities for aerospace experimentation; • Universities and fundamental and applied research centres, public and private.
Aerospace Propulsion Specialist	FUNCTIONS: The Aerospace Propulsion Specialist participates in (and after some years coordinates) project teams for both aeronautical and space propulsion systems. They manage engine tests and interpret the results. They interact with aerospace industries to integrate propulsion systems into aircraft, launchers, or satellites. They engage in applied and advanced research to generate innovation in industrial entities, research centres, and universities, or pursue further studies within doctoral programmes. COMPETENCIES: Computational skills, advanced knowledge of thermodynamics applied to propulsion, control techniques (particularly for engines), and characteristic experimental techniques of the sector. Ability to analyse problems and formulate them mathematically. Ability to plan an experimental measurement campaign or critically use current computational codes. POTENTIAL EMPLOYERS: • Industries involved in propulsion and energy production; • Large aerospace companies operating at national and European levels; • Military aviation and aerospace sectors of other armed forces; • Public and private entities for aerospace experimentation; • Universities and fundamental and applied research centres, public and private.

Flight Mechanics and Onboard Systems Specialist	FUNCTIONS: The Flight Mechanics and Onboard Systems Specialist performs system-level design of onboard systems and upgrades existing aircraft through the integration of new systems or avionics. They use simulation methods in the design phases of new aircraft. They participate in planning and conducting flight tests, as well as monitoring and interpreting results. They engage in applied and advanced research to generate innovation in industrial entities, research centres, and universities, or pursue further studies within doctoral programmes. COMPETENCIES: Computational skills, mastery of system-level design methods for aerospace systems, advanced knowledge of rigid body dynamics, atmospheric and space flight simulation methods and virtual reality, control techniques (including aerospace-relevant robotic systems), and sector-specific experimental techniques. Developing design simulators (for single or integrated systems) and training simulators (for fixed- and rotary-wing aircraft) is a specific competence of this professional profile. Ability to plan a flight test campaign is also part of the profile. POTENTIAL EMPLOYERS: • Large aerospace companies operating at national and European levels; • Airlines; • Air traffic management organisations; • Military aviation and aerospace sectors of other armed forces; • Public and private entities for aerospace experimentation; • Universities and fundamental and applied research centres, public and private.
Astronautical Engineering Specialist	FUNCTIONS: The Astronautical Engineering Specialist participates in design teams for satellites, pressurised modules, and space transportation systems. They design subsystems and integrate them into larger systems. They contribute to the planning of space missions, managing interfaces within international projects. They design, develop, and manage the necessary "Ground Segments" for mission operations. They engage in management and control activities within national and international space agencies. COMPETENCIES: Mathematical and computational skills, knowledge of orbital dynamics, space structures, gas dynamics, and space systems. Good command of English, and possibly other European languages, combined with communication skills in technical contexts and teamwork abilities, often developed through periods of international mobility during studies. POTENTIAL EMPLOYERS: • Large space companies operating at national and European levels; • National and international space agencies; • Universities and fundamental and applied research centres, public and private.
Preparation for Continuing Studies	**Required Knowledge for Further Studies**
	Students intending to continue their studies must possess in-depth theoretical knowledge in mathematics, physics, fluid dynamics, and mechanics. They must also have adequate language skills and the ability to formulate problems in mathematical terms. Opportunities for Further Studies Third-level university courses, including doctoral programmes and second-level University Master's programmes. Required Attitudes • For Doctoral Programmes: Students must demonstrate a clear vocation for research, either theoretical (closer to academia) or applied (closer to industrial R&D). Analytical and synthetic skills, as well as strong communication abilities, are essential for doctoral studies. • For Second-level University Master's Programmes: In addition to the knowledge acquired during the Master's degree, students must show aptitude for engineering applications and a strong interest in innovation. A good command of English is fundamental, as most second-level Master's programmes in aerospace are conducted in English.

1.3 Professional profiles (ISTAT codes)

With reference to the list of professional profiles classified by ISTAT (Italian National Institute of Statistics, https://www.istat.it/en/), graduates from this Master's degree programme can work as:

ISTAT code	Description
2.2.1.1.3	Ingegneri aerospaziali e astronautici

Art. 2 – Admission requirements

Italian regulations on enrolment in Master's degree programmes require Italian universities to check that applicants meet the following requirements:

- have a **three-year Bachelor's degree or university diploma**, or **other educational qualification obtained outside Italy** and recognized as suitable for admission;
- meet specific curricular requirements;
- have an **academic performance considered suitable** for admission.

CURRICULAR REQUIREMENTS

As far as curricular requirements are concerned, applicants must have a Bachelor's degree or a three-year university diploma, or an educational qualification obtained outside Italy and recognized as suitable for admission. In addition, they must have gained specific knowledge and competencies during their previous academic path (credits in specific Scientific Disciplinary Fields).
In particular, applicants must have earned:

- minimum 40 credits earned in the following core Scientific Disciplinary Fields (settori scientifico-disciplinari): CHEM-06/A (CHIM/07), PHYS-01/A, PHYS-03/A, PHYS-04/A (FIS/01, FIS/03), IINF-05/A (ING-INF/05), MATH-02/A (MAT/02), MATH-02/B (MAT/03), MATH-03/A (MAT/05)
- minimum 60 credits earned in the following specific Scientific Disciplinary Fields (settori scientifico-disciplinari): IIND-01/C (ING-IND/03), IIND-01/D (ING-IND/04), IIND-01/E (ING-IND/05), IIND-01/F (ING-IND/06), IIND-01/G (ING-IND/07), IIND-02/A (ING-IND/13), IIND-03/B (ING-IND/15), IIET-01/A (ING-IND/31), of which at least 6 credits in each one of the following Fields: IIND-01/C (ING-IND/03), IIND-01/D (ING-IND/04), IIND-01/E (ING-IND/05), IIND-01/F (ING-IND/06), IIND-01/G (ING-IND/07).

The credits of the Scientific Disciplinary Fields found both in the first group and in the second group are primarily counted for the first group. The remaining credits are counted for the second group. Therefore, the credits of a course can be counted partly to reach the minimum number of credits of both groups.

Applicants who lack less than **10 credits** can be admitted to the programme by the Academic Advisor of the degree programme. For applicants who lack **more than 10 credits**, the evaluation will be subject to the final approval of the Coordinator or the Vice coordinator of the degree programme.

Applicants who do not meet the curricular requirements are required to make up for their unfulfilled curricular requirements (missing credits) before enrolment, by means of:

- **enrolment in single courses in order to make up for unfulfilled curricular requirements**: this is possible for students who need to earn up to a maximum of 60 credits. Students who enrol in single courses for this reason are allowed to include in their Personal Study Plan exclusively the courses assigned by the evaluator.
  or else,
- **credit transfer at Bachelor's level**: this is possible for students who need to earn more than 60 credits. In this case, students need to enrol in the Bachelor's degree programme that offers the credits in the specific Scientific Disciplinary Fields (core subjects and commentary subjects) required for admission to this Master's degree programme.

SUITABLE ACADEMIC PERFORMANCE

Applicants must have a suitable academic performance and an English language certificate (B2 level or above, as defined by the Common European Framework of Reference for Languages: Learning, Teaching, Assessment - CEFR).

The academic performance will be assessed as follows.

1) **Applicants from Politecnico di Torino**

Applicants can be admitted to the programme if they earned their Bachelor's degree in:

- 4 years or less (1) - no exam average grade required
- between 4 and 5 years (1) –exam weighted average grade required (2): ≥21/30
- more than 5 years– exam weighted average grade required (2): ≥ 24/30

The weighted average grade is calculated on all accrued course credits (graded on a scale of 30) counting towards the achievement of the Bachelor's degree, after having subtracted the worst 28 credits.

The duration of the Bachelor's path is calculated on the basis of the number of academic years in which the applicant has been enrolled at the university, starting from the first enrolment in the Italian university system:

- for full-time students: the duration of the Bachelor's path is equivalent to the number of academic years of enrolment.
- for part-time students: each year of enrolment is counted as half-year.
- for full-time students taking part in the "Dual Career" programme: each year of enrolment is counted as half-year, as for part-time students.

In the event of credit transfer, the duration of the Bachelor's path must be increased proportionally to the number of credits that have been recognized by Politecnico (10-60 CFU =1 year, etc.). The worst 28 credits must be subtracted proportionally to the number of validated credits.

(1) Applicants must have graduated by the end of the December Graduation Period
*(2) The weighted average is calculated as follows: ∑(grade*credits) / ∑credits*

2) Applicants from other Italian universities

Applicants who have a Bachelor's degree awarded by another Italian university must have a weighted average grade of all the exams ≥ 24/30, regardless of the number of years it took them to graduate. The weighted average grade (∑(grade*credits) / ∑credits) is calculated on all accrued course credits (graded on a scale of 30) counting towards the achievement of the Bachelor's degree, after having subtracted the worst 28 credits.

3) Applicants with a non-Italian educational qualification

To be admitted to Politecnico Master's degree programmes, applicants must have an academic qualification awarded by an accredited/recognized foreign university, earned after completing at least 15 years of total education (including primary school, secondary school and university).

Applicants who have attended a university programme lasting five or six academic years (different from the 3+2 system) without completing it must still meet the minimum requirement of 15 years of total education (of which at least 3 years at university level) and they must have earned at least 180 ECTS credits or equivalent. Pre-university courses or foundation years cannot be counted towards the minimum number of credits or the minimum numbers of years of total education mentioned above.

In addition to having an adequate academic background and certified knowledge of English (minimum B2 level), applicants who wish to enrol in an Italian-taught degree programme also have an Italian language certificate (minimum B2 level), as defined by the Common European Framework of Reference for Languages (CEFR), as an admission requirement.

The applicant's academic performance and the consistency between the degree programmes offered by Politecnico and the applicant's previous academic background are assessed by the professors designated by Coordinator of the Collegio. The evaluation is carried out on the Apply@polito platform under the section called "Applicants with a non-Italian qualification."

A positive evaluation (offer of admission) allows applicants to enrol in the programme only in the academic year in which the application has been submitted. Admitted applicants who do not complete the enrolment process within the deadlines are required to apply again to the programme in the next academic years.

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More information is available at https://www.polito.it/en/education/applying-studying-graduating/admissions-and-enrolment/master-s-degree-programmes

Art. 3 – Programme curriculum

3.1 Programme overview

The educational path is structured into several thematic blocks:

- Scientific and Methodological Fundamentals: Positioned in the first year, these courses primarily cover applied mathematics and numerical methods.
- General Aerospace Engineering: Includes the mandatory courses that provide the foundational knowledge common to all aerospace Master's students (advanced elements of flight mechanics, aerospace structures, aerospace systems and installations, aero-gas dynamics, and aerospace propulsion).
- Contextual Knowledge / Final Examination: Contextual knowledge can be acquired during the second block, especially in industrial or international settings, or by choosing elective courses drawn from the university's educational offer.

The other thematic blocks define the specialist tracks within aeronautical engineering:

- Aerospace Structures: Focused on the analysis, calculation, and experimental methods for aerospace structures.
- Propulsion Systems: Primarily oriented towards the thermomechanical and fluid-dynamic design of aircraft engines.
- Aeromechanics and Systems: Aims to provide an integrated understanding of aeronautical systems.
- Aerogas Dynamics: Focused on numerical analysis and prediction methods for flows, as well as specific phenomenological aspects.

Alternatively, an interdisciplinary track is available within astronautical engineering:

- Space: Designed to provide advanced foundational knowledge specific to this sector.

Within the Master's programme, there are also extensive opportunities for international mobility, lasting from six months to one and a half years. The Master's Degree in Aerospace Engineering offers a defined number of students, selected based on merit and according to institutional agreements with European partner universities, the possibility of obtaining, in addition to the Master's degree, a foreign or equivalent qualification.

3.2 Organization of educational activities

The list of courses (compulsory and optional), curricula, possible organization of courses into modules, any pre-requisites and exclusions and the list of the faculty members responsible for the courses are available at: https://didattica.polito.it/pls/portal30/sviluppo.offerta_formativa_2019.vis?p_coorte=2027&p_sdu=32&p_cds=478

The list of the Scientific Disciplinary Fields (Settori Scientifico Disciplinari) for each activity (specific subjects and complementary subjects) is available in Annex 1 to the present Regulations.

Art. 4 - Student career

The Student Guide is published on the Teaching Portal every year before the beginning of the academic year. There is a specific Student Guide for each Master's degree programme. The Student Guide is available on the web site of the degree programme.

It contains information and deadlines on:

- academic calendar;
- Personal Study Plan and Annual Personal Study Plan;
- free choice credits;
- internships;
- tuition fees;
- dual career;
- classes and exams;
- class delivery;
- foreign language learning;
- studying abroad/mobility programmes;
- exam rules;
- transfers in/out and internal transfers;
- interruption, suspension, withdrawal, forfeiture;
- credit transfer.

Art. 5 - Final Examination

The final examination represents an important educational milestone of the Master's Degree programme and consists of a thesis that must be developed originally by the student under the guidance of a Supervisor.

The student is required to independently conduct an in-depth study of a technical or design problem, critically examine the available documentation, and develop the problem, proposing appropriate engineering solutions. The work can be carried out at the University's departments and laboratories, at other Italian or foreign universities, at external research laboratories, or at companies and professional offices with which collaboration agreements have been established.

The presentation and discussion of the thesis take place before a dedicated examination committee. The student must demonstrate the ability to work independently, mastery of the subject matter, and aptitude for summarising and communicating the content effectively during the discussion. The thesis may optionally be written and presented in English. The estimated workload for completing the thesis is approximately 400 hours, corresponding to 16 ECTS credits.

The Master's thesis represents a training opportunity to complete the programme, involving an individual study of a design-oriented or experimental research nature.

Students must submit their thesis topic request online through a dedicated procedure available on their personal page of the Teaching portal, in the section entitled "Thesis," observing the deadlines for the relevant session as published in the Student Guide – Thematic Calendar Section.

The final examination consists of the submission of the written thesis and its public defence.

The Graduation Examination Committees responsible for final evaluations assess the student's entire academic career, considering their cultural maturity, ability to develop original ideas, and the quality of the thesis work.

The final grade is given by the Graduation Examining Committee which will take into account the overall average of the exams, the evaluation of the work carried out for the thesis (effort, autonomy, methodological rigor, significance of the results achieved, etc.), and the presentation of the thesis (clarity of exposition, etc.).
To the overall average of the exams MMM on a 110-point scale, the committee may add up to a maximum of 8 points, calculated according to the following formula:

$$\text{Additional points } X \leq 0.0909 \cdot M - 2.5 \quad \text{(rounded up)}$$

A degree with honours (cum laude) may be awarded upon achieving a final score of 110 (attainable with an average of 28.13/30 or higher), at the discretion of the examination committee: unanimously if the score is below 112 (i.e., for an average below 28.63/30), or by qualified majority—i.e., at least two-thirds of the committee members—if the score is equal to or above 112. If the thesis meets the required standards, the Committee may grant the *dignità di stampa* (printing honour) only if the final grade is 110 cum laude and the Committee's decision is unanimous.

More Information and Deadlines:

- Student Regulations
- Student Guide

Diploma Supplement:
In compliance with article 11, paragraph 8, of Ministerial Decrees No. 509/1999 and 270/2004. Politecnico di Torino issues the Diploma Supplement, a document that can attached to a higher education qualification. It is designed to improve the transparency of international qualifications, as it provides the description of the curriculum successfully completed by the student. This certificate follows the European model developed by the European Commission, the Council of Europe and UNESCO – CEPES: it is issued in two languages (Italian-English) and it is composed of approximately 10 pages.

More information at https://www.polito.it/en/education/applying-studying-graduating/academic-experience/certificates-and-other-documents

Art. 6 - References

6.1 Student Regulations

The Student Regulations define the rights and responsibilities of students and set out the administrative and disciplinary rules that all students enrolled in a degree programme or in a single learning activity at Politecnico must abide by.

6.2 Other Regulations

Particular aspects of students' academic progress are governed by specific Regulations or Calls for Applications published on its website.
In particular:

- The Tuition Fee Regulations specify the annual tuition fees that students must pay. The procedure for requesting a tuition fee reduction is explained in a dedicated guide.
- The University Regulations on Funds for Student Mobility Abroad outline the principles and rules for awarding and disbursing mobility grants. Standard procedures apply to all types of mobility programmes with unified Calls for Applications published twice a year at https://www.polito.it/en/education/applying-studying-graduating/studying-abroad
- The Code of Ethical Conduct also applies to students.

Annex 1 – Tabella delle Attività Formative

Attività	Ambito Disciplinare	Settore	SSD corrisp	cfu min	cfu max
Attività caratterizzanti	Ingegneria aerospaziale ed astronautica	IIND-01/C - Meccanica del volo	ING-IND/03	64	81
		IIND-01/D - Costruzioni e strutture aerospaziali	ING-IND/04		
		IIND-01/E - Impianti e sistemi aerospaziali	ING-IND/05		
		IIND-01/F - Fluidodinamica	ING-IND/06		
		IIND-01/G - Propulsione aerospaziale	ING-IND/07		
Attività affini	Attivita formative affini o integrative	IIND-01/D - Costruzioni e strutture aerospaziali	ING-IND/04	12	18
		IIND-01/F - Fluidodinamica	ING-IND/06		
		IIND-03/A - Progettazione meccanica e costruzione di macchine	ING-IND/14		
		MATH-05/A - Analisi numerica	MAT/08		
Altre attività	A scelta dello studente	-		8	12
	Per la prova finale	-		16	30
	Abilita informatiche e telematiche	-		-	-
	Altre conoscenze utili per l'inserimento nel mondo del lavoro	-		-	-
	Tirocini formativi e di orientamento	-		-	-
	Ulteriori conoscenze linguistiche	-		-	-
	Per stages e tirocini presso imprese, enti pubblici o privati, ordini professionali	-		-	-