DOCTORAL PROGRAMME

IN

INDUSTRIAL ENGINEERING

Director prof. Giovanni Ferrara

XXXVII cycle – academic year 2021/2022

TECHNOLOGICAL AREA	
ADMINISTRATIVE OFFICE	Department of Industrial Engineering Florence (DIEF)
CURRICULA	1. Energy and Innovative Industrial and Environmental Technologies 2. Design and Development of Industrial Products and Processes 3. Industrial Engineering and Reliability 4. Science and Engineering of Materials
	POSITIONS AVAILABLE: 17 Positions with scholarship: 15 Positions without Scholarship: 2
SCHOLARSHIPS: 15	**6** - University of Florence **5** - Department of Industrial Engineering Florence (DIEF) **1** - co-funded by Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali (INSTM) and Department of Industrial Engineering **Thematic:** "Nano-structured magnetic materials: development and applications". **1** - co-funded by Consorzio PIN and Department of Industrial Engineering **Thematic:** "Value-based healthcare and technology assessment: applications in home care services". **1** - Nuovo Pignone tecnologie s.r.l. **Thematic:** "Numerical modelling and test support of non-conventional gas turbine combustion processes involving Exhaust Gas Recirculation, fuel mixtures based on ammonia, hydrogen and/or high C2+ hydrocarbon content". **1** - KW Apparecchi Scientifici **Thematic:** "Development of systems & components for ultra-low-temp solutions".
STUDY/RESEARCH PERIODS ABROAD	Mandatory only for positions with scholarship
MANDATORY PERIOD REQUIRED	3 months

DOCUMENTS REQUIRED FOR THE ADMISSION (under penalty of exclusion)	• Copy of the Identification Document • Self-declaration for qualifications (bachelor's/Master's/combined cycle degree) obtained in Italy with a list of all exams taken and their mark, title of the thesis and graduation mark (download the form **here** make sure you **fill in in all the fields**) • Foreign qualification required to access with a list of all exams taken and their mark, title of the thesis and graduation mark *The same documentation except for the final mark must be submitted by those who will graduate by 31/10/2021*
DOCUMENTS REQUIRED FOR THE EVALUATION	**MANDATORY** • Curriculum Vitae • Research project **OPTIONAL** • Abstract of the MSc degree Thesis • Scientific publications • Any other additional qualification document
REFERENCE LETTERS	A section is provided in the online application to specify the e-mail addresses of two professors/researchers willing to provide information about candidates training path and activities performed within a scientific field related to the Ph.D. course.
RESEARCH PROJECT	The **research project** must be written in Italian or English in NO MORE than 12,000 characters including spacing, abstract, introduction and references The project must be related, and should make specific reference, to one of the proposed work subjects listed in the below section **"Thematics"**.
EVALUATION PROCEDURE	• **Evaluation of curriculum vitae, research project, publications and /or other qualification documents** • **Interview** As detailed in the section below **"Evaluation Marks"**.
OTHER LANGUAGES FOR THE INTERVIEW	English
INTERVIEW MODE	**Remotely** (videocall)

EVALUATION MARKS	parameter	minimum score	maximum score
	Curriculum vitae; publications, other qualification documents	12/120	18/120
	Evaluation of the research project	48/120	62/120
	Applicants who obtain a mark of at least 60/120 according to the minimum score for each parameter will be admitted to the interview.		
	Interview: discussion of the research project and publications (if any)	20/120	40/120
	Eligibility is achieved with a minimum score of 80/120		

THEMATICS	- Advanced numerical modelling of combustion and heat transfer processes in gas turbine combustors using unconventional fuels based on hydrogen blends or liquid synthetic fuels - Development and innovation in gas turbine cooling systems through new manufacturing technologies - Numerical modelling and test support of non-conventional gas turbine combustion processes involving Exhaust Gas Recirculation, fuel mixtures based on ammonia, hydrogen and/or high C2+ hydrocarbon content - Resilient Energetic Smart city analysis with economic analysis - Aerodynamics and aeromechanics design methodologies for multi-stage axial compressors - Numerical methods for the multi-disciplinary design of turbomachinery modules for industrial applications - Geothermal Energy for Emerging Countries - Research and development of innovative methodologies based on reverse engineering and additive manufacturing for biomedical devices - Development of tools and methods based on reverse engineering for the diagnosis and treatment of scars in paediatrics - Development of numerical and experimental approaches for the characterisation of operating machines - Development of Actuator Line simulation methods for horizontal axis wind turbines - Value-based healthcare and technology assessment: applications in home care services - Development of digital twins for logistics service optimization - Nanostructured magnetic materials or molecular magnetic materials and their applications respectively in the sectors: a) of induction catalysis, replacement of critical materials, and high frequency electronic devices; b) of molecular electronics, spintronics and optoelectronics for the development of technologies for quantum computation and data storage. - Development of intelligent strategies for biosignals monitoring and processing in biorobotics applications - Development of control strategies for autonomous underwater vehicle-manipulator systems - Development of navigation strategies for autonomous underwater vehicles for monitoring and for intervention - Optimisation of driving dynamics and wheel-rail interaction railway vehicles - Multi-physics structural optimisation of railway vehicle components - Development of fluid-dynamic and direct-contact bearing for rotordynamic applications - Theoretical, numerical and experimental research on refrigeration with natural fluids - Biomimetic humid air processes for water treatment and high-efficiency HVAC - Hydrodynamic cavitation applied to the extraction of nutraceutical substances from biomass - Study and development of motor cognitive dual task protocols for early diagnosis in neurodegenerative diseases through wearable sensors, neuroimaging and machine learning - Study and development of bio-inspired social robots for rehabilitation and clinical assessment in neuro-cognitive declines - Numerical / experimental techniques for the development and approval of advanced driver assistance systems (ADAS) in a controlled environment and

	on the road. - Development of smart systems for the use of solar energy and PED solutions - Development of systems & components for the rationalization of energy use at industrial and residential level - Development of systems & components for ultra-low-temp solutions - Study and development of a single-user electric vehicle

Further information available at the following web page:
https://www.dief.unifi.it/vp-344-dottorato.html

EXAMINATIONS SCHEDULE

	DATE	TIME
INTERVIEW	September 7th 2021	9:30 a.m.

The list of the candidates admitted to the interview and the final ranking will be published at the following web page: https://www.unifi.it/p12018.html