



POLITECNICO
MILANO 1863

PhD School - Politecnico di Milano
Regulations of the PhD PROGRAMME in:

Ingegneria dell'Informazione / Information Technology
(IT PhD)

Cycle XXXVI

1. General Information

PhD School - Politecnico di Milano

PhD PROGRAMME: Information Technology

Course start: November 2020

Location of the PhD PROGRAMME: Milano Leonardo

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

Scientific Disciplinary Sectors

- ING-INF/05: Information processing systems
- ING-INF/04: Systems and control engineering
- ING-INF/03: Telecommunications
- ING-INF/01: Electronics
- ING-INF/02: Electromagnetic fields

PhD School Website: <http://www.polimi.it/phd>

PhD Programme Website: <http://dottoratoit.deib.polimi.it>

Areas:

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

2. General presentation

The PhD Course in Information Technology is organized at the Department of Electronics, Information and Bioengineering (DEIB) and provides the PhD School with a significantly large programme, that includes all research areas in Computer Science and Engineering, Electronics, Systems and Control, and Telecommunications, with 18% of the total number of PhD students in the School.

These research fields are of great scientific and technical interest to both industry, and governmental organizations and to the society in general. The doctorate opens up interesting possibilities of extended study and participation in high-level 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 Information Technology and its application to innovative products and services in many fields. The research activity focuses on the following research areas: artificial intelligence, machine learning, 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.

Electronics: the research activities focus on new developments, such as applied nanoelectronics, sensors and diagnostic technologies, genetics and biomedicine, diagnostics of cultural heritage, and astrophysics applications. The research framework is naturally dynamic and evolving, continuously driven by prospects and new initiatives.

Systems and Control: the research activity 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; 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.

Telecommunications: given the interdisciplinary nature of the world of telecommunications, many skills coexist in this section, among them: transmission systems and telecommunication networks, radio and optical wireless transmission, digital signal processing, electromagnetic methods, remote sensing methods and systems, 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 PhD Programme makes interdisciplinary research projects possible as well. Interdisciplinarity is also exploited through the collaboration with other PhD Programmes, as it is intrinsic to the pervasive nature of IT. Information Technology is bringing about a deep reorganization of industrial structures, with mergers and alliances between electronics, computer, and telecommunication companies. Interesting opportunities in public administrations and personal entrepreneurship are also open.

The PhD course is managed 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 Program and for teaching and administrative activities related to the PhD course (see Attachment A2).

3. Objectives

The PhD Program in IT enrolls, every year, about 60 students, mostly supported by scholarships from public institutions and private companies. After admission, each PhD student chooses a research advisor and a professor of the Doctoral Board as a tutor. Study activities consist of courses and individually guided study. Advanced courses (in English), reserved to 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 PhD students. Participation in local and external courses supplies the necessary knowledge to approach research problems in the most serious and competitive way. Our PhD students also have to follow courses to develop so-called transferable skills, offered by the Polimi PhD School.

All research is performed under the guidance of a scientific supervisor, or advisor. Throughout the three-year period, the student will have several possibilities to publicly illustrate both his/her studies and research results to DEIB professors and colleagues, and to international audiences, e.g., at international scientific conferences or at schools and project meetings. In doing this, the PhD candidates will leverage the soft skills acquired from the PhD School courses, developing a capacity for public speaking as well as improving their ability in oral and written communication.

The PhD Programme is held within a large international framework that includes also joint Programs established with foreign institutions, aimed at training young researchers and PhD students.

4. Professional opportunities and job market

The PhD 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 reached the PhD 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. In recent years, the number of positions offered in IT has fulfilled the expectations of the best PhD graduates. As a result of the experience gained with their PhD studies, in seminary courses, conferences, and other education activities, the research graduate is also qualified to undertake teaching activities.

The practice of communicating and working in English, as well as the knowledge of the academic world, acquired during visits and stays abroad, qualifies the PhD graduate for positions offered by the best universities, research centers, and innovative companies worldwide.

As evidence of the interest shown by companies for this PhD path, many scholarships for graduate students at DEIB have been funded by major industrial companies, to promote research in their respective fields of interest. More than half of IT PhD graduates gets a satisfactory position in companies, while about 44% access a career in academia and research centers.

Those 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 skill developed in brilliant PhD activities may lead, as it happened in the past for about 6% of graduates, to the establishment 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 PhD School website for details.

The admission to the Programme is granted upon evaluation of the candidate's curriculum, motivation letters and a proposal for a possible PhD research, which candidates will send 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 36th PhD cycle Programmes, available at <http://www.polimi.it/phd>

Scholarships, both on general and on specific topics, are available, in accordance with what is specified in the call for admission.

Scholarships may be granted from the University and Research Ministry, from Politecnico, from companies or from the Department, based on research project funds.

6. Contents

6.1 Requirements for the PhD title achievement

At the beginning of the PhD activities:

- the students have to select a *Supervisor*, or *Advisor*, who will guide and support their research activities aimed at the development of the PhD 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 PhD candidate to supervise and assist him/her in the overall training Programme. The tutor is a professor belonging to the Faculty Board. The tutor assists the candidate in the choice of courses to be included in the study plan, which has to be submitted for approval to the Coordinator of the PhD Program (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 in specific topics, relevant for their research projects.

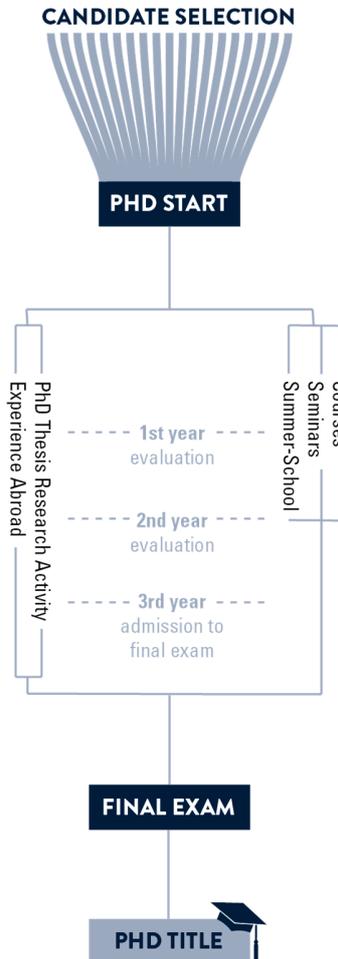
All activities related to courses (attendance/evaluation) have to be completed by the end of the second year of the PhD activity.

At the end of each year, each PhD candidate has to pass an evaluation to continue the Programme.

At the conclusion of the PhD studies, the Board of Professors evaluates the candidates. Candidates who receive a positive evaluation can submit their theses to two external reviewers. If the evaluation

provided by the reviewers is positive (or after the revisions possibly required by them), the candidates can 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.

The set of activities of the PhD student within the Programme are summarized in the following graph:



6.2 Research development

The main aim of all Politecnico di Milano PhD Programmes is the development of a research-oriented mind-set in the candidates, 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 organizations.

PhD candidates are required 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 Program is carried out.

The original research results are collected in the PhD thesis, where the candidate's contribution is put in perspective in relation to the research state of the art in the specific research field.

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

The PhD Program favors the candidates' research interactions with other groups in their research field, preferably abroad. Research visits of at least three months are strongly encouraged, since through them the candidates can acquire further skills to develop their research work and thesis.

The duration of the program is normally three years.

6.3 Objectives and general framework of the teaching activities

The PhD Programs and the PhD School activate teaching forms of different kinds and credit value, including courses, seminars, project workshops, and laboratories. Teaching activities cover both the basic research issues (problems, theories, methods) that represent the founding element of the PhD Programme and identify its cultural position, and research issues connected with the problems developed in the theses, which are deeply studied and investigated.

Lessons are usually offered in English.

Structured teaching activities allow the PhD candidate to earn ECTS credits.

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 Programme in Information Technology 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 in the first two years a **minimum of 25 ECTS** credits from courses consistent with their PhD activities, among which at least 10 credits should be obtained from characterising PhD courses offered by the PhD Programme in Information Technology, whereas at least 10 credits should be obtained from courses about soft and transferable skills proposed by the PhD School, and at most 5 credits may be taken from external PhD courses, e.g., from other PhD Programs, or from Summer Schools. All the abovementioned courses should provide an evaluation of the student's performance for the corresponding credits to be assigned. Other activities, typically specialized and for which it is difficult to evaluate the learning level achieved, fall within the scientific activities which the Faculty Board takes into account in the overall evaluation. Courses from the Master 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, relevant for their research projects.

The table below summarizes the candidate's path (as regards coursework activities). At the same time, the Program assumes that the candidates are devoted to research activity in a continuous way, following the lead of their supervisors, and of the Faculty Board.

First/Second Year

Courses	Details or reference	Number of credits
Courses characterizing the PhD program	See Table A (details in PhD School website)	min 10
PhD School Courses	See PhD School website	min 10
Other PhD courses	External courses with evaluation	max 5
Other activities	Seminars, courses without evaluation, to be agreed in advance with the Tutor. Language courses.	No credits

Third year

In the third year, the candidates should devote their time entirely to the research and to the finalization of their PhD thesis.

PhD Course List

A) The IT PhD Program in Information Technology organizes the **Characterising Courses** listed in Table A.

The scheduled course planning for the academic year 2020-21 follows. 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 programmes and schedule of the courses organized by this PhD Programme are available from <http://dottoratoit.deib.polimi.it>

**Table A: PHD COURSES 2020-21
CHARACTERISING THE PHD PROGRAM**

COURSE TITLE	PROFESSORS	SCHEDULE (Sept. 2020 - Oct. 2021)	LANG UAGE	CFU
Blockchain and distributed ledger technologies: principles, applications, and research challenges	Francesco Bruschi, 2 CFU Florian Daniel, 1 CFU Vincenzo Rana, 1 CFU Pierluigi Plebani, 1 CFU	May – July 2021	ENG	5
Advanced Topics on Heterogeneous System Architectures	Antonio Miele, 3 CFU Marco Santambrogio, 2 CFU	Nov. 2020 – January 2021	ENG	5
Embedded Software Research: Methodologies and Concrete Cases	Luca Mottola, 5 CFU	February - April, May – July 2021	ENG	5
Human-Computer Interaction for AI (HCI4AI)	Maristella Matera, 2 CFU Luigi De Russis, Politecnico di Torino, 1 credit Massimo Zancanaro, University of Trento and FBK, 2 credits	November 2020 – January 2021	ENG	5
Learning Sparse Representations for Image and Signal Modeling	Giacomo Boracchi, 5 CFU	February - April, May – July 2021	ENG	5
Energy-aware and Approximate Computing	Gianluca Palermo - 2 CFU Sotirios Xydis, Harokopio University of Athens - 3 CFU	May – July 2021	ENG	5
Data and Information Quality	Cinzia Cappiello, 3 CFU Barbara Pernici, 2 CFU	May – July 2021	ENG	5
Parallel computing on traditional (core-based) and emerging GPU-based architectures through OpenMP and OpenACC / OpenCL	M. Cremonesi (CINECA, 3 cfu), TBD CINECA 2 CFU	May – July 2021	ENG	5
Digital Design of Embedded Systems in the IoT and RISC-V Open Core Era	Alejandro Valero (University of Zaragoza, Spain) 3 CFU Davide Zoni, 2 CFU, responsible William Fornaciari	November 2020 – January 2021, February – April 2021	ENG	5
SYNTHESIS AND DESIGN TECHNIQUES FOR RF FILTERS	Giuseppe Macchiarella - 5 CFU	May – July 2021	ENG	5
Large Scale Optimization	titolare: Dr. Panagiotis Patrinos, KU Leuven, 5 CFU	May – July 2021	ENG	5
Applied Quantum Machine Learning	Paolo Cremonesi, 2 CFU Alessandro Luongo, Universite de Paris, 3 CFU	February - April, May – July 2021	ENG	5

COURSE TITLE	PROFESSORS	SCHEDULE (Sept. 2020 - Oct. 2021)	LANG UAGE	CFU
How to observe a distance of one thousandth of the proton diameter? The detection of Gravitational Waves	Alberto Gatto, 2 CFU Matteo Tacca (NIKHEF – Amsterdam, Commissioning Coordinator of Advanced Virgo) 3 CFU	November 2020 – January 2021	ENG	5
The Digital Imaging Pipeline: from photons to modern cameras	Giacomo Langfelder, 5 CFU	February – April 2021	ENG	5
High Resolution Electronic Measurements in Nano-Bio Science	Marco Sampietro 2 CFU, Giorgio Ferrari 2 CFU, Marco Carminati 1 CFU	February – April 2021	ENG	5
Digital Circuits and Systems for DSP and FPGA-based Processing	Angelo Geraci, Politecnico Milano, 5 CFU	May – July 2021	ENG	5
Feedback control in finance	Simone Formentin, 2CFU, Alberto Bemporad, IMT Lucca, 1 CFU Enzo Busseti, IMT Lucca, 2 CFU	May – July 2021	ENG	5
Hybrid Systems	Karl Henrik Johansson, KTH, Stockholm, Sweden - 2 CFU John Lygeros, ETH, Zurich, Switzerland - 1 CFU Maria Prandini, Politecnico di Milano - 2 CFU	November 2020 – January 2021	ENG	5
Data-Driven Approaches to Uncertain Optimization: Theory and Applications	Simone Garatti, 2 CFU Marco C. Campi - University of Brescia - 3 CFU	September – October 2021	ENG	5
Numerical Methods for Electromagnetics	Gian Guido Gentili, 4 CFU Stefano Selleri, Università di Firenze, 1 CFU	November – January 2021	ENG	5
Network Traffic Measurement and Analysis	Alessandro Redondi, 5 CFU	February – April 2021	ENG	5

B) PhD School Courses

The PhD School of Politecnico di Milano proposes a set of general and Interdoctoral courses aimed at training 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 acquisition of **at least 10 credits from these courses is mandatory** within the first two years. The list of PhD School courses activated for the 2020-2021 Academic Year is available on the website <http://www.dottorato.polimi.it/en/during-your-phd/phd-school-courses> and is included in Table B. All courses are 5 CFU.

Table B: PHD SCHOOL COURSES 2020-21

Professors	Course Title
Michela Arnaboldi Hans De Bruijn	Advanced Interaction Skills for Academic Professionals
Alessandro Balducci	Approaches to Resilience: Social, Economic, Environmental and Technological Challenges of Contemporary Human Settlements
Emanuela Jacchetti	Communication Strategies That Score in Worldwide Academia
Paolo Biscari	Complementary Doctoral Skills
Anna Maria Paganoni	Disseminare la Ricerca
Simona Chiodo Viola Schiaffonati	Empowering Imagination
Cristina Mariotti	English For Academic Communication
Pierangelo Masarati	Ethical Aspects of Research on Dual-Use Technologies
Andrea Aliverti	Ethics in Research
Simona Chiodo Lorenzo Cardilli	European Culture
Salvatore Zingale	Il pensiero inventivo: teorie e pratiche
Paolo Biscari	Industrial Skills
Domenico Brunetto	Innovative Teaching Skills
Paolo Volontè	Introduction to Academic Research
Paolo Bosoni	Milano-Politecnica: Città, Cultura, Design dal Dopoguerra ad oggi
Maria Pompeiana Iarossi	Power of Images and Visual Language for Academic Knowledge Dissemination and Public Engagement
Nicoletta Di Blas	Professional Communication
Mauro Mancini	Project Management (In Action)
Alfonso Fuggetta	Project Management Basics
Alfonso Fuggetta	Project Management Pmi – CAPM Certification Preparation
Donatella Sciuto	Research Skills
Emanuela Colombo	Resource Planning and Management within Sustainable Development: A Focus on the Water, Energy, Food and Climate Nexus
Carlo De Michele	Risk, Resilience and Sustainability in Science and Engineering
Guido Raos Chiara Castiglioni	Science, Technology, Society and Wikipedia
Tim Sluckin	Scientific Communication In English
Giovanni Valente	Scientific Reasoning: Philosophy, Logic and Applications
Valentina Ferretti	Strategic Decision Making
Paolo Maria Ossi	Sulla responsabilità della Tecnica
Monica Lavagna	Sustainability Metrics, Life Cycle Assessment and Environmental Footprint
Stefano Crabu	Technology & Society

C) Other PhD courses

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

The prior approval of the study plan by both the Tutor and the Coordinator is mandatory.

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 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 to the mandatory credits to be acquired with PhD courses.

SPECIALISTIC COURSES, LONG-TRAINING SEMINARS

The attendance of Specialist Courses, Workshops, Schools, Seminars 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 not qualified as credits), as optional “additional teaching”.

LANGUAGE COURSES

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

6.4 Presentation of the study plan

PhD candidates must submit a study plan, which may be revised periodically, in order to accommodate for possible modifications, or needs motivated by the development of their PhD career. The study plans must be approved by the Tutor and by the PhD program Coordinator, in the manner stipulated by the Faculty Board.

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 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 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 “not able to carry on with the PhD (Ei)”. In the former case (Er), the candidates are allowed to repeat the PhD year at most once. The PhD scholarships – if any – are suspended during the repetition year. In the latter case (Ei) the candidates are excluded from the PhD programme and lose their scholarships – if any.

In case the Faculty Board deems it proper to directly assign an exclusion evaluation (Ei) without a previous repetition year, the request must be properly motivated, and validated by the PhD School.

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

6.5 PhD thesis preparation

The main objective of the PhD career is the development of an original research contribution. The PhD thesis is expected to contribute to the advancement 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 thesis needs to be coherent with the research issues developed in the Department where the PhD 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 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 (or 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).

6.7 Laboratories

The Department 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 PhD Secretariat

This Office provides information about teaching activities and support about the formal aspects of the PhD programme. In particular, candidates are informed about deadlines to be respected, how to enter the study plans, training, etc. The Office provides information about the possibility of joining a double doctorate course in agreement with foreign universities.

Foreign students are also supported by specific services that offer support to cope with administrative issues (visa, residence permits, documents, and so on to access Italian language courses, and housing).

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8. Internationalization and interdisciplinarity

Carrying out study and research activities at external sites is strongly recommended.

Long stays are possible for up to 18 months. Scholarships are increased by 50% for a maximum of 6 months abroad. The stay requires a formal approval by the Faculty Board. Additional funds for long travel/stays abroad may be available from various PhD fundings. Other money may come from the advisor's funds and from teaching assistant activity (≤ 40 hours/year).

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 Program 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 of economy and society at large is fostered by networking, connectivity, inter-sectoral mobility and wide access to knowledge. In particular, the PhD Programme in Information Technology collaborates with the following Research Agencies and/or Industrial partners.

INFN ISTITUTO NAZIONALE DI FISICA NUCLEARE	Research Institution
TELECOM ITALIA S.P.A.	R&D Company
IIT - ISTITUTO ITALIANO DI TECNOLOGIA	Research Institution
ST MICROELECTRONICS S.R.L.	R&D Company
MICRON SEMICONDUCTOR ITALY S.R.L.	R&D Company
RSE - RICERCA SUL SISTEMA ENERGETICO S.P.A.	R&D Company
EIT	Research Institution
IBM ITALIA	R&D Company
CNR-ITIA	Research Institution
ABB	R&D Company
XNEXT S.R.L.	R&D Company
SECURITY REPLY S.R.L.	R&D Company
ENI	R&D Company

Attachment A1 – PhD Programme Coordinator

Short CV of Programme Coordinator

Barbara Pernici is full professor in Computer Engineering at the Politecnico di Milano since 1993. She leads the Information Systems group in the Department of Electronics, Information and Bioengineering. Her research interests include adaptive information systems, data quality, IS energy efficiency, and extracting located images from social media. She has published more than 60 papers in international journals and about 350 papers at international level. She has lead the information systems group of Politecnico di Milano in many projects, among which the European FP7 projects on energy efficiency ECO₂Clouds and GAMES (Green Active Management of Energy in Service Centers, where she was the scientific leader for the project). She currently participates in the EU H2020 projects CROWD4SDG, as PoliMi unit leader, and DataBench (Evidence Based Big Data Benchmarking to Improve Business Performance). She was an elected chair of TC8 Information Systems of the International Federation for Information Processing (IFIP), of IFIP WG on Information Systems Design, vice-chair of the IFIP WG on Services-Oriented Systems, and chair of the Steering Committee of the international Conference on Advanced Information Systems Engineering (CAiSE). She has chaired or cochaired main conferences, as general chair or program chair, including CAiSE, ER, BPM, ICSOC, Coopis, tracks in ICSE and ICIS. She is responsible of the editorial board of PoliMi-SpringerBriefs and she is member of the editorial boards of ACM TWeb and IEEE Trans. on Services Computing. She was Dean of the PhD School of Politecnico di Milano (2011-15) and member of the Academic Senate of Politecnico di Milano (2013-2016).

Web site: <http://pernici.faculty.polimi.it/>

Attachment A2 – PhD Faculty Board

Name	Affiliation	Scientific Disciplinary Sector
PERNICI BARBARA (ccordinator)	DEIB	ING-INF/05
ALIPPI CESARE	DEIB	ING-INF/05
AMIGONI FRANCESCO	DEIB	ING-INF/05
BASCETTA LUCA	DEIB	ING-INF/04
BERTUCCIO GIUSEPPE	DEIB	ING-INF/01
CASTELLETTI ANDREA	DEIB	ING-INF/04
CESANA MATTEO (vice-coordinator Telecommunication Area)	DEIB	ING-INF/03
DANIEL FLORIAN	DEIB	ING-INF/05
DERCOLE FABIO	DEIB	ING-INF/04
FAGIANO LORENZO	DEIB	ING-INF/04
FERRIGNO GIANCARLO	DEIB	ING-INF/06
FERRARI GIORGIO	DEIB	ING-INF/01
GARATTI SIMONE	DEIB	ING-INF/04
GATTI NICOLA	DEIB	ING-INF/05
GERACI ANGELO (vice-coordinator Electronics Area)	DEIB	ING-INF/01

MARTELLI PAOLO	DEIB	ING-INF/03
MIRANDOLA RAFFAELA	DEIB	ING-INF/05
MONTI GUARNIERI ANDREA	DEIB	ING-INF/03
PERNICI BARBARA	DEIB	ING-INF/05
PIRODDI LUIGI (vice-coordinator Systems and Control Area)	DEIB	ING-INF/04
PRADELLA MATTEO	DEIB	ING-INF/05
RECH IVAN	DEIB	ING-INF/01
RIVA CARLO	DEIB	ING-INF/02
SOTTOCORNOLA SPINELLI ALESSANDRO	DEIB	ING-INF/01
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