

**PHD PROGRAM IN
MANAGEMENT ENGINEERING
CYCLE XLI**

Project description:

In alignment with the objectives set out by the Doctoral School (SCUDO), the PhD Program in Management Engineering (DRIG) aims to train research professionals with advanced scientific skills in the areas of management, economics, industrial systems engineering, production technologies, and energy management. These competencies are intended to be applicable in academic, industrial, and public administration contexts.

The interdisciplinary nature of the program allows PhD candidates to develop cross-cutting skills – ranging from mathematics and engineering sciences to economic and managerial aspects – which are essential for operating in an ever-evolving economic and social environment. One of the program’s distinctive features is the balance between hard and soft skills: in addition to the technical competencies necessary for analyzing, designing, and improving products, processes, and organizational structures, the program also promotes the development of transferable skills such as research project management, scientific and language communication, and the ability to transfer and adapt knowledge to real-world applications.

Given the interdisciplinary character of the program and the commitment to balancing hard and soft skills, the training plan includes both general and specialized learning objectives, tailored to the specific research area of each PhD candidate. The transversal learning objectives aim to develop key competencies for both academic and professional careers, with a focus on scientific writing, public speaking, leadership, stress and conflict management, effective time management, the application of advanced project management techniques, and research ethics. The specialized training is intended to provide in-depth knowledge of the PhD’s research themes across five defined areas, along with the most appropriate research methodologies for addressing them. Additionally, the program includes training on entrepreneurship and technology transfer, covering topics such as intellectual property management, product-market fit, proof of concept (PoC) development, venture capital, and scale-up strategies.

Research activities, conducted under the supervision of one or more academic advisors, are designed to build and enhance both managerial and technological competencies, while also supporting PhD candidates in their integration into the international scientific community. The Academic Board assigns each student a personalized training path based on their specific interests, while ensuring a common core that shapes their cultural journey and provides the necessary multidisciplinary to address the complexity of modern socio-technical systems.

The PhD program actively involves multiple stakeholders, who are essential in ensuring the quality, relevance, and impact of the doctoral training in both academic and socio-economic contexts. The structured engagement of stakeholders allows the program to evolve in line with the needs of the academic, industrial, and societal spheres, promoting the development of highly qualified profiles suited to contemporary challenges.

The training program comprises 180 credits, divided between research activities and coursework, with a minimum of 36 and a maximum of 60 credits dedicated to didactic activities, preferably to be completed within the first two years of the program, in accordance with SCUDO regulations ([link](#)).

In line with the transversal, specialized, and technology transfer training objectives, and in accordance with SCUDO regulations, the PhD program includes three levels of training:

- Methodological training on general aspects of conducting research and developing the doctoral thesis (3–12 credits)
- Specialist training on innovative topics of interest to the PhD program (30–36 credits)
- Training on entrepreneurship and technology transfer, delivered in collaboration with BINP (3–12 credits)

Credits within the PhD program may be earned through various types of educational activities, provided they are properly documented and aligned with the candidate's training plan. These activities include participation in advanced courses (also at specialization schools or summer schools), master's or single-cycle degree courses, as well as courses organized by the PhD program or external organizations, including international institutions. Credits may also be obtained through attendance at online courses (including MOOCs), participation in specialized seminars, workshops, and conferences, and through the presentation of research work. In all cases, evaluation of attendance, any final assessments, and the associated workload is essential for credit recognition. Documentation of the activities (e.g., certificates of attendance, signed statements from lecturers or tutors, exam records) must be collected and presented to the tutor, who validates the credits and forwards them to the Academic Board for final approval.

The program is also strongly oriented toward internationalization, thanks to established collaborations with universities, research centers, and companies both in Europe and beyond. These partnerships support the integration of PhD candidates into global research networks. As a general rule, candidates are required to spend at least 6 months studying at prestigious international universities or research centers, with the aim of enhancing their competencies and building international networks.

Objectives:

The growing challenges posed by the society of the future and the complex ongoing socio-economic transformations demand highly qualified professionals capable of understanding, designing, and managing economic, organizational, and production systems across various contexts. These professionals must employ innovative and integrated tools to grasp the interactions among technological, strategic, economic, environmental, and organizational dimensions.

The evolution of the economy and its transition toward resilient and sustainable consumption and production paradigms require multidisciplinary and cross-cutting skills that span engineering, economics, and management. Recognizing this, the PhD Program in Management Engineering (DRIG) offers advanced training aimed at developing professionals capable of conducting independent, cutting-edge, and industrially relevant research in areas such as management, economics, industrial engineering, production technologies, and energy management.

The program is designed to provide both quantitative methodological tools (e.g., surveys, simulations, econometric models, optimization techniques) and qualitative approaches (e.g., action research, case studies), best suited for analyzing and understanding the competitive, innovative, technological, and

transformational dynamics of modern industrial contexts—ranging from traditional sectors to high-tech industries—as well as public sector organizations.

The educational program offers a strong theoretical and methodological foundation, integrating a wide range of perspectives, theories, tools, and methodological approaches into a unified and coherent framework. The research areas are structured around five main fields: Management, Economics, Industrial Systems Engineering, Production Technologies, Energy Management.

The DRIG program trains professionals who can conceive and manage high-impact, innovative projects, contributing to the creation of sustainable value for the economic and social system. In this light, research activities are closely aligned with local development needs and the demands of digital and ecological transitions, with a broad, future-oriented, and international outlook.

Scientific research activities are supported by access to the research laboratories of the Department of Mechanical Engineering, Mathematics, and Management (a Department of Excellence for 2018–2022 and 2023–2027). However, PhD students are strongly encouraged to spend at least six months at internationally renowned universities or research centers. This opportunity is facilitated by the Academic Board's solid international collaborations, which not only promote doctoral student mobility but also enable faculty exchange and co-supervised thesis projects.

Special attention is also given to technology transfer, thanks to close ties with the industrial sector, ensuring professional opportunities for PhD graduates beyond academia. The PhD program actively collaborates with the Boosting Innovation in Poliba (BINP) incubator, ESA_Lab@PoliBa, and RIAPRO-lab.

It is important to note that the program is fully aligned with the University's Strategic Plan 2024–2026, particularly concerning the themes of innovation, engagement, and internationalization. The research themes stem from continuous and active interaction with key local and national stakeholders, as well as from industrial research collaborations between Academic Board members and national and international companies.

Expected Employment and Career Opportunities:

The PhD program trains professionals capable of carrying out advanced research activities applicable across various fields. In particular, the profile of a PhD graduate in Management Engineering is well-suited for research roles within universities—both national and international—as well as in Italian and foreign research institutions, focusing on typical topics in five key areas of management engineering: management, economics, industrial systems engineering, production technologies, and energy management.

Moreover, the program addresses the growing demand for highly qualified engineering profiles capable of managing the innovative and competitive dynamics of economic and production sectors, and effectively leading ongoing transformation processes. This includes the digital and energy transitions, and the pursuit of economic, environmental, and social sustainability, through advanced, integrated, and multidisciplinary approaches that recognize the interdependencies among technological, organizational, economic, and strategic dimensions. These priorities are emphasized in the University's Strategic Plan and confirmed by a stakeholder consultation survey on the Management Engineering PhD profile, conducted with members of the Stakeholder Advisory Table through a questionnaire.

The survey revealed a growing interest in multidisciplinary and cross-functional competencies across the fields of management, economics, and engineering, essential for meeting modern competitive challenges. There is a clear demand for highly specialized professionals with skills exceeding those of Master's graduates. Particularly valued are complex problem-solving abilities, analytical and systemic thinking, and soft skills, which are distinguishing features of the program's graduates.

The economic and managerial competencies developed during the PhD, combined with technological expertise, will also enable graduates to enter the workforce as high-profile managers and specialized professionals in various industrial, service, and public administration contexts, both traditional and innovative. Additionally, graduates will be well-prepared to pursue entrepreneurial careers.

The professional career paths for a PhD in Management Engineering include:

- Researchers at universities, research centers, and laboratories, both in Italy and abroad
- Highly qualified professionals employed by consulting firms, financial and banking institutions, training organizations, and public administrations at the national, regional, and local levels
- Managerial roles in national and international companies across multiple sectors
- Entrepreneurs in both traditional industries (e.g., agrifood, apparel, automation, mechanics, logistics, energy management) and innovative sectors (e.g., aerospace, biotechnology, renewable and alternative energy, environmental sustainability)

The strong employment outlook for PhD graduates in Management Engineering is confirmed by data from the 2024 ALMALAUREA report on the employment status of PhD holders. The report shows a 94.3% employment rate one year after graduation for PhDs in engineering—an increase from previous years. It also highlights that PhDs in engineering are more likely than others to secure permanent employment (32.8%), find jobs in both the public sector (54.3%) and the private sector (43.5%), and receive among the highest net monthly salaries (€1,944).

To ensure continuous alignment between the training program and the evolving needs of the labor market, the PhD program includes an Advisory Board composed of nationally and internationally recognized experts and professionals. This board supports the Academic Committee in defining the training and research plans for doctoral students, assessing their potential and impact.