Sant'Anna
Scuola Universitaria Superiore Pisa

Factsheet no. 6

Ph.D. Programme in Emerging Digital Technologies

https://www.santannapisa.it/en/training/international-phd-course-emerging-digital-technologies

Ph.D. Coordinator	Prof. Luca Valcarenghi e-mail: info-phdtecip@santannapisa.it
Language	English
Duration	3 years
Academic Objectives	The objective of the programme is to train professionals for public and private, national and international, research bodies, and for companies providing products or services in the fields of communication, information, and perception technologies.
Curricula	**Embedded Systems:** It focuses on real-time embedded software for safe and secure cyber-physical systems, hardware acceleration of deep neural networks, operating systems, cloud computing, hypervisors, and software architectures for predictable support of machine learning algorithms in safety-critical systems, such as autonomous driving and artificial intelligence for industrial systems. **Photonic Technologies**: It focuses on photonic integrated circuits and sensors, optical communication systems and networks, microwave photonics for 5G/6G, photonics for radar and lidar, optical wireless, artificial intelligence in telecommunication networks, and programmable telecommunication networks. Applications span terrestrial, aerial, and space domains. **Perceptual Robotics:** It focuses on human-robot interaction systems, telerobotics and virtual environments, intelligent automation systems and artificial intelligence, mechanical engineering and intelligent machine design, human-robot interaction, and wearable robotics, virtual and augmented.
Available Positions	**no. 9 positions with a scholarship,** as follows: • **no. 6** funded by Scuola Superiore Sant'Anna on the research topics related to the Ph.D. in EDT curricula and the "*Dipartimento di Eccellenza*" in Robotics and AI (at least two scholarships will be assigned to each curriculum); • **no. 1** "Prof. Di Natale" scholarship on one of the following topics: o real-time systems; o design optimization of embedded systems; o software for automotive systems; • **no. 2** funded by the ERC BREATHE project (Horizon ERC-2022-COG, grant number 101088694) on the following topics: o development of a mixed numerical and experimental strategy to verify air-breathing electrical propulsors; o development of power control and diagnostics systems for miniaturized air electrical propulsors. Other scholarships that may become available will be published on the webpage at: https://www.santannapisa.it/it/formazione/dottorato-internazionale-emerging-digital-technologies
Additional documentation to be attached to the online application	Mandatory documents (in addition to those already listed in Art. 3 of the Call for Applications): • A copy of the **degree thesis** (Vecchio Ordinamento degree, specialistica/magistrale degree, degree obtained abroad, comparable in duration and contents to the Italian degree) or an abstract of the thesis (along with a copy of the cover in Italian or English). Candidates who have not yet

	received their degree must attach a final draft copy of the thesis or an abstract to their application. • The **research project** requested in the Call shall have the following features: o The content must not exceed 3000 words (the content exceeding this limit will not be considered). o The research project shall embrace a three-year development and include in detail: ▪ research title; ▪ scientific background and relevant bibliography; ▪ research aims and expectations; ▪ where necessary, experimental and data analysis methodologies; ▪ connections and implications on the PhD EDT curriculum research topics. o The proposed research project is not binding in terms of the definition of the research programme to be developed within the Course. Other optional documents: • Copy of **publications** relevant to the evaluation, including full bibliographic references. • Any **other document** relevant to the evaluation (for instance GRE certificates, awards, job experiences, course and workshop attendance, etc…)
Evaluation Criteria	The selection consists of the assessment of the submitted qualifications and an interview. The Selection Committee will award a score out of one hundred, from 1 to 100. ***Assessment of qualifications – maximum score: 70*** The Selection Committee will assess the CV and any scientific qualifications submitted. The candidate's research plan will be assessed in terms of quality, feasibility, and relevance concerning the lines of research specified in the "curricula" sections of this information sheet. Candidates obtaining a score of at least 49/70 in the assessment of qualifications phase will be admitted to the interview. The School will publish the list of candidates selected for the interview and the interview schedule on the webpage: https://www.santannapisa.it/en/education/international-phd-course-emerging-digital-technologies Candidates are not required to be present during the assessment of qualifications. ***Interview – maximum possible score: 30*** The interview will consist of a discussion about the qualifications submitted, in particular the CV, and about the proposed research topics, as well as verification of the level of knowledge of the English language. Candidates obtaining a score below 21/30 in the interview will be excluded from the final ranking list. The interview will take place on the premises of the School, in the city of Pisa. In special cases, subject to the Selection Committee's approval, the interview may be conducted as a video conference through the platforms available at the School. In this case, the candidate must select their preference in the application form and attach a copy of their identity document, which must include a clear photograph. The identity document used in the online application form must also be shown before the video conference starts, to allow for a clear identification of the candidate. Candidates should be prepared to interview at any time during the day scheduled for the selection. In the event of failure or connectivity problems, the examining Commission may decide to postpone the interview to another time available, within the test schedule.

	The minimum score for inclusion in the final ranking list is 70/100. If positions are still available in one of the curricula included in the Programme, their scholarships may be assigned to other curricula, according to the ranking list order.
Contacts	info-phdtecip@santannapisa.it +39 050 882191

Sant'Anna
Scuola Universitaria Superiore Pisa

SHEET OF THE SKILLS REQUIRED FOR ADMISSION TO THE PHD IN EMERGING DIGITAL TECHNOLOGIES

Skills required for the Embedded Systems curriculum:

Basic Calculus
Fundamentals of Physics
Fundamentals of Computer Programming
Computer Architectures
Fundamentals of Digital Circuits
Fundamentals of System Theory
Operating Systems

Skills required for the Photonic Technologies curriculum:

Profilo A – Optical Communication systems and photonic devices (check 4 out 7)	Profilo B – Optical Networks (check 4 out of 7)
Advanced Calculus	Advanced Calculus
Fundamentals of Physics	Fundamentals of Physics
Digital Communication Theory	Digital Communication Theory
Fundamentals of Optical Communications	Fundamentals of Optical Communications
Fundamentals of Optoelectronics	Computer Networks
Electromagnetic Fields	Fundamentals of Computer Science
Fundamentals of Computer Programming	Fundamentals of Computer Programming

Skills required for the Perceptual Robotics curriculum:

Profile A – Industrial	Profile B – Informatics
Common requirements:	**Common requirements:**
Elements of Algebra and Analysis	Elements of Algebra and Analysis
Elements of Physics	Elements of Physics
Fundamental of Robotics	Elements of Computer Programming
Fundamental of Robotics or Fluid Mechanics	
Check 3 out of 5 from:	**Check 3 out of 5 from:**
Automation and Control	Computer Architectures
Fundamentals of Applied Mechanics	Theory of Dynamic Systems
Fundamentals of Machine Design	Fundamentals of Operating Systems
Fundamental of Electronics or Mechatronics	Signal Theory
Measurement and Data Analysis	Fundamentals of Artificial Intelligence
Fundamentals of Applied Mechanics or Thermodynamics	