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Ph.D. School - Politecnico di Milano

Regulations of the Ph.D. programme in:

Ingegneria dell'Informazione / Information Technology (IT Ph.D.)

Cycle XLII

1. General Information

Ph.D. School - Politecnico di Milano

Ph.D. programme: Information Technology

Course start: September 2026

Location of the Ph.D. programme: Milano Leonardo

Promoter Department: Electronics, Information and Bioengineering [Elettronica, Informazione e Bioingegneria (DEIB)]

Scientific Disciplinary Sectors:

□ IINF-01/A: Electronics

□ IINF-02/A: Electromagnetic fields

□ IINF-03/A: Telecommunications

□ IINF-04/A: Systems and control engineering

□ IINF-05/A: Information processing systems

Ph.D. School website: **http://www.polimi.it/phd**

Ph.D. programme website: **http://phd-inf.polimi.it/**

Areas:

1) Computer Science and Engineering (IINF-05/A: Information processing systems)
2) Electronics (IINF-01/A: Electronics)
3) Systems and Control (IINF-04/A: Systems and control engineering)
4) Telecommunications (IINF-03/A: Telecommunications - IINF-02/A: Electromagnetic fields)

2. General presentation

The Ph.D. programme in Information Technology is organized at the Department of Electronics, Information and Bioengineering (DEIB) and provides the Ph.D. School of the Politecnico di Milano with a significantly large programme, that encompasses all research areas in Computer Science and Engineering, Electronics, Systems and Control, and Telecommunications, and amounts to about 20% of the total number of Ph.D. students in the School.

These research fields are of great scientific and technical interest to both industry and governmental organizations, as well as to society in general. They are crucial to foster the technological development and digital transformation of our economy and society, as also recognized by the EU research funding policies. This doctorate opens up interesting possibilities of extended study and participation in state-of-the-art research in Information Technology (IT). The many scientific collaborations of DEIB with renowned research institutes in Europe, the United States, and worldwide, facilitate access to the world of international research through meetings with scientists and visits to laboratories abroad. The intense industrial collaboration of DEIB in applied research allows the doctoral student to become acquainted with the activities of technologically advanced companies, thus acquiring the elements needed to support a career choice in industrial research as well as at university.

DEIB's scientific IT activities are organized along many research lines, organized in four areas: Computer Science and Engineering, Electronics, Systems and Control, and Telecommunications.

Computer Science and Engineering aims at the development of computing methods and at their application to innovative products and services in many fields. The research activity focuses on the following research areas: artificial intelligence, machine learning, data analysis, robotics, information systems, database management, bio-informatics, security and reliability, information design for the web, methods and applications for interactive multimedia, computer vision, advanced software architectures and methodologies, embedded systems design, computer architectures, dependable systems, and computer performance.

The research activities in the **Electronics** area focus on new developments of innovative devices, circuits and systems which are pervasive in our life as well as in all scientific and industrial applications. Just to name a few: nanoelectronics, sensors and diagnostic technologies, genetics and biomedicine, diagnostics of cultural heritage, astrophysics. This research area is naturally dynamic and evolving, continuously driven by prospects and new initiatives in national and international application environments.

The research activity in **Systems and Control** covers various research areas related to control systems science, robotics and industrial automation, nonlinear and networked systems, ecosystems and environmental modelling, and operations research. Specific research topics are: predictive, distributed, and robust estimation and control, model identification and data analysis, data-driven modeling and decision making, automation of automotive, transportation, energy, and manufacturing systems, collaborative and mobile robotics, modeling and control of biological, social, and economic systems, ecology, natural resources management, and climate change, discrete and nonlinear optimization models and algorithms.

Given the interdisciplinary nature of the world of **Telecommunications**, many different topics are covered also in this area of research. Among these are telecommunication and computer networks, radio and optical communications, digital signal processing, electromagnetism, remote sensing, audio and video analysis and production.

The four curricula supported by the aforementioned areas correspond to a traditional partition of IT, but their presence in the same Ph.D. programme facilitates and encourages interdisciplinary research projects as well. Interdisciplinarity is also exploited through the collaboration with other Ph.D. programmes, as it is intrinsic to the pervasive nature of IT. IT is driving a profound transformation in industrial structures, leading to mergers and strategic alliances among companies in electronics, computing, and telecommunications sectors. This convergence reflects how digital technologies are dissolving traditional industry boundaries and fostering integrated ecosystems. Interesting opportunities are also available in public administration and personal entrepreneurship.

The Ph.D. course is managed by a Coordinator and a Faculty Board. The Coordinator chairs the Faculty Board, coordinates the preparation of the annual educational program and organizes the general educational activities of the Ph.D. course (see Attachment A1). The Faculty Board is responsible for the educational program and for the teaching and administrative activities related to the Ph.D. course (see Attachment A2).

3. Objectives

The Ph.D. programme in IT enrolls more than 100 students per year, mostly supported by scholarships

from public institutions and private companies. After admission, each Ph.D. student chooses a research advisor and a professor of the Faculty Board as a tutor. Study activities consist of courses and individually guided study.

Advanced courses (in English), reserved for doctoral students and senior graduate students, bring attendees to the frontiers of knowledge in the sectors where DEIB's research is most active. Specific courses on relevant subjects are also organized by various national and international schools regularly accessed by our Ph.D. students. Participation in both local and external courses provides the essential knowledge required to tackle research problems with the highest level of rigor and competitiveness. Ph.D. students also attend courses to develop transferable skills, offered by the Ph.D. School of the Politecnico di Milano.

One of the distinctive skills developed during the doctoral programme is the ability to transfer knowledge effectively, adapting it to different contexts, audiences, and communication occasions. This skill enables Ph.D. graduates to work effectively in teams and disseminate their research results both within their specific community and to broader, more diverse audiences.

The Ph.D. programme aims to help candidates communicate technically, both orally and in writing, in a way that can be tailored to academic or non-academic recipients. This goal is supported by courses offered by the Ph.D. School, including Technical Communication classes. Additionally, candidates participate in activities that promote experiential learning ("learning by doing").

More specifically, each candidate, within their PhD path, must experiment with each of the three modes of technical-scientific communication described below:

1. Oral presentation to experts in the field and topic, aimed at developing the ability to communicate advanced content within a limited timeframe, highlighting key aspects of the research/project and justifying methodological choices in front of an audience with high evaluative capacity. This skill, aimed at sharing projects among colleagues, is achieved by participating in at least one conference/ workshop where the research results are presented.
2. Oral presentation to stakeholders with expertise in the field but not the specific topic, in order to transfer content with an appropriate level of detail in unlimited time frames. This skill is aimed at the ability to transfer research/project content to non-expert collaborators and is achieved through training experiences with specific goals and typical timelines of both academic and corporate training.
3. Written communication aimed at a community of experts. This skill is focused on developing the ability to organize the content of a document, shorter than a book or thesis but still broad in scope, with an appropriate level of technical-scientific detail. This communication mode, typical of internal reports or technical notes, is experienced through the creation of at least one written piece addressed to a relevant scientific community. This could include, for example, a scientific article or a contribution to conference proceedings.

Each candidate is therefore required to participate as a speaker in at least one international conference or workshop, to complete at least one training activity, and to publish at least one scientific or technical contribution aimed at an expert community. Any exceptions must be justified and authorized by the Faculty Board.

All research is performed under the guidance of a scientific supervisor, or advisor. Throughout the three-year period, the student has several opportunities to publicly present his/her studies and research results to DEIB professors and colleagues, as well as to international audiences, *e.g.*, at international scientific conferences or at school and project meetings. In doing this, the Ph.D. candidates will

leverage the soft skills acquired from the Ph.D. School courses, developing public speaking skills as well as improving their ability in oral and written communication.

The Ph.D. programme is held within a large international framework that includes also joint programmes established with foreign institutions, aimed at training young researchers and Ph.D. students.

4. Professional opportunities and job market

The Ph.D. degree in Information Technology gives access to the highest levels of scientific research in the ICT and related areas. Depending on their interests, their personal inclinations, and circumstances, students who have achieved the Ph.D. degree may head for a career either in academia or in companies and research institutions, both in Italy and abroad.

Each year, Politecnico di Milano and neighboring universities award post-doctorate positions oriented towards research and teaching. As a result of the experience gained with their Ph.D. studies in seminary courses, conferences, and other educational activities, the research graduate is also qualified to undertake teaching activities.

The Ph.D. graduate acquires significant experience in communicating and working in English and gets familiarized with the global academic environment through research visits and periods abroad. These experiences equip the Ph.D. graduate for positions at leading universities, research institutions, and innovative companies worldwide.

As evidence of the interest shown by the industrial sector for this Ph.D. course, many scholarships for graduate students at DEIB are funded by major companies, to promote research in their respective fields of interest. More than half of Ph.D. graduates in IT secure positions in industry, while approximately 44% pursue careers in academia and research institutions.

Graduates aiming for a research career in industry should consider that the globalization of the economy has led to industrial research centers often established in other countries and organized into intercontinental research structures that impose great mobility on the researchers themselves.

Openings are also available in sectors that are not tied to industry, but to services (*e.g.*, transport planning, natural and human resource management, web services), in important engineering firms, in technical services of government and EU bodies, and in international institutions.

Finally, the skills and results developed in Ph.D. activities may lead, as it happened in the past for about 6% of graduates, to the founding of innovative and creative companies, where it is possible to combine personal interests and entrepreneurial attitudes.

5. Enrollment

5.1 Admission requirements

Both Italian and international citizens may apply. They are requested to have graduated in accordance with the pre-existing laws, Ministerial Decree (D.M.) No. 509 of 03/11/1999, or to hold a Master of Science degree in accordance with D.M. No. 509 of 03/11/1999, or a Master of Science in accordance with D.M. No. 270 of 22/10/2004, or a similar academic title obtained abroad, equivalent for duration and content to the Italian title, having an overall duration of university studies of at least five years.

The certified knowledge of English is a requirement for admission. Please refer to the Ph.D. School

website for details.

The admission to the programme is granted upon evaluation of the candidate's curriculum, motivation letters, and proposal for a possible Ph.D. research, which candidates will submit together with their application to the admission announcement.

5.2 Admission deadlines and number of vacancies

The number of positions is reported in the Call for admission to the 42nd Ph.D. cycle programme, available at https://www.polimi.it/en/phd. Various calls are issued throughout the year, the first call being issued in April 2026, for Ph.D. students starting in September 2026, followed by additional calls. Check regularly https://www.polimi.it/en/phd/prospective-phd-candidates and https://phd-inf.polimi.it/admission/open-calls/ for precise deadlines and call announcements.

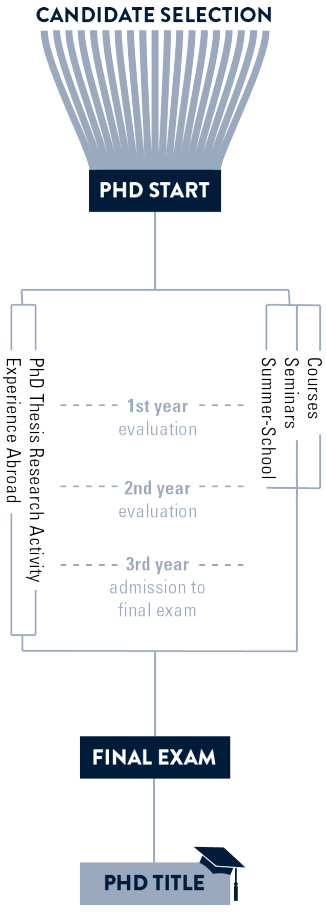
Scholarships on both general and specific topics may be available, as specified in the call for admission. Scholarships may be granted by the Ministry of University and Research or other national agencies and institutions, by Politecnico di Milano, by companies, or by the Dipartimento di Elettronica, Informazione e Bioingegneria.

6. Contents

6.1 Requirements for the achievement of the Ph.D. title

At the beginning of the Ph.D. activities:

- Students have to select a *Supervisor,* or *Advisor,* who will guide and support their research activities aimed at the development of the Ph.D. thesis. The advisor is not necessarily a member of the Faculty Board, and may also belong to an institution different from Politecnico di Milano. The advisor can be supported by one or more co-supervisors.
- The Faculty Board assigns a *Tutor* to each Ph.D. candidate to assist him/her in the overall training program. The tutor is a professor belonging to the Faculty Board.



At the beginning of each year each Ph.D. candidate has to present a study plan, that must be approved by the vice-Coordinator of the Ph.D. programme for the related research area (see also section 6.4 below). The Faculty Board may assign extra course credits to a Ph.D. candidate, should there be a lack of preparation in specific topics, that are relevant for the research project. The suggested timeline is to program 10 credits (at least 5 in characterizing courses) for each of the first two years and 5 credits for the third year.

At the end of each year each Ph.D. candidate must undergo an evaluation exam to continue the programme. At the conclusion of the Ph.D. studies, the Faculty Board evaluates the candidates for possible admission to the final exam. Candidates who receive a positive evaluation can submit their theses to two external reviewers. If the evaluation provided

by the reviewers is positive (and after carrying out the requested revisions, if any), the candidates can defend their thesis in a final exam, in front of a committee composed of three (or more) members. At least 2/3 of the committee must be external experts, and at least 2/3 of the committee must be from academia.

Candidates will be asked to demonstrate knowledge of the Italian language, equal to at least the A2 level of the Common European Framework of Reference for the knowledge of languages. This requirement will be needed in order to register for the final exam. Native Italian speakers and all those who can proficiency in Italian at the required level will be exempt.

6.2 Research development

The main aim of all Politecnico di Milano Ph.D. programmes is the development of a research-oriented mindset in the candidates, with general research-oriented skills and expertise in a specific research topic. To this end, candidates must develop the ability to formulate and solve problems in complex contexts, perform deep problem analysis, identify original solutions, and evaluate their applicability in practical contexts. These skills provide the Ph.D. candidates with major opportunities for development in their research both in the academic field and in public and private organizations.

Ph.D. candidates are required to develop an original research contribution, coherent with the research topics developed in the Department where the Ph.D. programme is carried out. The Ph.D. thesis must thus contribute to increasing the knowledge in the candidate's research field. The original research results are collected in the Ph.D. thesis, where the candidate's contribution is positioned in relation to the state of the art in the specific research field.

The Ph.D. research is developed under the guidance of the supervisor, who supports the candidate in the setting-out and in the everyday activities related to thesis development. 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 Ph.D. path.

Candidates must acquire the ability to present and discuss their work in their research community. Consequently, both participation in international conferences and publication of the research results in peer-reviewed journals are encouraged. A minimum number of publications is required by the end of the Ph.D. programme.

The Ph.D. programme promotes candidates' research interactions with other groups in their research field, preferably abroad. Research visits of at least three months are strongly encouraged, since they allow candidates to acquire further skills to develop their research work and thesis.

The duration of the programme is normally three years.

6.3 Objectives and general framework of educational activities

The Ph.D. programmes and the Ph.D. School provide educational activities of different kinds and value, including courses, seminars, project workshops, and laboratories. Educational activities cover both basic research issues (problems, theories, methods) that represent the founding elements of the Ph.D. programme, and research issues connected with the problems specifically developed in the theses. Courses are usually offered in English.

The Ph.D. School of the Politecnico di Milano proposes a set of courses in soft and transferable skills. These courses are expected to help candidates to respond to the rapidly evolving needs of the global economy and society at large.

The Ph.D. programme in IT offers courses, held at DEIB by internal or foreign professors, in the four areas in which it is structured, *i.e.*, Computer Science and Engineering, Electronics, Systems and Control, and Telecommunications, as well as some cross-area courses. All courses are worth 5 credits.

Candidates must earn a **minimum of 25 ECTS** credits from courses consistent with their Ph.D. activities. Of these credits, at least 10 should be obtained from characterizing Ph.D. courses offered by the Ph.D. programme in IT, exactly 10 from courses on soft and transferable skills proposed by the Ph.D. School, and at most 5 credits from external Ph.D. courses, *e.g.*, from other Ph.D. programmes or from Ph.D. Summer Schools. A positive evaluation of the student's performance in a course is mandatory for the corresponding credits to be assigned. Courses from the Master's Degree may be inserted in the curriculum of the student, in agreement with the Supervisor and the Tutor, but do not contribute to the acquisition of credits. The Faculty Board may assign extra course credits to candidates, in case they need to complete their preparation in specific topics, that are relevant to their research projects. The table below summarizes the requirements in terms of coursework activities.

COURSES	DETAILS OR REFERENCE	CREDITS
Courses characterizing the Ph.D. programme	See Table A (details in Ph.D. School website)	≥ 10
Ph.D. School Courses	See Ph.D. School website	= 10
Other Ph.D. courses	External courses with evaluation	≤ 5
Other activities	Seminars, courses without evaluation (to be agreed in advance with the Tutor) Language courses	No credits

The suggested timeline is to program 10 credits (at least 5 in characterizing courses) for each of the first two years and 5 credits for the third year.

At the same time, the programme assumes that the candidates are constantly devoted to their research activity, following the lead of their supervisors, and of the Faculty Board. In the third year, the candidates should devote their time primarily to research and to the finalization of their Ph.D. thesis.

Ph.D. Course List

A) **Characterizing Courses** of the Ph.D. programme in Information Technology

The scheduled courses planned for academic year 2026-27 are listed in the following table. All courses will be held in English and amount to 5 credits (CFU) each. Other courses may be activated during the year. In this case, the candidates will be promptly informed, and will be allowed to insert these new courses in their study plan.

The topics and schedules of the courses organized by this Ph.D. programme are available from https://www11.ceda.polimi.it/manifestidott/manifestidott/controller/MainPublic.do.

AREA	COURSE TITLE	PROFESSORS	TENTATIVE SCHEDULE
Computer Science and Engineering	Computing platforms for AI	Davide Zoni, Matteo Matteucci, Andrea Galimberti	March-April 2027
	Time-series exploration with machine and deep learning: from theory to practice	Fabrizio Pittorino, Manuel Roveri, Alessandro Falcetta	Sept.-Nov. 2026
	Multi-Agent Learning: From Theory to Practice	Alberto Marchesi, Matteo Castiglioni	Feb./March 2027
	Engineering AI-enabled Software Systems	Livia Lestingi, Luciano Baresi	March-April 2027
	From Large Language Models to Agentic AI: What does it all mean for research?	Francesco Pierri, Mark Carman	Feb.-March 2027
	Advanced Data Engineering: Trustworthiness and Sustainability Perspectives	Cinzia Cappiello, Pierluigi Plebani, Monica Vitali	March-April 2027
	Learning-Augmented Competitive Algorithms	Gianmarco Genalti, Nicola Gatti	Sept.-Oct. 2026
	HCI4AI	Micol Spitale, Maristella Matera, Shelly Levy-Tzedek (Ben-Gurion University)	Jan.-Feb. 2027
	Online Learning and Monitoring	Francesco Trovò, Giacomo Boracchi	April-May 2027
	Advanced Research Topics in Cybersecurity	Stefano Longari, Lorenzo Binosi	Jan. 2027
	Parallel computing on core-based and GPU-based architectures through OpenMP, CUDA and OpenACC	Luca Breveglieri (POLIMI), Laura Bellentani (CINECA), Marco Celoria (CINECA), Alberto Guarnieri (CINECA), Alessandro Romeo (CINECA), Nitin Shukla (CINECA)	June 2027
Electronics	The digital imaging pipeline: from photons to modern cameras	Giacomo Langfelder	Feb. 2027
	Single-photon detection: principles, technologies, and applications.	Giulia Acconcia, Serena Farina (Scuola Univ. Superiore IUSS, Pavia & INAF-Istituto di Astrofisica Spaziale e Fisica Cosmica), Angelo Gulinatti, Fabio Telesca, Federica Villa	Jan.- Feb. 2027
	High resolution electronic measurements in nano-bio science	Marco Sampietro, Francesco Zanetto Giorgio Ferrari	June 2027
	High-Efficiency dc-dc Resonant Converters	Claudio Adragna (STMicroelectronics)	Nov. 2026
Systems and Control	Distributed algorithms for optimization and control over networks	Maria Prandini, Alessandro Falsone, Kostas Margellos (Univ. Oxford)	Feb./March 2027
	Advanced Kalman Filtering for State Estimation: from Centralized to Distributed Architectures	Daniela Selvi	Feb. 2027
	Dealing with uncertainty in data-based learning	Fredy O. Ruiz Palacios, Carlo Novara, Lorenzo Fagiano	June 2027
	Feedback control in finance	Simone Formentin	May-July 2027
Telecom-munications	Edge Network Softwarization: Architectures and Applications	Sebastian Troia, Guido Maier	Jan.-Feb. 2027
	Quantum information and communication theory	Luca Barletta, Maurizio Magarini	Jan.-Feb. 2027
	AI-Driven Wireless Systems: From Signals to Networks	Marco Cominelli, Alessandro Redondi	Nov.-Dec. 2026
	Numerical methods for electromagnetics	Gian G. Gentili, Lorenzo Codecasa	Nov. 2026 – Jan. 2027
	Advanced Radar Remote Sensing	Marco Manzoni	Dec. 2026

The tentative course programme for the academic years 2027-28 and 2028-29 is given below.

Please note that the listed courses are subject to change and approval by the Faculty Board on a yearly basis and additional courses will be offered as well.

AREA	PLANNED COURSES 2027-28	PLANNED COURSES 2028-29
Computer Science and Engineering	Reinforcement learning	Online learning and monitoring
	Advanced topic in SW Architectures and Methodologies	Advanced topic in SW Architectures and Methodologies
	Advanced topic in Human Computer interaction	Advanced topic in Human Computer interaction
	Advanced topic in Data Management/Information Systems	Advanced topic in Data Management/Information Systems
	Advanced topic in Artificial Intelligence and Robotics	Advanced topic in Artificial Intelligence and Robotics
	Advanced topic in System Architectures	Advanced topic in System Architectures
	Advanced topic in Cryptography	Advanced topic in Cybersecurity
	Webtree technologies: block chain, smart contracts, zero knowledge proof	
Electronics	Organic electronics: principles, devices and applications	Advanced MEMS gyroscopes
	Digital circuits and systems for DSP and FPGA-based processing	High resolution electronic measurements in nano-bio science
	Design of integrated circuits: from schematic to physical implementation	Signal integrity in very-high speed digital circuits
Systems and Control	Data-driven approaches to uncertain optimization: theory and applications	Model Predictive Control
	Large-scale optimization	Stochastic Dynamic Programming
	Analysis of Complex Networks: Theory and Applications	
Telecom-munications	Synthesis and design of microwave and mmWave filters	Metamaterials and metasurfaces in electromagnetics and optics
	Towards 6g communications: evolution or revolution?	Synthetic Data Generation
	Wireless prototyping	Quantum Communication Topics
	Datacenter Networking in the AI era	Advanced topic on Optical/Wireless networks

B) Ph.D. School Courses

The Ph.D. School of the Politecnico di Milano proposes a set of general and inter-doctoral courses aimed at training the Ph.D. candidates in soft and transferable skills. The list of Ph.D. School courses activated for the academic year 2026-27 is available on the website

https://www.polimi.it/en/phd/current-phd-candidates/during-the-phd/study-plan

The following courses are suggested to IT Ph.D. candidates:

COURSE TITLE	PROFESSOR
Advanced interaction skills for academic professionals	Michela Arnaboldi
Creativity, Science and Innovation: the Multimagineering course (†)	Marco Domenico Santambrogio
English for Academic Communication	Paolo Biscari
Ethical Aspects of Research on Dual-Use Technologies	Pierangelo Masarati
Ethics of Artificial Intelligence	Daniele Rocchi
Professional Communication	Nicoletta Di Blas
Project Management Basics	Sara Grilli Colombo
Research Skills	Paolo Biscari
Scientific / Academic English: Writing and Presenting with and without the support of LLMS	Emanuela Jacchetti

(†) The CSI course is compulsory to access the BRIDGES initiative, whereby a selected group of Ph.D. students is chaperoned to a scientific or technological center (e.g. Boston, San Francisco, Silicon Valley) to visit prestigious institutions and companies, and contact directly key persons (professors, managers) both for their Ph.D. and their future career. Contact prof. Santambrogio for further information.

Ph.D. candidates can choose also other courses from the Ph.D. School list of courses. In particular, participation in courses on research management and project management is encouraged.

Furthermore, each candidate will experience within his/her doctoral path all three technical-scientific communication methods described below:

1. Oral presentation to experts in the general scientific area and in the specific research topic, to develop the ability to communicate advanced content within a limited timeframe, highlighting the key aspects of a research/ project and justifying methodological choices, to an audience with high evaluation skills. This experience, aimed at sharing projects among colleagues, is achieved by participating in at least one conference or workshop where the candidate can present his/her own research results.
2. Oral presentation to expert audiences in the general scientific area, but not in the specific topic, to develop the ability to transfer contents with an adequate depth in absence of tight time constraints. This skill is aimed at the ability to transfer research/project contents to non-expert collaborators and is gained through specific training experiences with specific goals and typical timelines of academic and corporate settings.
3. Written communication addressed to a community of experts. This skill is aimed at developing the ability to organize the contents of a document, shorter than a book or a thesis but still broad in scope, with an adequate level of technical-scientific detail. This communication method, typical for example of internal reports or technical notes, is experienced by creating written documents addressed to a relevant scientific community such as scientific or technical articles.

Each candidate is therefore expected to participate as a speaker in at least one international conference or workshop, carry out at least one training activity and publish at least one scientific or technical contribution intended for a community of experts. Any exceptions must be justified and authorized by the Faculty Board.

C) Other Ph.D. courses

A maximum of 5 credits can be obtained by choosing among courses provided by other Ph.D. programmes at Politecnico di Milano and/or external Institutions.

D) Preparatory courses

If the Advisor and the Tutor find it useful or necessary for the candidate to attend preparatory courses (chosen among the courses activated at the Politecnico di Milano), the Faculty Board of the Ph.D. 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 to the mandatory credits to be acquired with Ph.D. courses.

A preparatory course for early-stage researchers, entitled “Being a researcher”, is available online as a MOOC at https://www.pok.polimi.it/, where other preparatory courses of general interest can be found as well.

E) Specialistic courses, long-training seminars

The attendance of specialistic courses, workshops, schools, seminar cycles is strongly encouraged and (if these seminars, workshops are certified and evaluated) may earn the candidates further credits, subject to the prior approval of the study plan submitted by the candidate. These courses and workshops can be inserted in the study plan, even if they are not evaluated (and therefore do not qualify

as credits), as optional “additional educational activities”.

F) Language courses

Language courses (English, Italian as a foreign language, German, Chinese, other European languages) are offered by Politecnico di Milano to Ph.D. candidates and enrolled students in general. The detailed list and calendar are published on the Politecnico website before the beginning of each semester. The Ph.D. programme in IT supports the enrolment in these courses, refunding the registration fee.

6.4 Presentation of the study plan

Ph.D. candidates must submit a study plan, which may be revised periodically, to accommodate for possible modifications or needs motivated by the development of their Ph.D. career. The study plan must be approved by the Ph.D. programme vice-coordinator in the area of the Ph.D. candidate.

6.5 Yearly evaluations

Candidates present their work to the Faculty Board at least once a year. In particular, the candidates must undergo an annual evaluation to be admitted to the next Ph.D. year. The third-year evaluation establishes the candidate’s admission to the final Ph.D. defense.

As a result of each annual evaluation, the candidates who pass the exam receive an evaluation (A/B/C/D) and may proceed with the enrolment for the following year. Candidates who do not pass the exam are qualified either as “Repeating candidate” (Er) or “Unable to carry on with the Ph.D. (Ei)”. In the former case (Er), the candidates are allowed to repeat the Ph.D. year at most once. The Ph.D. scholarships (if any) are suspended during the repetition year. In the latter case (Ei) the candidates are excluded from the Ph.D. programme and lose their scholarships (if any).

Should the Faculty Board directly assign an exclusion evaluation (Ei) without a previous repetition year, the decision must be properly motivated and validated by the Ph.D. School.

After the final year, candidates who have achieved sufficient results but need more time to conclude their research work and/or write their theses may obtain admission to a further year.

6.6 Ph.D. thesis preparation

The main objective of the Ph.D. career is the development of an original research contribution. The Ph.D. thesis is expected to contribute to the advancement of knowledge in the candidate’s research field.

The Ph.D. study and research work is carried out, full time, during the three years of the Ph.D. course. Stages or study periods in (Italian or international) companies or external institutions may complete the candidate’s preparation.

The thesis must be coherent with the research areas developed in the Department where the Ph.D. programme is developed.

The candidate must present an original thesis, discussing its contribution to the state of the art in the research field in the research community.

The Ph.D. research is developed following the lead of a supervisor, who supports the candidate in

setting research targets and in supervising the research development.

6.7 Laboratories

The Dipartimento di Elettronica, Informazione e Bioingegneria hosts many laboratories for Computer Science and Engineering, Systems and Control, Electronics, and Telecommunications, and participates in interdepartmental laboratories. Professional technicians continuously update the laboratory infrastructures and assist researchers and students.

The list of laboratories is provided on the following website:
https://www.deib.polimi.it/eng/laboratories

6.8 IT Ph.D. Secretariat

This office provides information about teaching activities and support regarding the formal aspects of the Ph.D. programme. In particular, candidates are informed about deadlines, study plans, training activities, etc. The office provides information about the possibility of joining a double doctorate course in agreement with foreign universities.

Foreign students are also supported with administrative issues (visa, residence permits, documents), and have access to Italian language courses and housing facilities.

E-mail address: phd-inf@polimi.it

7. Internationalization and interdisciplinarity

Study periods and research activities at external institutions are strongly recommended.

Research periods at external institutions are possible for up to 18 months. Scholarships are increased by 50% (of the base scholarship as defined at national level) for a maximum of 6 months in case of periods spent abroad. External visits require a formal approval by the Faculty Board. Additional funds for long travel/visits abroad may be available from other Ph.D. funding programmes (Erasmus+, Idea League, etc.). Additional financial support may come from research funds and from teaching assistance activies ($\leq$ 40 hours/year).

Politecnico di Milano supports joint Ph.D. paths with International Institutions, as well as joint and double Ph.D. programmes. Further information is available on the Ph.D. School website and on the Ph.D. programme website.

Interaction with 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 is fostered by networking, connectivity, inter-sectoral mobility and wide access to knowledge. The Ph.D. programme in Information Technology collaborates with numerous research institutions and industrial companies, which regularly fund Ph.D scholarships.

The Ph.D. programme supports BRIDGES, an initiative designed for Ph.D. candidates who wish to transform their research journey into a truly global experience, building strategic connections among universities, research centers, companies, and innovators worldwide. In the typical format a delegation of selected students is chaperoned to a university abroad, with the opportunity to get in touch with specific scholars through pre-reserved appointments, and visit laboratories and other facilities. Most

venues include one or more prestigious universities, as well as some IT companies. The visit is aimed at generating concrete opportunities: targeted visiting periods, internships, scientific collaborations, and relationships capable of significantly impacting each participant's professional future.

8. Attachment A1 – Ph.D. programme coordinator

Short CV of programme coordinator

Luigi Piroddi graduated in Electrical Engineering at the Politecnico di Milano, Italy, in 1990, with a thesis on the identification of periodic ARMA models. He received his Ph.D. degree from Politecnico di Milano in October 1995 with a dissertation on the application of neural networks for nonlinear predictive control. Between 1994 and 1999 he was professor of Fundamentals of Automation at the Università degli Studi di Bergamo, Italy. He was then assistant professor (1999-2005) and associate professor (2005-2015) at the Dipartimento di Elettronica, Informazione e Bioingegneria of Politecnico di Milano, where he is currently full professor in the systems and control area (from 2015).

He holds various courses in the systems and control area, among which "Fundamentals of Systems and Control", "Industrial Automation", "Discrete Event Systems", "Model Identification and Data Analysis", "Model Identification and Adaptive Systems", and "Active Control of Noise and Vibrations".

His research activity focuses mainly on model identification and industrial automation. More precisely, his current research interests are: nonlinear model and switched model identification, randomized feature selection methods, modeling and control of flexible manufacturing systems and batch processes, active control of noise and vibrations. He has participated in various projects, related both to industrial and public sponsored research programs. L. Piroddi is author of 70 international journal papers, 2 international book chapters, 95 papers presented at international conferences, and 7 patents.

Personal web site: https://piroddi.faculty.polimi.it/

9. Attachment A2 – Ph.D. Faculty Board

NAME	AFFILIATION	SCIENTIFIC DISCIPLINARY SECTOR
Amigoni Francesco	DEIB	IINF-05/A
Ardagna Danilo	DEIB	IINF-05/A
Bertuccio Giuseppe	DEIB	IINF-01/A
Bestagini Paolo	DEIB	IINF-03/A
Bisoffi Andrea	DEIB	IINF-04/A
Bonfanti Andrea	DEIB	IINF-01/A
Boracchi Giacomo	DEIB	IINF-05/A
Cappiello Cinzia, vice-coordinator for Computer Science and Engineering area	DEIB	IINF-05/A
Carminati Marco	DEIB	IINF-01/A
Corno Matteo	DEIB	IINF-04/A
Dercole Fabio	DEIB	IINF-04/A
Farina Marcello	DEIB	IINF-04/A
Ferrari Giorgio	Dip. di Fisica	IINF-01/A
Filippini Ilario	DEIB	IINF-03/A
Fornaciari William	DEIB	IINF-05/A
Garatti Simone, vice-coordinator for Systems and Control area	DEIB	IINF-04/A

Gatti Nicola	DEIB	IINF-05/A
Geraci Angelo	DEIB	IINF-01/A
Gulinatti Angelo	DEIB	IINF-01/A
Jabali Ola	DEIB	MATH-06/A
Luini Lorenzo	DEIB	IINF-02/A
Maier Guido Alberto	DEIB	IINF-03/A
Mainardi Luca	DEIB	IBIO-01/A
Mari Lorenzo	DEIB	BIOS-05/A
Margara Alessandro	DEIB	IINF-05/A
Martinenghi Davide	DEIB	IINF-05/A
Matera Maristella	DEIB	IINF-05/A
Monti Guarnieri Andrea	DEIB	IINF-03/A
Mottola Luca	DEIB	IINF-05/A
Parolari Paola	DEIB	IINF-03/A
Pelosi Gerardo	DEIB	IINF-05/A
Piroddi Luigi, coordinator	DEIB	IINF-04/A
Rech Ivan, vice-coordinator for Electronics area	DEIB	IINF-01/A
Restelli Marcello	DEIB	IINF-05/A
Santambrogio Marco Domenico	DEIB	IINF-05/A
Silvano Cristina	DEIB	IINF-05/A
Tornatore Massimo, vice-coordinator for Telecommunications	DEIB	IINF-03/A
Zanero Stefano	DEIB	IINF-05/A