TABLE 3 – PhD Programme INDUSTRIAL AND INFORMATION ENGINEERING

THE PhD PROGRAMME	
Administrative location	University of Udine, Polytechnic Department of Engineering and Architecture (DPIA) - via delle Scienze 206, 33100 Udine, ITALY (tel. +39 0432 558253)
Associated location	-
Location for training, teaching and research activity	Teaching and other training activities will take place primarily at the administrative programme location or in other locations of the University of Udine. The research program will be mainly developed, depending on the scholarship (see art. 11 and 14 of the Call) and/or on the supervisor assigned, at one of these locations: administrative location or financial supporter's location (if the financial supporter is an external institution).
Coordinator	Prof. David Esseni (david.esseni@uniud.it)
Programme duration	3 years
Curricula	1. New management paradigms and fabrication technologies for competitive enterprises with low environmental impact; 2. Information and communication technology for the inclusive society; 3. Design of innovative thermo-electro-mechanical systems and development of advanced methods for the assessment of structural damage and reliability for energy saving; 4. Mechanical technologies and electronic devices for domotics, medical diagnostic and safety.
Research topics	- *Curriculum 1 - New management paradigms and fabrication technologies for competitive enterprises with low environmental impact* 1. Lean management, agile project management, operations management, production planning and control, supply chain management, purchasing and supplier management, innovation management, new product development, global manufacturing, complexity management, performance measurement systems; 2. System and machinery efficiency for industrial production; 3. Cognitive features of products development in view of CAD-PLM technologies; 4. Characteristics and applicability of emerging prototyping methodologies (augmented reality, functional mock-up, interaction design, etc.); 5. Smart logistics: computation models and algorithms; 6. New technologies for the manufacturing of innovative materials; 7. Systems for monitoring and control of machine tools; 8. Methodologies for the design of automatic systems with a high energy and production efficiency. Approaches to system and product innovation; 9. Robotic systems for the industrial sustainability; 10. Robotic systems for production and energy efficiency. - *Curriculum 2 - Information and communication technology for the inclusive society* 1. Nano-electronic devices (MOSFETs, Steep Slope, etc.) for energy efficient and high-performance electronics. Non-volatile Memories for massive 3D integration (Flash, charge trap); 2. Advanced electron devices based on innovative materials and architectures in the Beyond CMOS and More than Moore domains: graphene, 2D crystals, III-V compound semiconductor devices; 3. Semi-classical (BTE) and quantum mechanical (NEGF) simulation of nanoelectronics devices; 4. Integrated circuit design for energy efficient communications, energy conversion and management; 5. Innovative communication paradigms and systems: systems with multiple antennae, distributed communication systems, HW and SW architectures for telecommunications; 6. Multimedia signals processing and analysis: video and image encoding, video streaming based on peer-to-peer networks, joint source/channel encoding, compressive sensing; 7. Test and development of metaheuristic algorithms for combinatorial problems: 8. Pervasive computing, cloud computing, overlay networking, distributed computing in miscellaneous networks of computers; 9. Artificial vision system, virtual sound, machine learning; 10. Wireless communication systems and networks, signal processing for communication, physical substrate algorithms, transmission system algorithms. 11. Data and Information Fusion. *Curriculum 3 – Design of innovative thermo-electro-mechanical systems and development of advanced methods for the assessment of structural damage and reliability for energy saving* 1. Energy harvesting systems for self powered, smart, distributed sensors; 2. Electro-mechanical devices for innovative production and storage energy systems; 3. New paradigms, systems, technologies for surface and air transportation vehicles with low energy consumption; 4. Improving the performance and energy efficiency of industrial systems through innovative power electronic converters, machines and electric drives;

TABLE 3 – PhD Programme INDUSTRIAL AND INFORMATION ENGINEERING

	5. Power electronic converters, electrical machines and drives for electric power generation and distribution, and electric mobility of the future; 6. On board electronics: terrestrial and satellite localisation and navigation systems; communication networks and systems; 7. Green mechatronics: mechatronics for energy saving; 8. Design methodologies for materials handling systems characterised by low environmental impact; 9. Holistic design of lightweight structures for low emissions and low energy consumption vehicles; 10. Design of energy efficiency industrial plants; 11. Stress and strain analysis of materials and structures subjected to time-dependant deformation processes; 12. Methods for structural integrity design and verification; 13. Developments of damage-tolerant design methods; 14. Multi-physics analyses for the evaluation of the stress/strain state in materials and engineering structures; 15. Micromechanical damaging processes in materials; 16. Behaviour characterisation and modelling of materials processed by advanced manufacturing techniques; 17. Modeling and control of mechanical and mechatronic systems; 18. Modeling and control of vibrations in mechanical systems; 19. Numerical modeling for the simulation of electromagnetic devices and fields. *Curriculum 4 – Mechanical technologies and electronic devices for domotics, medical diagnostic and safety* 1. Smart systems and technologies for home, working and leisure environments 2. Systems for safety at work, on the road, at home; systems for the management of home assistance activities; 3. Sensors, devices and instrumentation for medical care and tests and for the support of the elderly; systems for the planning and support of hospital activities; 4. Innovative paradigms for the interaction of domotics, surgery and security devices; 5. Passive and active control of noise and vibration for industrial, home and surface-air transport vehicles applications; 6. Devices and instrumentation for the detection of biomedical parameters: nanosensors 7. Robots for eldery and disable people assistance; 8. Robots for surgery applications; 9. Large scale tri-dimensional image modelling, automatic synthesis of binocular video flows from monocular sources; 10. Geophysics; seismic data acquisition, vulcanology, geostatics, seismic risk evaluation.
Research programmes	The research programs, if not already defined by funding organizations or specific funding lines (see "Available positions and Examinations procedures", art. 3 p. 5 of the Call), are determined by the Teaching Board among the topics offered by the curricula.
Programme website	https://www.uniud.it/en/research/do-research/doctorate-res/our-ph-d-programmes/area-physical-science-and-engineering/industrial-and-information-engineering/ph-d-programme/industrial-and-information-engineering?set_language=en https://phd.diegm.uniud.it/iie-phd/

ADMISSION REQUIREMENTS	
Required degree	Italian Laurea (before DM 509/99) or Italian Laurea specialistica/magistrale (ex DM 509/1999 and DM 270/04) or equivalent degree obtained abroad. Foreign degrees and titles: refer to art. 4 and 5 of the Call.
Knowledge of the following foreign language	English

DOCUMENTS AND QUALIFICATIONS TO BE ATTACHED TO THE APPLICATION FOR ADMISSION	
<u>Mandatory</u> documents (art. 6 of the Call) UNDER PENALITY OF EXCLUSION	1. Certification or self-certification (pursuant to art. 6 c. 5 of the Call) of the academic qualification for admission to the doctoral program (Italian Laurea Specialistica/Magistrale or Italian Laurea before DM 509/99 or foreign degree); 2. Curriculum vitae et studiorum, dated and signed; 3. Copy of a valid identity document (citizens of countries not belonging to the European Union a copy of a valid passport, comprehensive of the pages containing the holder's photo, personal details, passport number, date and place of issue, date of expiry).
<u>Optional</u> documents (art. 6 of the Call)	1. Master thesis ("Tesi di Laurea") associated to the degree/title providing access to the PhD programme. Applicants who are not graduated on the expiration date of this Call can submit an extended abstract in place of the complete thesis, in Italian

TABLE 3 – PhD Programme INDUSTRIAL AND INFORMATION ENGINEERING

	or English, signed by themselves and by their thesis Supervisor (approximate limit: 25.000 characters, including spaces); 2. Motivational letter by which the applicant explains the reasons for admission to the PhD programme, dated and signed (approximate limit: 2,500 characters, included spaces); 3. Publications (max 2); 4. Letters of reference (max 2), from university professors, scientific researchers or other experts in the field (art. 7 of the Call).
All titles must be submitted exclusively in PDF format, dated and signed by the candidate.	

SELECTION COMMITTEE	
Appointed members	Franco Blanchini – Full Professor – University of Udine Lorenzo Scalera – Associate Professor – University of Udine Mirko Loghi – Researcher – University of Udine
Substitute members	David Esseni – Full Professor – University of Udine Stefano Filippi – Full Professor – University of Udine Roberto Rinaldo – Full Professor – University of Udine

ADMISSION

Competition procedure and test schedule		
Evaluation of qualifications and oral examination. For the evaluation of applicants' attitude for scientific research and their basic skills to tackle the course program, the Selection Committee can attribute up to 100 points to each applicant: max 30 points to the titles and max 70 points to the oral examination. The applicant is admitted to the oral examination if his/her titles receive at least 16 points. The oral examination is passed with at least 49 points. The applicant is eligible to the PhD programme if he/she passes the oral examination. Only for eligible applicants, the points attained in in the oral examination will be added to the points of the titles.		
Language that can be used for the exam	Italian or English	
Evaluation Criteria of qualifications *During the preliminary meeting the Selection Committee may establish sub-criteria for the evaluation*	Curriculum vitae et studiorum	*max.15*
	Scientific publications	*max.5*
	Thesis/Abstract	*max.2*
	Letters of reference	*max.4*
	Motivational letter for admission to the PhD programme	*max.4*
Oral examination	**The oral examination takes place on line (art. 9 p. 4 of the Call).** The oral examination consists of an individual interview of about 15 minutes aiming to assess the applicant flair to undertake a research doctorate and to carry out the research tasks in the areas of interest for the doctorate. The interview will be assessed considering the following criteria: a) technical and scientific competence in the topics of the doctorate; b) knowledge of the state of the art for the doctorate curricula; c) mastery of English.	