POLITECNICO
MILANO 1863

Ph.D. School of the Politecnico di Milano
Regulation of the Ph.D. programme in:
Management Engineering

Cycle XXXIV

1. General Information

Ph.D. School - Politecnico di Milano

Ph.D. programme: MANAGEMENT ENGINEERING

Start of the programme: November 2018

Location of the PhD Programme: Milan Bovisa

Promoter Department: Department of Management, Economics and Industrial Engineering (DIG).

Scientific Disciplinary Sectors:

- ING-IND/17 - INDUSTRIAL MECHANICAL PLANTS
- ING-IND/35 - BUSINESS AND MANAGEMENT ENGINEERING

PhD School website: **http://www.polimi.it/phd**

Ph.D. programme website: **www.dig.polimi.it**

Areas: 09 - Industrial and Information Engineering

2. General Presentation

The Ph.D. programme in Management Engineering (DRIG) offers candidates advanced training and preparation to conduct research at the intersection of management, economics and industrial engineering fields. It aims to develop professionals who are able to carry out, in these fields, high-profile research in universities and international research institutions, manufacturing and service companies, regulatory authorities and other public bodies. The programme allows the candidate to develop a sound methodological background and multidisciplinary knowledge by attending courses designed to provide a multiplicity of visions, theories and approaches, a broad cultural panorama and the ability to study problems in an innovative manner, combining various analytical perspectives.
The commitment of the Department of Management, Economics and Industrial Engineering (DIG) to research and to cooperate with other academic institutions, or major industrial and service companies, creates an ideal environment for candidates to acquire leading-edge knowledge and cultivate their own research interests in a broad range of research subjects.

The PhD course is run by a Coordinator and a Faculty Board.
The Coordinator chairs the Faculty Board, coordinates the preparation of the annual Educational Programme and organises the general educational activities of the PhD course (see Attachment A1).
The Faculty Board is responsible for the Educational programme and for teaching and administrative activities related to the PhD course (see Attachment A2).

2.1 Research topics

Research topics within the Ph.D. Programme are aligned with the *Research Areas and Lines* of the Department; the former are described below in terms of the issues addressed, disciplinary research fields and methodologies used.

More focused, problem-driven and interdisciplinary *Research Lines* are identified as priorities in the research agenda of the Department (the updated list is reported on the DIG website). The PhD Programme echoes these priorities and a specific number of associated scholarships may be made available each year.

2.1.1 Management

The *Management* Research Area focuses on the study of management and innovation at companies, financial institutions and Public Administrations from a strategic and organisational point of view. Particular emphasis is placed on the study of the complex links and reciprocal influences between strategy, management and the use of technology, through analysis of business processes both internal and external to the company. At the same time, research in this area is strongly oriented towards understanding the change management processes required when introducing strategic, organisational or technological innovations. The final goal of the research is to develop both innovative theoretical models and practical tools and methodologies to be applied and tested in real cases. These topics are studied across industries and regions, often comparing best practices or emerging models in various countries. Research in this area is based on the integrated use of various methodologies, including case studies, action research, surveys, simulation and quantitative modelling.

The research in this area is organised in the following fields:

- **Sustainability Management:** organisation, human resources and laws pertaining to sustainability; performance measurement for sustainability; Corporate Social Responsibility; Sustainable Mobility; green marketing.
- **Complex Decision Making:** analysis and design of complex and uncertain systems; risk and performance management in control systems at large companies; social software in managing complex systems.
- **Strategic Management of Technology and Innovation:** strategic planning of technology-based projects; organisation for innovation; open innovation paradigm; management of product and service innovation; design driven innovation; innovation project management; open marketing.
- **Public Management**: new managerial methods, organisational forms and legal rules for Public Administration (in particular in the sectors of Educational Institutions and Research Centres, Healthcare, Justice); public policies for innovation and technology transfer; impact of e-government applications in the public administration.
- **Supply Chain and Purchasing Management:** purchasing strategy and organisation; customer-supplier relationships and network management; global supply chain management; sustainable supply chain.
- **ICT Driven Business Innovation:** strategic management of ICT; ICT governance and organisation; new digital business and entrepreneurship; ICT value measurement; digital and

social marketing and CRM; knowledge and competence management; Marketing & New media.

- **Energy Management:** strategy, organisation and legislation in renewable energy businesses; strategy and organisation in the energy efficiency business; energy management, sustainability and mobility; the management and business implications of distributed power generation systems.
- **Strategy and Organisational Innovation in Operations:** strategies and organisational paradigms in manufacturing companies and networks; organisational practices and manufacturing strategies; the role of operational strategy in the overall company strategy.
- **Corporate finance and financial markets and institutions:** asset allocation: drivers and efficiency; public-private initiatives for new technology-based firms; regional financial institutions; public infrastructure financing; Enterprise Risk Management; micro-finance initiatives.

2.1.2 Applied Economics

Researchers in the area of *Applied Economics* use economic theory and models to study issues arising in the industrial, international, financial, innovation and entrepreneurship domains. Investigations into these areas are conducted at multiple levels of analysis, including firms, industries, countries, individuals, public administrations and non-profit organisations.

- Researchers in this area take an approach to this subject in which: special attention is paid to the economic foundations of public policy decisions, company decisions and managerial processes.

- Theories and formal models are empirically based and are tested using multiple methodologies and research designs. Quantitative methods are used for the purposes of testing theories. Rigorous qualitative research is practiced in a theory building effort.

- The regulatory implications of the design and assessment of company strategies and public policies are considered.

The area encompasses the following research fields:

- **Internationalization of economic activities**: multinational enterprises; economic rationale for company internationalization processes (e.g. location choice, entry mode, governance) and their impact on company performance, industries and countries; international trade, international fragmentation of production and off-shoring of business services.
- **International competitiveness of national and local systems**: international competitiveness and exchange rates; mergers of MNEs and competitiveness of local systems (e.g. industrial districts).
- **Technical change and innovation**: economic rationale for company innovation processes and impacts on company performance; collaborative development of technological knowledge, open innovation and communities of users and developers; innovation policies.

- **Entrepreneurship and entrepreneurial finance**: theoretical and empirical research on the determinants of new company creation and development; start-up financing processes; public support measures.
- **Regulated industries**: regulation of electricity sectors; economics and policy of energy innovation; restructuring local government and public utilities; economics and policy of broadband networks.
- **Monetary policy**: monetary policy and macroeconomic stability; central banking; financial frictions and financial instability; global imbalances; financial intermediation and markets.
- **Econometrics**: time series analysis (non-stationary time series, co-integration, long memory, vector autoregressive models), financial econometrics (GARCH models, analysis of ultra-high frequency data), applied macroeconometrics (econometric analysis of monetary policy).
- **Pattern recognition and optimization**: predictive models in finance, economics and bio-life sciences; social media analytics and text mining; optimization models and algorithms; supply chain optimization; business intelligence.

2.1.3 Industrial Engineering

The *Industrial Engineering* Research Area examines the strategies, methodologies and techniques for planning, design, modelling, construction, operation, maintenance, processing and disposal of industrial plants, infrastructure and production systems of goods and services. Particular attention is paid to the aspects of innovation, competitiveness, value analysis, effectiveness, efficiency and sustainability through a systemic view of the corresponding technological, organisational, managerial and economic factors at the factory and company levels. The goal of the research is to develop new or improved solutions to apply in the design and/or management of production and service systems. Theoretical models, methodologies and ICT tools are developed, applied and tested in the laboratory or in real world applications. A close relationship with companies in the industrial and service sectors supports this research activity, which is conducted in collaboration with scientific and industrial partners both nationally and internationally. Various tools, including case studies, mathematical modelling, simulation techniques and laboratory activities are used to conduct this research.

The Research Area is divided into the following fields:

- **Analysis and design of systems for the production of goods and services,** including feasibility studies, operational availability analysis, environmental impact assessment, economic valuation and investment risks.
- **Project management,** including conceptual and strategic project configuration, time and cost management, project risk management and project procurement, particularly focusing on the unique challenges encountered with large and mega projects in the energy, oil & gas and infrastructure sectors.
- **Study of industrial processes,** including manufacturing technology, energy systems and general plant services, based on criteria of innovation, environmental sustainability and technical-economic optimization.
- **Technical Ergonomics and System Safety Engineering,** including Human Reliability Analysis, organisational and human factors analysis, vulnerability and interdependency analysis for critical infrastructure.

- **Operations management for production and services**, including lean management, quality management, safety and ergonomics in the workplace, energy and the environment, compliance management, risk management and customer service.
- **Life cycle management of products and production systems,** including management of processes and systems for product/process development, lean product development, integration with supply chain design, lifecycle cost/assessment techniques and end of life analysis.
- **Maintenance management of production systems and infrastructure**, including facility management and global service.
- **Design and management of logistics systems / supply chains of goods and services**, including traceability, purchasing, distribution networks, post-sales service and reverse logistics.
- **Modelling processes and production / logistics systems,** including service delivery processes and logistics / transportation networks.
- **ICT for manufacturing, operations and supply chain management,** including management and control logic, production / logistics information systems and Internet of Things applications.

3. Objectives

3.1 Full Time PhD Programme

The Full Time Ph.D. educational programme is a three-year programme comprising 180 credits, of which 35 are for main courses that provide basic training, 20 for elective training and 125 for the development of the Doctoral Thesis. The programme has three basic components.

Basic research training: this component includes: a) methodological courses related to key aspects of theoretical and applied research in Management, Economics and Industrial Engineering; b) elective courses exploring research issues in specific fields. All courses offered by DIG are in English and about half of them are taught by internationally renowned scholars.

Specific Research training: this second area can be arranged to suit the research interests of the candidates; on the one hand, it allows the candidates to strengthen their knowledge on specific topics of interest; on the other, it supports the candidates to establish themselves in the scientific community, by participating in conferences and presenting their scientific work in academic or professional contexts.

Development of the Doctoral Thesis: this is the primary requisite of the Ph.D. programme; it allows candidates to develop leading-edge research competencies and to produce an original scientific work on a topic that contributes to scientific debate and is of interest in the business world.

The Ph.D. programme includes a compulsory period of study abroad of at least one semester (six months in total). This period abroad is intended to foster the development of the candidates' international network of relationships, to facilitate their subsequent career path, and opens up further opportunities for high quality research and training (e.g. through Ph.D. courses, schools and workshops offered by the host institutions). A series of scientific cooperation agreements with renowned international academic institutions have allowed Ph.D. candidates to spend extended

periods abroad. Some examples include: CRIC (Centre for Research in Innovation and Competition) – University of Manchester, Harvard Business School, ETH Zurich, London Business School, MIT (Massachusetts Institute of Technology), SPRU – University of Sussex, University of Reading, Columbia, UCLA. In addition, Double Degree agreements are in place at the PhD level:

- EDIM (European Doctorate in Industrial Management, since 2011) is an Erasmus Mundus Joint Doctoral Programme run by KTH (Sweden, Co-ordinator), POLIMI (Italy) and UPM (Spain) and is funded by the European Commission (EACEA);
- Double Degree Programme with the Pontificia Universidad Católica de Valparaíso (Chile), Escuela de Ingeniería Industrial, Doctorado en Ingeniería Industrial (started in 2013);
- Double Degree Programme with the Copenhagen Business School (CBS, Denmark), PhD School in Economics and Management (started in 2018).

Close ties with industry and other economic players is a cornerstone of DRIG. This collaboration consists of participation in the candidate's research (sometimes comprising a formal period of internship) and involvement in the Advisory Committee of qualified representatives from companies and public institutions in order to:

- fine tune the DRIG training project by aligning it with the demand for researchers created by external bodies on an ongoing basis;
- identify the research issues that are deemed to be important by the scientific community and other stakeholders in order to provide useful insights into the development of Doctoral Theses;

3.2 Executive PhD Programme

The Executive Ph.D. programme aims to train professionals to be able to carry out high-quality research in the fields of management, economics and industrial engineering at universities, other research institutions, manufacturing and service companies, regulatory authorities and other public bodies. Target candidates are company employees holding a Master of Science degree in Italy or abroad and have a desire to develop strong applied research capabilities in the fields of economics, management and industrial engineering. Previous work experience is required.

The programme allows participants to work in a stimulating international context that will help them to develop methodological skills and specialised expertise in research and innovation, while their companies benefit from the application of the rigour of academic research to an innovative project that has a practical application and brings concrete benefits to the company.

The programme is specifically designed to complement and be compatible with each participant's professional life and consists of a four-year, part-time programme, during which participants receive an education geared towards applied research and innovation and develop a PhD Thesis on a topic that is relevant to their company, supervised by a member of the doctoral faculty.

The Executive Ph.D. programme admission process, curriculum, qualification criteria and PhD thesis characteristics are equivalent to the full-time programme, although the part-time nature and the Executive orientation enable a high level of flexibility and customization in structuring the study plan.

4. Professional opportunities and job market

The Ph.D. programme aims to train professionals who are able to carry out high-quality research in the fields of Management, Economics and Industrial Engineering at universities or other research institutions. Ph.D. graduates from DRIG are also well equipped with distinctive skills and advanced knowledge to pursue a professional career in manufacturing and service companies, regulatory authorities and other public bodies.

In this framework, the following opportunities are open to those completing the Ph.D. programme:

- Post doc, research fellows and young lecturers in Italian and foreign universities;
- researchers and scholars of management, economics or industrial engineering in the research departments of public and private organisations;
- highly qualified personnel in research and training institutions, with the role of providing a link between universities and the business world, or in technology transfer centres in Italy and abroad;
- professionals in leading management and strategic consulting firms able to provide deep and advanced insight in areas of activity relating to the company itself;
- high level professional roles in national (ministries, regulatory authorities, local public institutions) and international (EIB, IMF, World Bank, European Commission, European Central Bank) public institutions;
- managerial roles in multinational companies with a strong focus on innovation;
- entrepreneurs in contexts characterised by a high level of innovation.

Support actions for placement are provided with the purpose of sharing experiences, services and information through a number of initiatives fitting the different types of career opportunities. Amongst the actions, the “Placement programme for PhD candidates” is the programme offered by the Career Service, in cooperation with the PhD school of Politecnico di Milano. This programme is offered to all candidates to support them entering the job market. Other initiatives are directly supported by the Ph.D. programme in Management Engineering, to share experiences with invited speakers, to gather information on job fairs and funding initiatives, to build opportunities for networking and visibility, etc. Particular emphasis is given to career development in the Management Engineering area.

5. Enrolments

5.1 Admission Requirements

Italian and International citizens can apply. They are requested to have graduated in accordance with the pre-existing laws D.M. 3.11.1999 n. 509, or to have a Master of Science degree in accordance with D.M. 3.11.1999 n. 509, or a Master of Science in accordance with D.M. 22.10.2004 n. 270, or similar academic title obtained abroad, equivalent for duration and content to the Italian title, with an overall duration of university studies of at least five years.
The certified knowledge of the English language is a requirement for admission. Please refer to the PhD School website for details.
The admission to the programmes will be established according to the evaluation of the candidates'

curricula, motivation letters, and an illustrative report about the development of a possible PhD research, which candidates will send contextually with their application to the admission announcement.

5.2 Admission deadline and number of places available

The number of vacancies is indicated in the Call for admission to the 34th PhD cycle Programmes: http://www.polimi.it/phd
Scholarships both on general and on specific themes are available, in accordance with what is specified in the call for admission.

6. Contents

6.1 Requirements for the PhD title achievement

The achievement of the PhD title in Management Engineering requires a study and research activity of at least three years equivalent of full time study, research and development of PhD thesis.
The PhD in Management Engineering must earn a minimum of 35 course credits (see paragraph 6.3 below), and to continuously conduct studies and research.
At the beginning of the course, the Faculty Board assigns a tutor to each PhD candidate to supervise and assist him/her in the overall training programme. The tutor shall be a professor belonging to the Faculty Board. The tutors assist the candidates in the choice of courses to be included in the study plan, which is eventually submitted for approval to the Coordinator of the PhD Programme (see also section 6.4 below).
The Faculty Board may assign extra course credits to one or more candidates, in case they need to complete their preparation within specific topics, relevant for their research projects.

6.2 Research development

The main aim of all Politecnico di Milano PhD programmes is the development in the candidates of a research-oriented mind-set, with expertise and skills in a specific research topic. To this end, candidates develop a problem-solving capability in complex contexts, including the capacity of performing deep problem analysis, identifying original solutions, and evaluating their applicability in practical contexts.
These skills provide the PhD candidates with major opportunities of development in their research both in the academic field, and in public and private organisations.
PhD candidates are requested to develop an original research contribution. The PhD thesis must thus contribute to increase the knowledge in the candidate's research field. Besides, it has to be coherent with the research topics developed in the Department where the PhD Programme is carried out.
The original research results are collected in the PhD thesis, where the candidate's contribution is put in perspective with respect to the research state of the art in the specific research field.
The PhD research is developed under the guidance of a supervisor, who supports the candidate in the setting-out and in the everyday activities related to the thesis development. The supervisor is not necessarily a member of the Faculty Board, and may also belong to another institution. The supervisor can be supported by one or more co-supervisors.
Further activities intended to develop the candidate's personal skills and research expertise are encouraged during the PhD path.
Candidates must acquire the capability to present and discuss their work in their research

community. Consequently, both the participation to international conferences and the publication of the research results in peer-reviewed journals are encouraged.
The PhD programme favors the candidates' research interactions with other groups in their research field, preferably abroad. The Ph.D. programme includes a compulsory period of study abroad of at least six months in total (equivalent to one semester); through them, the candidates may acquire further skills to develop their research work and thesis.
The duration of the full time programme is normally three years. The duration of the Executive PhD programme is normally four years.

6.3 Objectives and overview of teaching activities
The PhD Programmes and the PhD School activate teaching forms of different kind and credit value, including courses, seminars, project workshops, laboratories. Teaching activities both cover the basic research issues (problems, theories, methods), which represent the founding element of the PhD Programme and clearly identify its cultural position, and deepening in a specialist way some research issues connected with the problems developed in the theses. Classes are all held in English. Certain teaching activities enable the candidate to acquire ECTS credits (Structured teaching activities); other activities, typically specialised activities for which it is difficult to assess and quantify learning, fall within the scope of scientific activities that will be taken into account by the Academic Board in the overall assessment, but whose value is not quantified in terms of ECTS.

The PhD School of Politecnico di Milano proposes a set of courses aiming to train the PhD candidates in soft and transferable skills. The skills and abilities provided by these courses are expected to help candidates across different areas of their careers in order to respond to the rapidly evolving needs of the global economy and society at large. The PhD School courses activated for the 2018-2019 Academic Year are summarized in the following table.

Course name	Professor
Ethics in Research	Andrea Aliverti
Advanced Interaction Skills for Academic Professional	Michela Arnaboldi
Scientific Communication in English	Paolo Biscari
Complementary doctoral skills	Paolo Biscari
Industrial Skills	Paolo Biscari
Empowering Imagination	Viola Schiaffonati – Simona Chiodo
Issue Mapping	Paolo Ciuccarelli
Resource Planning and Management with Sustainable Development	Emanuela Colombo
Technology and Society	Stefano Crabu
Design thinking	Alessandro Deserti
Professional Communication	Nicoletta Di Blas
Strategic Decision Making	Gianni Ferretti
Project Management Basics	Alfonso Fuggetta
Project Management PMI-CAPM Certification Preparation	Alfonso Fuggetta
Sustain Metrics, Life Cycl Assessment and Environmental Footprint	Monica Lavagna
Innovative Teaching Skills	Giulio Magli
Project Management (in Action)	Mauro Mancini

Ethical Aspetcs of Research on Dual-Use Products	Pierangelo Masarati
Sulla Responsabilità della Tecnica	Paolo Maria Ossi
Science, Technology, Society, and Wikipedia	Guido Raos
Research Skills	Donatella Sciuto
Scientific Models: Conceptual Foundations and Philosophical Issue	Giovanni Valente
The process of research	Paolo Volontè
La diffusione della Ricerca	Anna Maria Paganoni
The ageing society: a challenge for technological and social innovation	Ranci Costanzo Stefania Sabatinelli

At least 10 of the 35 course credits that each candidate is required to earn shall be obtained through soft and transferable skills courses organized by the PhD School.

The teaching structure for the Ph.D. Programme in Management Engineering is divided into three types of activities:

- basic research training;
- specific research training;
- development of the Ph.D. Thesis.

Basic research training is achieved by attending methodological and thematic Ph.D. courses offered directly through the Ph.D. programme, by the Ph.D. School or by other institutions and universities. Most of the basic research training takes place during the first year of the programme although it may possibly extend into the second year.
Specific research training is mainly acquired by attending Residential Courses, Workshops and International Scientific Conferences. This activity generally takes place during the second and third years of the programme.
The development of the Ph.D. thesis is an ongoing activity throughout the three-year programme, which includes a compulsory period of study abroad for a total duration of not less than 6 months. At the end of the first year, the candidate submits his/her research project to the Academic Board for approval and admission to the following year.
The table presented below outlines the programme for candidates with respect to training activities. In parallel, the candidate is expected to engage in ongoing research under the guidance of a supervisor and the Faculty Board. Training activities for Executive Ph.D. candidates are similar to those of full time Ph.D. candidates; however, specific courses and laboratories might be offered exclusively to Executive Ph.D. candidates.

First/Second year *(proposal structure to be tailored)*

Courses	*Possible details or reference to following tables*	***Number of credits (min-max)***	***Notes***
PhD School Courses	*See table B*	*10*	

Courses characterising the Ph.D. Programme	*See table A*	*25-35*	
Other Ph.D. courses	Elective Ph.D. courses at the discretion of the Supervisor and Tutor	0-10	

Third year
In the third year, the candidate is expected to be focused on research and on the development of the thesis. Executive Ph.D. candidates have one additional year (fourth) to complete their research and finalise the thesis.

PhD Course List

A) The Ph.D. programme in Management Engineering organises **Characterising Ph.D. level courses listed in** Table A.
For admission to the final examination, the candidate must earn at least **35** credits from **"**characterising" Ph.D. courses offered through the Ph.D. programme, of which at least **20** must be for methodological type courses.
To proceed to the second year, the candidate must have obtained at least **10** credits from **"**characterising" Ph.D. courses offered through the Ph.D. programme, and to proceed to the third year at least **20** credits are required.

B) The PhD School organises every year general and Interdoctoral courses. The acquisition of **at least 10 credits** is **mandatory** among the courses of B type. The list of PhD courses organized by the PhD School is available at the website http://www.dottorato.polimi.it/en/during-your-phd/phd-school-courses

C) Other Ph.D. courses. Depending on specific research needs and/or to round out the educational background of the candidate, the supervisor and the tutor may identify a maximum of **10** credits to be obtained for such purpose. This requirement may be met by taking Ph.D. courses offered through the Programme (Table A), the School (Table B) or other institutions, depending on the opportunities and research needs.

PREPARATORY COURSES (only if foreseen)
If the supervisor and the tutor find it useful or necessary that the candidate attends preparatory courses (chosen among the activated courses at the Politecnico di Milano) the Faculty Board of the PhD programme may assign some extra-credits to be acquired to complete the training path. The credits acquired in this way will be considered as additional, in relation to the mandatory credits to be acquired with the PhD courses.

SPECIALIST COURSES, LONG-TRAINING SEMINARS
Attendance at Specialist Courses, Laboratories, Workshops, Schools and Seminar Cycles is strongly encouraged and can be a way for the candidate to earn credits in the manner prescribed by the Academic Board and following approval of a study plan submitted by the candidate.
In particular, Management Engineering Ph.D. programme candidates are strongly encouraged to attend one of the following Schools:

- AiIG Management Engineering School (http://www.ingegneriagestionale.it/scuole/scuola-estiva-aiig/);
- "Francesco Turco" Summer School in Industrial Engineering (http://www.aidi-impianti-industriali.it/summer-school).

The scheduled course planning for the academic year 2018-2019 follows. Other courses may be activated during the year. In the case, the candidates will be promptly informed, and will be allowed to insert these new courses in the their study plan.

Table A: PH.D. COURSES CHARACTERISING THE PH.D. PROGRAMME

Name of the Course	Professor	A.A.	Language	Credits
Academic Publishing	Alessandro Brun	2018-19	English	5
Advanced topics in Econometrics	Rocco Mosconi	2018-19	English	5
Case study and content analysis methodologies	Michela Arnaboldi	2018-19	English	5
Innovation Management and Economics	Roberto Verganti	2018-19	English	5
Literature review in Social Sciences and Engineering	Emanuele Lettieri	2018-19	English	5
Modelling and analysis of complex systems	Marco Macchi	2018-19	English	5
Research Challenges in Global Value Chain	Federico Caniato	2018-19	English	5
Survey and Experimental research methodologies	Raffaella Cagliano	2018-19	English	5

Table B SUGGESTED CROSS – SECTORAL COURSES

The complete and updated catalogue of the courses offered by the PhD School is accessible at http://www.dottorato.polimi.it/en/during-your-phd/phd-school-courses/.

6.4 Presentation of the study plan

PhD candidates must submit a study plan, which may be revised periodically (approximately every three months), in order to adequate them to possible changes in the course list, or to needs motivated by the development of their PhD career. The study plans must be approved by the PhD programme Coordinator, according to the modalities established by the Faculty Board of the PhD Programme itself.

6.5 Yearly evaluations

Candidates present their work to the Faculty Board at least once a year. In particular, the candidates must pass an annual evaluation in order to be admitted to the following PhD year.
The third year evaluation establishes the candidate's admission to the final PhD defense. As a results of each successful annual evaluation, the candidates receive an evaluation (A/B/C/D). Candidates who do not pass the exam will be qualified as “Repeating candidate”(Er) or “not able to carry on with the PhD (Ei)”.
After the final year, candidates who have achieved sufficient results but need more time to draw up their theses, may obtain a prorogation of up to 12 months.

6.6 PhD thesis preparation

The main objective of the PhD career is the development of an original research contribute. The PhD thesis is expected to contribute to the advance of the knowledge in the candidate's research field.
The PhD study and research work is carried out, full time, during the three years of the PhD course. Stages or study periods in (Italian or International) companies or external Institutions may complete the candidate's preparation.
The resulting theses need to be coherent with the research issues developed in the Department where the PhD programme is developed.
The candidate must present an original thesis, discuss its contribution to the state of the art in the research field in the research community.
The PhD research is developed following the lead of a supervisor, who supports the candidate in the setting out and in the everyday activities regarding the thesis development.
At the conclusion of the PhD studies, the Faculty Board evaluates the candidates. Candidates who receive a positive evaluation submit their theses to two external reviewers for refereeing. If the evaluation provided by the reviewers is positive (o after the revisions required by the external reviewers), the candidates defend their thesis in a final exam, in front of a Committee composed of three members (at least two of which must be external experts).

7. Laboratories, Ph.D. Secretary Services

LABORATORIES FOR EXPERIMENTAL WORK:

The Management Engineering laboratory can be used by candidates to:
- carry out simulations of production and logistics systems,
- learn and use production planning systems, supply chain management systems and ERP systems,
- use optimisation and data analysis tools,
- use hardware and software to support field investigations.

Departmental Secretary for the Ph.D. programme:

Name and Surname: **Giuseppa Di Tavi**
Department: **Management, Economics and Industrial Engineering**
Telephone: +39 **022399 2774**
Fax: +**39 02 2399 2730**
e-mail: giuseppa.ditavi@polimi.it

Department Manager for the Ph.D. programme:

Name and Surname: **Laura Catellani**
Department: **Management, Economics and Industrial Engineering**
Telephone: **02 2399 2702**
Fax: +39 02 2399 2730
e-mail: laura.catellani@polimi.it

8. Internationalisation and inter-sectoriality

Carrying out study and research activities at external laboratories is strongly recommended.
Politecnico di Milano supports joint PhD paths with International Institutions, as well as Joint and Double PhD programmes. Further information is available on the PhD School website and on the PhD programme website.
Some agreements with international institutions are currently active for the PhD programme in Management Engineering, as summarised in the table below.

Table C: LIST OF ACTIVE INTERNATIONAL AGREEMENTS

University	Country	Department/ School	Type of Agreement	Credits transfer
ROYAL INSTITUTE OF TECHNOLOGY - KTH	Sweden	Industrial Economics and Management	Double Degree	YES
PONTIFICIA UNIVERSIDAD CATOLICA DE	Chile	Escuela de Ingeniería Industrial	Double Degree	YES

University	Country	Department/ School	Type of Agreement	Credits transfer
VALPARAISO (PUCV)				
UNIVERSIDAD POLITECNICA DE MADRID (UPM)	Spain	Escuela Tecnica Superior de Ingenieros Industriales	Double Degree	YES
WINDESHEIM UNIVERSITY OF APPLIED SCIENCES	The Netherlands	Strategic Entrepreneurship Research Centre	Co-financing of thematic scholarships	NO
CBS – COPENAGHEN BUSINESS SCHOOL	Denmark	PhD School in Economics and Management	Double Degree	NO

Interaction with and exposure to non-academic sectors provides significant benefits to doctoral candidates as well as to research and innovation intensive employment sectors. Direct exposure to the challenges and opportunities in non-academic sectors of the economy and society at large is fostered by networking, connectivity, inter-sectoral mobility and wide access to knowledge. In particular, the PhD programme in Management Engineering collaborates with the following Research Agencies and/or Industrial partners.

Table D: LIST OF COLLABORATIONS WITH AGENCIES AND COMPANIES AT PhD LEVEL

Name	Public/ Private	Type of Collaboration	Country
IBM ITALIA S.P.A.	PRIVATO	PhD Research project and scholarship	Italy
FUTURE CONCEPT LAB S.R.L.	PRIVATO	PhD Research project and scholarship	Italy
ASTRAZENECA S.P.A.	PRIVATO	PhD Research project and scholarship	Italy/Sweden
TURCAS PETROL A.S.	PUBBLICO	PhD Research project and scholarship	Italy/Turkey

Name	Public/ Private	Type of Collaboration	Country
AUSTRALIAN POSTAL CORPORATION	PRIVATO	PhD Research project and scholarship	Italy/Australia
FONDAZIONE BRESCIA MUSEI	PRIVATO	PhD Research project and scholarship	Italy

Attachment A1 – PhD Programme Coordinator

Short CV of Programme Coordinator

Paolo Trucco is Full Professor of Industrial Risk Management at Politecnico Di Milano, Department of Management, Economics and Industrial Engineering where he is also Director of the PhD in Management Engineering. He is the local co-ordinator and member of the Scientific Committee of EDIM (European Doctorate in Industrial Management; www.edim-phd.eu).

Paolo was educated at Politecnico di Milano, where he completed a Laurea degree programme (5 years) in Industrial Engineering with distinction, and University of Florence, where he received a DPhil in Engineering Science (Doctoral Programme in Quality Engineering).

Paolo's ongoing research mainly focuses on:

- Risk Management and Resilience of complex socio-technical systems, with applications in the energy, transportation, and healthcare sectors;
- Supply Chain Risk Management, with a particular emphasis on modelling and quantitative studies, and Smart Resilient Supply Chains, investigating digital transformation trends in relation to SC vulnerabilities and resilience capacities;
- OHS Performance Management.

Minor or research streams are related to:

- Operations management in ETO and EPC businesses, with a focus on procurement and supply management, modularisation in the plant life cycle, and project & portfolio management;
- Industrial Eco-efficiency: energy and resource efficiency, Product Recovery Network planning and management, and product-system life cycle management.

He is author of more than 240 scientific publications and in the last four years he has been involved, as scientific coordinator or principal investigator, in five research projects, at national and European level, on Critical Infrastructure Protection and Operational Resilience.
He is member of ESRA (the European Safety and Reliability Association), and founder member of CIRINT.NET (the Critical Infrastructure Resilience International Network) and of the Italian Chapter of TIEMS (The International Emergency Management Society).
Paolo is scientific advisor of DG Home Affairs (European Commission) and of the Lombardy Region Government (Italy) for the promotion and development of Regional Programmes on Critical Infrastructure Resilience.

Attachment A2 – Ph.D. Faculty Board - Collegio dei Docenti

Description of the composition of the Faculty Board

Name	**Affiliation**	**Scientific Disciplinary Sector**
Trucco Paolo (Coordinator)	Politecnico di Milano	ING-IND/17
Arena Marika	Politecnico di Milano	ING-IND/35
Arnaboldi Michela	Politecnico di Milano	ING-IND/35
Cagliano Raffaella	Politecnico di Milano	ING-IND/35
Caniato Federico	Politecnico di Milano	ING-IND/35
Chiesa Vittorio	Politecnico di Milano	ING-IND/35
Cigolini Roberto	Politecnico di Milano	ING-IND/17
Colombo Massimo Gaetano	Politecnico di Milano	ING-IND/35
Franzoni Chiara	Politecnico di Milano	ING-IND/35
Frattini Federico	Politecnico di Milano	ING-IND/35
Grilli Luca	Politecnico di Milano	ING-IND/35
Lettieri Emanuele	Politecnico di Milano	ING-IND/35
Macchi Marco	Politecnico di Milano	ING-IND/17
Melacini Marco	Politecnico di Milano	ING-IND/17
Micheli Guido	Politecnico di Milano	ING-IND/17
Piscitello Lucia	Politecnico di Milano	ING-IND/35
Piva Evila	Politecnico di Milano	ING-IND/35
Rossi Cristina	Politecnico di Milano	ING-IND/35
Taisch Marco	Politecnico di Milano	ING-IND/17
Tajoli Lucia	Politecnico di Milano	SECS-PO2

Attachment A3 – Ph.D. Advisory Board

Description of the composition of the Advisory Board

Name	**Affiliation**
Punam Sahgal	VP/HR, National Institute for Smart Government, Indian Institute of Management, Lucknow
Wayne W. Huang	Dean School of Management Xi'an Jiaotong University, China
Maryam Alavi	Dean Scheller College of Business, Georgia Institute of Technology)
Valerie Suslow	Associate Dean at Johns Hopkins, Baltimora
Joahn Roos	Chief Academic Officer, Hult International Business School, UK
Mats Engwall	Head of Division of Industrial Management, KTH Royal Institute of Technology
Georg von Krogh	Head of the Department of Management at ETH - Zurich
Reinhilde Veugelers	Professor of Managerial Economics, Strategy and Innovation, University of Leuven
Martin Schader	Associate Director of Quality Services, EFMD, Germany
Carlo Purassanta	ECO Microsoft Italia
Aldo Fumagalli Romario	President and CEO of SOL s.p.a.
Andrea Pignataro	Founder & CEO, ION Trading
Giuseppe Falco	CEO of BCG Italia
Laura Frigenti	Direttore Agenzia Italiana per la Cooperazione allo Sviluppo
Melissa Peretti	CEO American Express Italia
Elena Zambon	President Zambon
Matt Symonds	QS