



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 38th cycle

Research Area n. 4 - Telecommunications

Number of scholarship offered	4
Department	DIPARTIMENTO DI ELETTRONICA, INFORMAZIONE E BIOINGEGNERIA

Description of the Research Area

The research in the Telecommunications Area of the Ph.D. Programme in Information Technology at the Department of Electronics, Information and Bioengineering (DEIB) is organized along these lines:

- **Communications:** the main research topics are Applied Electromagnetics with particular attention to Innovative techniques for microwave circuits design, and numerical methods for electromagnetics; Information Transmission and Radio Communications with principal attention to modulation, detection theory, channel estimation and equalization, synchronization, information theory, block codes and algebraic decoding, and turbo-like codes with iterative decoding; Optical Communications, including Quantum Key Distribution, both from the system and component point of views; Wireless and Space Telecommunications (terrestrial and space telecommunications using centimeter, millimeter and optical wavelengths, identification and modeling of the radio-channel properties, design of advanced satellite-based telecommunication and broadcasting systems at centimeter and millimeter waves).
- **Networks:** the research topics focus on 5G/6G Radio Access Networks, Internet of Things, autonomic and sustainable optical and microwave networks, network softwarization (SDN, NFV), network programmability (P4), security and cryptography, Artificial Intelligence for network management, and novel network platforms for a wide range of rising applications as smart cities, sustainable mobility, disaster resiliency, e-health, etc.
- **Sensors:** the research topics focus on Remote Sensing and Signal Processing for Multimedia and Telecommunications. The activities in Remote Sensing focus on the design of innovative systems, applications and processing methods, based on imaging Synthetic Aperture RADAR (automotive, drones and cubesat/spaceborne MIMO swarms), on the study and implementation of methods and systems for assessing and tracking the integrity of pipelines transportation



assets (detection of leaks, corrosion, threats, pumps failure), and on the imaging and multidomain inversion of the properties of the subsurface for hydrocarbons exploration. See <https://www.deib.polimi.it/eng/telecommunications> and the personal web pages of the faculty members involved in the Telecommunications Area for more information on the current research activities.

All the research activities carried out within the Telecommunication Area are characterized by a high level of interdisciplinary ranging from mathematics, physics, computer science, digital mono/multi-dimensional signal processing and obviously topics traditionally connected to telecommunications and remote sensing.

The Telecommunications area is characterized by strong connections with Universities and Research Centers in Europe and outside Europe, but also by a strict cooperation with leading-edge companies active in the Telecommunication/Remote-Sensing/Multimedia markets and also outside these areas offering to PhDs effective possibilities to found excellent job opportunities in high-tech companies.

Further information:

- Research at the DEIB Department: <https://www.deib.polimi.it/eng/>
- PhD Programme in Information Technology (IT PhD): <https://dottoratoit.deib.polimi.it/>
- Telecommunications Section at DEIB: <https://www.deib.polimi.it/eng/telecommunications>



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OPEN SUBJECT Research Field: TELECOMMUNICATIONS

Monthly net income of PhDscholarship (max 36 months)
€ 1250.0
In case of a change of the welfare rates or of changes of the scholarship minimum amount from the Ministry of University and Research, during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	<p>The research field Telecommunications is focused on the design and implementation of devices, systems, networks (Internet, wireless networks, optical networks), services, and applications for the transmission and the processing of any type of signals (including audio, video, RADAR) and multimedia information. Particular attention is given to advanced networks and transmission systems for mobile and fixed users and to remote sensing applications aiming at earth observation and sub-soil exploration.</p> <p>The strong connection with leading companies (within and outside the telecommunication market) makes the mix between theory and application one of the strengths of the Telecommunications research field at Politecnico di Milano.</p> <p>http://www.deib.polimi.it/eng/telecommunications</p>
Methods and techniques that will be developed and used to carry out the research	<p>The research is carried out with the support of a supervisor and of his research group. Seminars and courses are offered to encourage an interdisciplinary approach to the research. Computer simulation and/or laboratory activities are always required to finalize the research.</p>
Educational objectives	<p>The doctoral program offers advanced training in the hot topics explored by the scientific community and industry.</p>



	<p>A period of study within one among the worldwide most recognized research institutions is supported by the doctoral school and the supervisor.</p> <p>http://dottoratoit.deib.polimi.it/</p>
Job opportunities	<p>Careers in the leading telecommunication, remote sensing, multimedia companies are facilitated by the strong connection between the academic and industrial research. Post doc positions in the university are frequently offered.</p>
Composition of the research group	<p>11 Full Professors 20 Associated Professors 11 Assistant Professors 57 PhD Students</p>
Name of the research directors	<p>Any faculty member can act as research advisor</p>

Contacts
<p>Prof. Mario Martinelli Coordinator of the Telecommunications area E-mail: mario.martinelli @polimi.it Phone: +39 02 2399 3676 Web: http://www.deib.polimi.it/eng/people/details/60424</p>
<p>Prof. Carlo Giuseppe Riva Vice-coordinator of the Ph.D. IT Programme for the Telecommunications area E-mail: carlo.riva@polimi.it Phone: +39 02 2399 3659 Web: https://www.deib.polimi.it/eng/people/details/339682</p>
<p>Prof. Luigi Piroddi Coordinator of the Ph.D. IT Programme E-mail: luigi.piroddi@polimi.it Phone: +39 02 2399 3556 Web: https://www.deib.polimi.it/eng/people/details/318548</p>

Additional support - Financial aid per PhD student per year (gross amount)			
	1st year	2nd year	3rd year
Housing - Foreign Students	1500.0 € per student	1000.0 € per student	1000.0 € per student
max number of financial aid available: 2, given in order of merit ..			



Housing - Out-of-town residents (more than 80Km out of Milano)	--
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Scholarship Increase for a period abroad	
Amount monthly	625.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p><u>EDUCATIONAL ACTIVITIES</u> (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student 5.095,96 Euro</p> <p><u>TEACHING ASSISTANTSHIP</u>: availability of funding in recognition of supporting teaching activities by the PhD student There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.</p> <p><u>COMPUTER AVAILABILITY</u>: 1st year: Yes 2nd year: Yes 3rd year: Yes</p> <p><u>DESK AVAILABILITY</u>: 1st year: Yes 2nd year: Yes 3rd year: Yes</p>