PhD Scholarship

Research Title

AI-driven Thematic Mapping and Data Analysis for Aerospace Sector

Start Date

PhD program start date: Sept. 15, 2026.

Supervisors

Main supervisor: Prof. Erasmo Carrera (Full professor at Politecnico di Torino and Space It Up! President of board of directors).

Co-supervisors: to be defined.

Research Environment

The PhD programme in Aerospace Engineering is run by Politecnico di Torino (www.polito.it) and is based in Turin, in north-western Italy, near the Alps, in a region characterized by a strong industrial tradition and a well-established aerospace ecosystem. The research activities will be primarily carried out at Space It Up!, also located in Turin, where the PhD candidate will be based and will work in close interaction with industrial and research partners.

Space It Up! is a national research initiative funded by the *Italian Space Agency (ASI)* and the *Minister of University and Research (MUR)*, aimed at advancing innovation in the space sector through coordinated research activities involving universities, research centers, and industrial partners. The ongoing program covers a wide range of topics, including space exploration, robotics, Earth Observation (EO), and enabling technologies, with the shared goal of fostering collaboration between academia and industry.

Position Description and Research Plan

The PhD position focuses on developing AI-based tools for the analysis of large-scale textual data in the aerospace context. The research aims to design a structured and interpretable framework to extract and monitor thematic patterns across heterogeneous document collections.

The core idea is to build a procedure capable of identifying relevant topics, capturing their relationships, and tracking their evolution over time. The activity combines Natural Language Processing (NLP), unsupervised learning, and data analysis, with a strong emphasis on interpretability and reproducibility.

The research will be structured along three main directions. The first direction concerns data acquisition and integration. The candidate will collect and organize textual data from multiple sources, ensuring consistency, traceability, and proper handling of metadata. Particular attention will be given to data quality the construction of a reliable analytical corpus.

The second direction focuses on the development and comparison of AI-based methods for thematic analysis. Different families of approaches will be explored, including probabilistic models, matrix factorization techniques, and embedding-based representations. The objective is to understand how different approaches influence the identification and structure of topics.

The third direction addresses the analysis of temporal dynamics and relationships between themes. The candidate will investigate how topics evolve with the aim of identifying recurrent trends and patterns. This will be complemented by the integration of visualization tools to support the exploration and interpretation of results. A key component of the research is the definition of a robust evaluation framework. Quantitative metrics will be combined with qualitative validation, including expert-based assessment, to ensure that the extracted themes are meaningful and actionable.

The expected outcome of the PhD is the development of a reusable and scalable framework for thematic analysis, together with methodological contributions and application results in the aerospace domain. The project will lead to scientific publications, software tools, and structured datasets, contributing both to the advancement of AI-based methodologies and to their application in advanced aerospace domains.

Required Qualifications

We seek highly motivated and creative individuals interested in conducting scientific research in the aerospace domain, with a strong inclination toward data analysis. The candidate should be goal-oriented and capable of working both independently and collaboratively within an interdisciplinary research environment.

Suitable candidates must meet the following requirements:

- A recent MSc degree (or equivalent) in Aerospace Engineering, Mechanical Engineering, or a closely related engineering field.
- Good understanding of aerospace systems, technologies, and industrial contexts.
- Strong analytical skills and a solid understanding of mathematical methods for data analysis and modelling.
- Ability to work with data, including the collection, processing, and interpretation of complex datasets.
- Interest in data-driven approaches for the analysis of complex engineering systems.
- Good programming skills are appreciated but are not strictly required.
- English proficiency at B2 level or higher, with independent reading, writing, listening, and speaking skills.

Additional eligibility criteria and requirements for enrollment in the doctoral programme are detailed in the official call available at the following link: https://www.polito.it/sites/default/files/2026-03/Bando%20di%20concorso_Dottorato_42ciclo_ENG_DEFINITIVO_AGG_per%20sito_0.pdf

What We Offer

- A stimulating and collaborative research environment, with the ambition to produce high-impact scientific results and publications.
- The opportunity to work in close interaction with an industrial ecosystem through *Space It Up!*, gaining exposure to real-world challenges and applications in the aerospace sector.

- Direct collaboration with industrial and institutional stakeholders, enabling the development of research activities grounded in practical use cases and real data.
- Access to advanced computational resources and research infrastructure to support data analysis and modeling activities.
- Financial support for participation in international conferences, workshops and training schools.
- The salary will be based on the PhD scholarship at Politecnico di Torino.