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PhD School - Politecnico di Milano

Regulations of the PhD Programme in:

Information Technology

Cycle XXXIII

1. General Information

PhD School - Politecnico di Milano

PhD Programme: Information Technology

Course start: November 2017

Location of the PhD Programme: Milano Leonardo

Promoter Department: Elettronica, Informazione e Boingegneria (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 within the Dipartimento di Elettronica, Informazione e Bioingegneria (DEIB) and is part of the PhD School as a significantly large program, including all research areas in Computer Science and Engineering, Electronics, Systems and Control, Telecommunications, with 18% of the total number of PhD students in the School.

These fields of research are of great scientific and technical interest to both industry, governmental organizations, and to the society in general. The doctorate opens interesting possibilities of extended study and participation in high level research in Information Technology (IT). Scientific collaboration of DEIB with renowned research institutes in Europe, the United States and worldwide, facilitates the entrance into the world of international research through meetings with scientists and visits to laboratories abroad. 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 or in university.

DEIB's scientific activities in IT 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 develops within these research lines: information systems, database management, information design for the web, methods and applications for interactive multimedia, artificial intelligence, machine learning, robotics, computer vision, advanced software architectures and methodologies, embedded systems design, dependable systems, computer performance, security and reliability.*

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 dynamical and evolves, continuously driven by prospects and new initiatives.*

Systems and Control*: the research activity covers various fields related to control system science, systems theory, ecology, operations research, and electrical and electronic measurements. Despite the rich variety of topics, both theoretical and application-oriented, a unifying system viewpoint is generally adopted, which enables the analysis, the management, and the design of complex systems (not only in the area of automation in a strict sense), through the powerful theoretical tools of mathematical modeling.*

Telecommunications*: given the interdisciplinary nature of the world of the telecommunications, in this section many competences coexist, among which: 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 mentioned areas correspond to a traditional partition of IT, but their presence in the same PhD program makes interdisciplinary research projects possible. Interdisciplinarity is also exploited through collaboration with other PhD programs, as it is natural, given the pervasive nature of IT. Information Technology is bringing about a deep reorganization of industrial structures, with merging and alliances between electronics, computer, and telecommunication companies. Interesting opportunities towards public administrations and personal entrepreneurship are also open.

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).

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 the attendants 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. The participation in local and external courses supplies the necessary knowledge to approach research problems in the most serious and competitive way.

All research is conducted under the guidance of a scientific supervisor. The student will, throughout the three-year period, publicly illustrate both his/her studies and research results to DEIB professors and colleagues, and to audiences of international scientific conferences. In doing this, possibly supported by soft skills acquired from the PhD School courses, the student will develop a capacity for public speaking as well as improving his/her ability of oral and written communication.

The PhD program 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 in university or in industry, both in Italy or worldwide.
Each year Politecnico di Milano and neighboring universities award post-doctorate positions oriented towards research and teaching. In recent years, the number of offered positions 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 habit 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 worldwide universities.
As evidence of the interest shown by companies for this PhD track, many scholarships for graduate students at DEIB have been funded by major industrial firms, to promote research in their respective fields of interest.
Those aiming for a research career in industry must be aware 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 to 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, in international institutions.
Finally, the competence developed in brilliant PhD activities may lead, as it happened in the past, to the establishment of innovative and creative companies, where it is possible to combine personal interests and entrepreneurship attitudes.

5. Enrollment

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 program is granted upon evaluation of the candidates' curricula, motivation letters, and a report about the development of a possible PhD research, which candidates will present together with their application to the PhD call.

5.2 Admission deadlines and number of vacancies

The number of positions is reported in the Call for admission to the 33rd PhD cycle program: http://www.polimi.it/phd
Scholarships both on generic and on specific themes are available, as 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

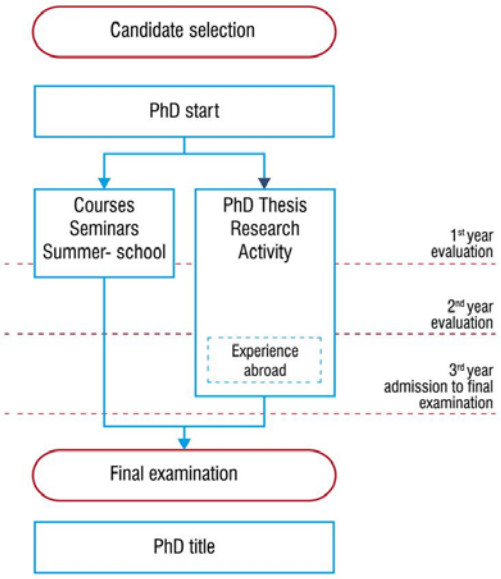
The achievement of the PhD title in Information Technology requires a study and research activity of at least three years equivalent of full time study, research, and development of the PhD thesis.
PhD candidates in Information Technology must earn a minimum of 25 course credits (see paragraph 6.3 below), and to continuously conduct studies and research.

At the beginning of the PhD activities:

- the student has to select an *advisor* who will guide and support her/his 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-advisors.
- the Faculty Board assigns a *tutor* to each PhD candidate to supervise and assist him/her in the overall training program. The tutor shall be 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).

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 program.
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 program are summarized in the following graph:



6.2 Research development

The main aim of all Politecnico di Milano PhD programs 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 organizations.
PhD candidates are requested to develop an original research contribution. The PhD thesis must 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 compared to the research state of the art in the specific research field.
The PhD research is developed under the guidance of the advisor, who supports the candidate in the setting-out and in the everyday activities related to the thesis development.

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 program supports the candidates' research interactions with other researchers, possibly abroad. Research visits of at least three months are strongly encouraged, as through them the candidates may acquire further skills to develop their research work and thesis.

The duration of the program is normally three years, which could be extended under specific conditions.

6.3 Objectives and general framework of the teaching activities

The PhD Program and the PhD School activate teaching forms of different kind, including courses, seminars, project workshops, laboratories. Teaching activities cover the basic research issues (problems, theories, methods) that represent the founding elements of the PhD Program.
Lessons are usually held in English, except when indicated otherwise.
Structured teaching activities allow to earn ECTS credits. Candidates must earn in the first two years a minimum of 25 ECTS credits from courses coherent with their PhD activities, among which at least 10 credits have to be obtained from PhD courses characterizing the PhD program in Information Technology (held at DEIB by internal or foreign Professors), at least 10 credits should be obtained from PhD School Courses on soft and transferable skills proposed by the PhD School, and 5 or less credits may be taken from external PhD courses, e.g., from other PhD programs, or from Summer Schools. All the mentioned courses should provide an evaluation of the student's performance to assign the corresponding credits. Other activities like attendance to seminars, PhD courses without evaluation, workshops, conferences, and similar, contribute to create the curriculum of the PhD student.
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 rules concerning course attendance.

First/Second Year

Courses	Details or reference	Number of credits
PhD School Courses	See table and School website	min 10
Courses characterizing the PhD Programme	See table and Program website	min 10
Other PhD courses	External courses with evaluation	max 5
Other activities	Seminars, courses without evaluation, Minor Research, … (To be agreed in advance with the Tutor)	No credits

Third year

The third year should be devoted entirely to the research and to the development of the PhD thesis.

PhD Course List

A) The PhD Programme in Information Technology organises the **Characterising Courses.**
For the admission to the final exam, the acquisition of at least 10 credits in this list within the first two years is **mandatory**.

The scheduled course planning for the academic year 2017-2018 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. Programs and schedule of the courses organized by this PhD program are available from http://dottoratoit.deib.polimi.it

Table A: PHD COURSES CHARACTERISING THE PHD PROGRAMME

SSD	Name of the Course	Professor	A.A./Semester	Language	Credits
ING-INF/01	ADVANCED MEMS GYROSCOPES	Giacomo Langfelder	April/May 2018	English	5
ING-INF/03	ADVANCED TOPICS IN MUSIC INFORMATICS	Mark Brian Sandler	Spring 2018	English	5
ING-INF/05	ADVANCED TOPICS ON HETEROGENEOUS SYSTEM ARCHITECTURES	Antonio Rosario Miele	November 2017	English	5
ING-INF/05	AUTOMATED VERIFICATION OF TIMED SYSTEMS	Matteo Giovanni Rossi	January/February 2018	English	5
ING-INF/05	BUSINESS PROCESS MANAGEMENT	Pierluigi Plebani	April/May 2018	English	5
ING-INF/04	CONSTRAINED NUMERICAL OPTIMIZATION WITH CONTROL APPLICATIONS - THEORY AND ALGORITHMS	Lorenzo Mario Fagiano	June 2018	English	5
ING-INF/04	COOPERATIVE AND NONCOOPERATIVE OPTIMIZATION AND CONTROL	Maria Prandini	July 2018 or September/ October 2018	English	5
ING-INF/05	DATA AND RESULTS VISUALIZATION	Daniele Loiacono	May 2018	English	5
ING-INF/05	DEEP LEARNING: THEORY, TECHNIQUES AND APPLICATIONS	Matteo Matteucci	February 2018	English	5
ING-INF/05	DESIGNING INTERACTION	Andrea Bonarini	April/May 2018	English	5
ING-INF/05	IMAGE CLASSIFICATION: MODERN APPROACHES	Giacomo Boracchi	March/April 2018	English	5

ING-INF/05	INTEGRATION AND COMPUTATIONAL ANALYSIS OF GENOMIC INFORMATION	Marco Masseroli	June/July 2018	English	5
ING-INF/03	MACHINE LEARNING METHODS FOR COMMUNICATION NETWORKS AND SYSTEMS	Francesco Musumeci	May/June 2018	English	5
ING-INF/01	MICROCONTROLLERS FOR EMBEDDED SYSTEMS	Federica Alberta Villa	April 2018	English	5
ING-INF/04	MODEL PREDICTIVE CONTROL	Riccardo Scattolini	November 2017	English	5
ING-INF/03	MOLECULAR AND NANOSCALE COMMUNICATION	Maurizio Magarini	May/October 2018	English	5
ING-INF/03	NETWORK TRAFFIC MEASUREMENT AND ANALYSIS	Alessandro Enrico Cesare Redondi	Fall 2017	English	5
ING-INF/04	OBJECT-ORIENTED MODELLING AND SIMULATION	Francesco Casella	Jan-Feb 2018	English	5
ING-INF/01	ORGANIC ELECTRONICS: PRINCIPLES, DEVICES AND APPLICATIONS	Dario Andrea Nicola Natali	Jan/Feb 2018	English	5
ING-INF/05	PARALLEL COMPUTING USING MPI AND OPENMP	Luca Oddone Breveglieri	Feb/Jul 2018	English	5
ING-INF/01	SIGNAL INTEGRITY IN VERY-HIGH SPEED DIGITAL CIRCUITS	Angelo Geraci	July 2018	English	5
ING-INF/01	SINGLE-PHOTON DETECTORS FOR ADVANCED SCIENTIFIC AND CONSUMER APPLICATIONS	Alberto Tosi	Nov 2017/Jan 2018	English	5
ING-INF/04	SLIDING MODE CONTROL: THEORY AND APPLICATIONS	Mara Tanelli	Jan/Feb 2018	English	5
ING-INF/03	STATISTICAL SIGNAL PROCESSING	Umberto Spagnolini	Feb/Mar 2018	English	5

B) 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 support 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 PhD School courses activated for the 2017-2018 Academic Year are listed in the following table, and on the web site: http://www.dottorato.polimi.it/en/during-your-phd/phd-school-courses

Course name	Professor
Ethics in Research	Andrea Aliverti
Ethics, Technology, and Society	Viola Schiaffonati
From Knowledge to Decision	Simona Chiodo
Public Engagement and Communication for Science and Research	Paolo Ciuccarelli
Sulla Responsabilità della Tecnica	Paolo Maria Ossi
Sociology of research	Paolo Volontè
Design thinking - management and production of ideas	Nicola Crea
Methods and models for the decision making	Alberto Colorni
Collaborative Research Methodologies	Rami Shani
Scientific Communication in English	Timothy J Sluckin
Advanced Interaction Skills for Academic Professionals	Michela Arnaboldi
Professional Communication	Nicoletta Di Blas
Science, Technology, Society and Wikipedia	Guido Raos
Disseminating Research	Anna Maria Paganoni
Research Skills	Donatella Sciuto
Research Planning	Tullio Tolio
Innovative Teaching Skills	Giulio Magli
Industrial Skills	Paolo Biscari
Project Management Basics	Alfonso Fuggetta
Project Management (in Action)	Mauro Mancini
Project Management PMI-CAPM Certification Preparation	Alfonso Fuggetta

C) Other PhD courses
A maximum of 5 ECTS can be obtained by choosing among courses provided by other PhD programmes at Politecnico di Milano and/or external Institutions.

SPECIALISTIC COURSES, LONG-TRAINING SEMINARS
The attendance of Specialist Courses, Workshops, Schools, Seminars cycles is strongly encouraged and, if they are certified and evaluated, theymay provide credits according to the modalities established by the Faculty Board and upon 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 for ECTS assignment), as optional “additional teaching”.

PREPARATORY COURSES

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.

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 plan must be approved by the Tutor and by the PhD program Coordinator, according to the modalities established by the Board of professors.

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. Candidates who do not pass the exam can be qualified as “Repeating candidate”(Er) and will be allowed to repeat the year, or as “not able to carry on with the PhD (Ei)”, and will leave the PhD program.

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, which has to be deliberated by the Board of Professors.

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 thesis needs to be coherent with the research topics developed in the Department where the PhD programme is developed.

The candidate must present an original thesis, and discuss its contribution to the state of the art in the corresponding research field.

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 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.

7. Laboratories, PhD Secretary Services

The Department hosts 28 laboratories for Computer Science and Engineering, Systems and Control, Electronics, Telecommunications and advanced interdisciplinary studies. Professional technicians continuously update the laboratory infrastructures and assist researchers and students.
The list of laboratories is provided below:

Computer Science and Engineering
ARCSLAB (Adaptable, Relational and Cognitive Software Environments) Laboratory
AIRLab (Artificial Intelligence and Robotics Laboratory)
Bioinformatics and Web Engineering Lab
Embedded system laboratory (Como Campus)
HOC - Hypermedia Open Center Laboratory
Linux Laboratory
NECST Lab - Novel, Emerging Computing System Technologies
Software engineering lab
Electronics
Analog integrated circuit design
Circuits and systems: theory and applications
Digital electronic systems
Electron devices
Radiation detectors and low-noise electronics
Single-photon detectors and applications
Systems and Control
Automatic Control Laboratory
Computer Laboratory for Environmental Systems - LITA
LOOMS Laboratory
Optical and Electronic Measurements Laboratory
ORLAB
Telecommunications
ANTLab - Research and experimental laboratory of wireless network and networked embedded systems
BONSAI (Broadband Optical Networks, Security, and Advanced Internet)
Electromagnetic compatibility laboratory "C.E.S.A.R.E."
Geophysical and Radar Sounding (GEOSAR) laboratory
Image and Sound Processing Lab (ISPLab)
PoliCom
Sound and Music Computing Lab
Spino d'Adda satellite station
Wireless system laboratory (WISYLAB)

Information Technology PhD Secretariat

In this Office candidates receive information about the teaching; in particular, they 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 courses in agreement with foreign universities.
Foreign students are also supported by the specific services that offer support to cope with bureaucratic issues (visa, residence permits, documents, ...), to access Italian language courses, and housing.

Francesca Clemenza - Tel. 0223994209
E-mail address: dottoratoinginfo-deib@polimi.it, phd-inf@polimi.it

Information Technology PhD head of administration

Fabio Conti – Tel. 0223993431
E-mail address: fabio.conti@polimi.it

8. Internationalization and inter-sectoriality

Carrying out study and research activities at external laboratories 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 require a formal approval by the Board of Professors. 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 activity ($\leq$ 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.

More specifically, the PhD program in Information Technology has agreements with:

UNIVERSIDAD CARLOS III DE MADRID	*Spain*
UNIVERSIDAD NACIONAL DE COLOMBIA	*Colombia*
ECOLE POLYTECHNIQUE DE MONTREAL	*Canada*
TECHNISCHE UNIVERSITAT BERLIN	*Germany*
QUEENSLAND UNIVERSITY OF TECHNOLOGY	Australia
QATAR UNIVERSITY	*Qatar*
UNIVERSITÉ PARIS SUD	*France*
WUHAN UNIVERSITY	P.R. China

CENTER FOR COMMUNICATIONS AND SIGNAL PROCESSING OF THE NEW JERSEY INSTITUTE OF TECHNOLOGY	USA
PONTIFICIA UNIVERSITAD - BOGOTA'	Colombia
ESCUELA SUPERIOR POLITENICA DEL LITORAL	Ecuador
TELECOM PARISTECH	France

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-disciplinary mobility and wide access to knowledge. In particular, the PhD program 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*
ABB	*R&D Company*

Attachment A1 – PhD Programme Coordinator

Short CV of Programme Coordinator

Andrea Bonarini (Milano, 1957). Laurea (Master) in Electronics Engineering (Computer Engineering area), 1984. PhD in Computer Engineering in 1989 from Politecnico di Milano. Master in Neuro-Linguistic Programming in 1993, from IIPNL.

Full professor and Chair of the PhD Program in Information Technology at Politecnico di Milano, Department of Electronics, Information and Bioengineering.

Since 1990 he is coordinating the AI and Robotics Lab at Politecnico di Milano (AIRLab).

He has been nominated Fellow of the Alta Scuola Politecnica (http://www.asp-poli.it) in 2012. He is among the founders of the Italian Association for Artificial Intelligence (AI*IA) and the Italian Regional Interest Group of the IEEE Neural Network Council, now Italian Chapter of the IEEE Computational Intelligence Society (Chair from 2008 to 2010). He has been from 2003 to 2006 coordinator of the Working Group on Robotics of the AI*IA. He participated since 1997 to the Robocup initiative (member of the Executive Committee from 2002 to 2010 (www.robocup.org)).

He is currently in charge of "Informatics", "Artificial Intelligence", "Robotics and Design", and "Soft Computing" courses at the Politecnico di Milano. He has given and gives courses about "Uncertainty", "Fuzzy Logic", "Soft Computing" and "Designing Interaction" within the PhD program of Politecnico. He has tutored more than 150 Laurea (Master) Theses, some ERASMUS Theses, Alta Scuola Politecnica theses, and 12 PhD Theses in the AI, Machine Learning, and Robotics fields.

He has participated and leaded several EU, national, and industrial projects. Since 1989, he has realized with his collaborators and students more than 40 autonomous robots. His research interests are focusing on Human-Robot Interaction, but still include Intelligent Data Interpretation, Autonomous Robotic Agents (in particular for Edutainment, Entertainment, and Robogames), Affective Computing, Reinforcement Learning, and Fuzzy Systems. He has published more than 150 peer-reviewed papers on international journals, books, and proceedings of international congresses.

In 2015, he co-founded the NovaLabs start-up (www.novalabs.io), a company based on the results of research developed with PhD students in collaboration with ST Microelectronics, i.e., a HW/SW system to provide modules to implement professional robots with a plug-and-play approach. This makes it possible to implement the electronics and basic control of professional, autonomous, mobile robots (and many other devices) in 1-2 days.

Attachment A2 – PhD Board of Professors

Name	Affiliation	Scientific Disciplinary Sector
BONARINI ANDREA	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
BOLCHINI CRISTIANA	DEIB	ING-INF/05

BOLZERN PAOLO	DEIB	ING-INF/04
CASTELLETTI ANDREA	DEIB	ING-INF/04
CERI STEFANO	DEIB	ING-INF/05
CESANA MATTEO	DEIB	ING-INF/03
DERCOLE FABIO	DEIB	ING-INF/04
FAGIANO LORENZO	DEIB	ING-INF/04
FERRIGNO GIANCARLO	DEIB	ING-INF/06
FIORINI CARLO	DEIB	ING-INF/01
GARATTI SIMONE	DEIB	ING-INF/04
GATTI NICOLA	DEIB	ING-INF/05
GERACI ANGELO	DEIB	ING-INF/01
MAGARINI MAURIZIO	DEIB	ING-INF/03
MIRANDOLA RAFFAELA	DEIB	ING-INF/05
MONTI GUARNIERI ANDREA	DEIB	ING-INF/03
PERNICI BARBARA	DEIB	ING-INF/05
PRADELLA MATTEO	DEIB	ING-INF/05
RECH IVAN	DEIB	ING-INF/01
SOTTOCORNOLA SPINELLI ALESSANDRO	DEIB	ING-INF/01
TORNATORE MASSIMO	DEIB	ING-INF/03

Attachment A3 – PhD Advisory Board

Name	Affiliation
Claudio Bartolini	Cloud4Wi
Riccardo De Gaudenzi	European Space Agency
Giuseppe Fogliazza	MCM S.p.A.
Renato Marchi	Gruppo PAM
Giorgio Parladori	SM Optics s.r.l.

Fabrizio Renzi	IBM Italia S.p.A.
Massimo Valla	TIM
Maria Luisa Venturini	Vodafone Omnitel B.V.
Stefano Verzura	Huawei