

<b>PhD Programme in INDUSTRIAL ENGINEERING</b>	
DISCIPLINARY SCIENTIFIC AREA	09 - INDUSTRIAL AND INFORMATION ENGINEERING; 08 - CIVIL ENGINEERING AND ARCHITECTURE
COORDINATOR	PROF. MICHELE MASCIA
HEAD DEPARTMENT	DEPARTMENT OF MECHANICAL, CHEMICAL AND MATERIAL ENGINEERING
DURATION	3 years
LEARNING OUTCOMES AND RESEARCH TOPICS	<p>The goal of the PhD programme is to train students who are aiming to become research-oriented staff members at academic institutions, research centres and industries, and who will be able to develop new projects with high scientific and technological content.</p> <p>The PhD involves: the completion of a literature review, developing original research with the collection of results, producing a thesis, submitting it as a written study, and elaborating the thesis in an oral exam or presentation to the PhD evaluation board.</p> <p>Specific courses with final exams are also included in the programme.</p> <p>The main topics (as ERC subsector) of the PhD programme in Industrial Engineering are the following:</p> <p>PE7_1 Control engineering  PE7_2 Electrical and electronic engineering: semiconductors, components, systems  PE7_4 Simulation engineering and modelling  PE6_6 Informatics and information systems  PE8_2 Chemical engineering, technical chemistry  PE8_6 Energy systems (production, distribution, application)  PE8_8 Mechanical and manufacturing engineering (shaping, mounting, joining, separation)  PE2_3 Nuclear physics  LS7_1 Medical engineering and technology</p>
ELIGIBILITY AND OTHER REQUIREMENTS FOR CANDIDATES (ART. 2 - NOTICE OF COMPETITION)	LM-4 Architettura e ingegneria edile-architettura LM-13 Farmacia e farmacia industriale LM-17 Fisica LM-20 Ingegneria aerospaziale e astronautica LM-21 Ingegneria biomedica LM-22 Ingegneria chimica LM-23 Ingegneria civile LM-24 Ingegneria dei sistemi edilizi LM-25 Ingegneria dell'automazione LM-26 Ingegneria della sicurezza LM-27 Ingegneria delle telecomunicazioni LM-28 Ingegneria elettrica LM-29 Ingegneria elettronica LM-30 Ingegneria energetica e nucleare LM-31 Ingegneria gestionale LM-32 Ingegneria informatica LM-33 Ingegneria meccanica LM-34 Ingegneria navale LM-35 Ingegneria per l'ambiente e il territorio LM-40 Matematica

	<p>LM-44 Modellistica matematico-fisica per l'ingegneria  LM-53 Scienza e ingegneria dei materiali  LM-54 Scienze chimiche  LM-70 Scienze e tecnologie alimentari  LM-71 Scienze e tecnologie della chimica industriale  LM-75 Scienze e tecnologie per l'ambiente e il territorio  14/S (specialistiche in farmacia e farmacia industriale)  20/S (specialistiche in fisica)  25/S (specialistiche in ingegneria aerospaziale e astronautica)  26/S (specialistiche in ingegneria biomedica)  27/S (specialistiche in ingegneria chimica)  28/S (specialistiche in ingegneria civile)  29/S (specialistiche in ingegneria dell'automazione)  30/S (specialistiche in ingegneria delle telecomunicazioni)  31/S (specialistiche in ingegneria elettrica)  32/S (specialistiche in ingegneria elettronica)  33/S (specialistiche in ingegneria energetica e nucleare)  34/S (specialistiche in ingegneria gestionale)  35/S (specialistiche in ingegneria informatica)  36/S (specialistiche in ingegneria meccanica)  37/S (specialistiche in ingegneria navale)  38/S (specialistiche in ingegneria per l'ambiente e il territorio)  45/S (specialistiche in matematica)  50/S (specialistiche in modellistica matematico-fisica per l'ingegneria)  61/S (specialistiche in scienza e ingegneria dei materiali)  62/S (specialistiche in scienze chimiche)  82/S (specialistiche in scienze e tecnologie per l'ambiente e il territorio)</p> <p>Candidates with other master's degrees:  Foreign academic degrees equivalent to the Italian degrees mentioned above (the equivalence with the Italian regulations will be assessed by the PhD admission board).</p>
ADMISSION TESTS	<p>ASSESSMENT OF QUALIFICATIONS AND CURRICULUM VITAE, AND INTERVIEW</p> <p>The interview will be aimed at verifying the candidate's ability to orient himself/herself on the main fields of study related to the Doctorate and to verify his/her knowledge in chemical sciences and technologies, skills of analysis, elaboration and communication, and can take place, at the request of the candidate, also in English.</p> <p>During the interview, the candidate will discuss his/her 3-year research project. The project (preferably written in English) must be uploaded along with the documents listed in art. 3 of the PhD notice of competition (<i>Annex A "Titoli valutabili e Curriculum Vitae"; Annex B 'Dichiarazione sostitutiva di certificazioni del/i titolo/i di accesso con esami e voti'; two-sided coloured scanned copy of a valid ID, with a clear photo</i>), within the deadline (file name: progetto_di_ricerca_surname_name).</p> <p>During the interview, the candidate's language skills in English will be assessed.</p> <p>Candidates who are unable, for justified reasons, to take the interview at the established location, may be given the opportunity to conduct it by teleconference, on the same date and time established for face-to-face interviews, according to the instructions of the notice of competition.</p>
ADMISSION TESTS FOR FOREIGN CANDIDATES APPLYING FOR RESERVED POSITIONS SUPPORTED BY A SCHOLARSHIP	<p>ASSESSMENT OF QUALIFICATIONS AND CV, VIDEO CONFERENCE INTERVIEW</p> <p>The interview will focus mainly on the experiences gained by the candidate in the topics specific to the Doctorate and on the topics that he/she would</p>

	<p>propose as a possible object of the activity to be developed during the three-year PhD programme.</p> <p>During the interview, the candidate will discuss a three-year research project, which must be submitted in addition to the documents required in art. 3 of the notice of competition (<i>certificate attesting the award of a 2<sup>nd</sup> level foreign degree needed to access a PhD programme, including exams and marks, with a translation in Italian or English; certificate attesting the award of a 1<sup>st</sup> level foreign degree, including and marks, with a translation in Italian or English; signed Curriculum Vitae preferably in EU format, in English or Italian; additional qualifications, certifications, publications (up to 5) and work experiences, detailed in English or in Italian; two-sided coloured scanned copy of a valid passport, with a clear photo</i>), within the deadline (file name: research project_surname_name).</p> <p>During the interview, the candidate's language skills in English will be assessed.</p> <p>Reference letters must be written in English, using the form available on the webpage <a href="https://unica.it/dottoraticerca">https://unica.it/dottoraticerca</a> (How to apply for PhD selection: Guidelines and forms- Annex D), by a university professor or an expert in the research fields of the PhD programme, on letterhead of their institution, dated and signed. Evaluators will send their letters directly to the email address phdcall_referenceletter@unica.it (object: surname and name of the candidate being evaluated and name of the PhD programme for which he/she is applying).</p>
POSITIONS	8 (1 of which reserved for foreign candidates with a degree awarded abroad)
SCHOLARSHIPS	7: 1 funded by UniCa; 3 funded by Ministerial Decree no. 118/2023: 1 NRRP Research, 1 Public Administration, 1 Digital and Environmental Transitions; 3 funded by Ministerial Decree no. 117/2023
POSITIONS WITHOUT SCHOLARSHIP	1
CONTACT PERSON	PROF. MICHELE MASCIA EMAIL: <a href="mailto:michele.mascia@unica.it">michele.mascia@unica.it</a> - TEL. +39 0706755054
WEBSITE	<a href="https://dottorati.unica.it/ingegneriindustriale/">https://dottorati.unica.it/ingegneriindustriale/</a>
<b>SCHOLARSHIPS FUNDED BY MINISTERIAL DECREE NO. 118/2023</b>	
<b>SCHOLARSHIP 1</b>	
TYPOLOGY	NRRP Research
RESEARCH PROJECT	Innovative technologies of the industrial engineering applied to the topics of the NextGenerationEU plan
PRINCIPAL INVESTIGATOR	Prof. Michele Mascia
DESCRIPTION OF DOCTORAL TRAINING	The PhD student will develop an original research project on the topics described by the ERC keywords and descriptors: PE7 Systems and communication engineering: electronic, communication, optical and systems engineering; PE8 Products and process engineering. The programme will also include: internships at companies or research centres; internships at foreign institutions; attendance of schools; publication of the results in international journals; presentation of the results in international conferences.
FOREIGN INSTITUTION	The foreign institution where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6
<b>BORSA 2</b>	
TYPOLOGY	Public Administration

RESEARCH PROJECT	Innovative technologies of the industrial engineering for enabling the digital and environmental transition in the civil service
PRINCIPAL INVESTIGATOR	Prof. Michele Mascia
DESCRIPTION OF DOCTORAL TRAINING	The PhD student will develop an original research project on the topics described by the ERC keywords and descriptors: PE7 Systems and communication engineering: electronic, communication, optical and systems engineering; PE8 Products and process engineering. The programme will also include: internships at companies or research centres; internships at foreign institutions; attendance of schools; publication of the results in international journals; presentation of the results in international conferences.
COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	The company/research institution/public administration where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	6
FOREIGN INSTITUTION	The foreign institution where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6
<b>BORSA 3</b>	
TYPOLOGY	Digital and Environmental Transitions
RESEARCH PROJECT	Innovative technologies of the industrial engineering for enabling the digital and environmental transition
PRINCIPAL INVESTIGATOR	Prof. Michele Mascia
DESCRIPTION OF DOCTORAL TRAINING	The PhD student will develop an original research project on the topics described by the ERC keywords and descriptors: PE7 Systems and communication engineering: electronic, communication, optical and systems engineering; PE8 Products and process engineering. The programme will also include: internships at companies or research centres; internships at foreign institutions; attendance of schools; publication of the results in international journals; presentation of the results in international conferences.
COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	The company/research institution/public administration where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION/PUBLIC ADMINISTRATION	6
FOREIGN INSTITUTION	The foreign institution where the activity will be carried out and the relative contact person will be defined after the conclusion of the selection proceedings.
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6
<b>SCHOLARSHIPS FUNDED BY MINISTERIAL DECREE NO. 117/2023</b>	
<b>SCHOLARSHIP 1</b>	
TYPOLOGY	Innovative doctorates responding to the innovation needs of companies and promoting the recruitment of researchers by companies (M4C2 - Inv. 3.3)
RESEARCH PROJECT	Development of a demonstrator for the integrated production of hydrogen and hydrogen carriers from renewable energy sources

PRINCIPAL INVESTIGATORS	Prof. Giorgio Cau, Professional Engineer, and Prof. Fabrizio Pilo, Professional Engineer
DESCRIPTION OF DOCTORAL TRAINING	<p>The training activities provided during the PhD will focus on industrial engineering themes related to the energy transition based on the overall chain of green hydrogen production and use. In particular, the training activities will be structured as follows:</p> <ul style="list-style-type: none"> <li>- Training activities offered by the PhD in Industrial Engineering consisting of academic courses, such as: Methods of energy analysis and optimization, Eco-sustainable industrial development.</li> <li>- Research activity at the partner company, aimed at the development and implementation of the demonstrator.</li> <li>- Research activity at the foreign institution, which is at the forefront in the field of hydrogen production systems through electrolysis, storage technologies and transformation processes.</li> <li>- Study and research activities aimed at preparing journal papers, communication at international conferences and reports on the themes of energy transition through RES and green hydrogen.</li> </ul>
COMPANY/RESEARCH INSTITUTION	Remosa s.r.l. Legal head office: Loc. Macchiareddu, Strada VI Ovest - 09068 Uta, Italy Contact person: Ing. Andrea Pusceddu (Technica Director)
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION	12
FOREIGN INSTITUTION	Centro Nacional de Experimentación de Tecnologías de Hidrógeno y Pilas de Combustible (CNH2) Legal head office: Prolongacion Fernando el Santo, s/n - 13500 Puertollano (Ciudad Real), Spain Contact person: Dr. Jesus Rodriguez, PhD Legal representative: Dr. Emilio Nieto, PhD
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6
<b>SCHOLARSHIP 2</b>	
TYPOLOGY	Innovative doctorates responding to the innovation needs of companies and promoting the recruitment of researchers by companies (M4C2 - Inv. 3.3)
RESEARCH PROJECT	Development of a demonstrator for the integrated production of hydrogen and hydrogen carriers from renewable energy sources
PRINCIPAL INVESTIGATORS	Prof. Giorgio Cau, Professional Engineer, and Prof. Fabrizio Pilo, Professional Engineer
DESCRIPTION OF DOCTORAL TRAINING	<p>The training activities provided during the PhD will focus on industrial engineering themes related to the energy transition based on the overall chain of green hydrogen production and use. In particular, the training activities will be structured as follows:</p> <ul style="list-style-type: none"> <li>- Training activities offered by the PhD in Industrial Engineering consisting of academic courses, such as: Methods of energy analysis and optimization, Eco-sustainable industrial development.</li> <li>- Research activity at the partner company, aimed at the development and implementation of the demonstrator.</li> <li>- Research activity at the foreign institution, which is at the forefront in the field of hydrogen production systems through electrolysis, storage technologies and transformation processes.</li> <li>- Study and research activities aimed at preparing journal papers, communication at international conferences and reports on the themes of energy transition through RES and green hydrogen.</li> </ul>

COMPANY/RESEARCH INSTITUTION	Remosa s.r.l. Legal head office: Loc. Macchiareddu, Strada VI Ovest - 09068 Uta, Italy Contact person: Ing. Andrea Pusceddu (Technica Director)
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION	12
FOREIGN INSTITUTION	Aalborg University (Denmark), the Faculty of Engineering and Science Research Unit: Electric Power Systems and Microgrids Research Unit: Intelligent Energy Systems and Flexible Markets Referente: Prof. Birgitte Bak-Jensen
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6
<b>SCHOLARSHIP 3</b>	
TYPOLOGY	Innovative doctorates responding to the innovation needs of companies and promoting the recruitment of researchers by companies (M4C2 - Inv. 3.3)
RESEARCH PROJECT	The energy trilemma in Sardinia
PRINCIPAL INVESTIGATORS	Prof. Fabrizio Pilo, Professional Engineer
DESCRIPTION OF DOCTORAL TRAINING	The training activities provided during the PhD will focus on industrial engineering themes related to the energy transition based on the overall chain of green hydrogen production and use. In particular, the training activities will be structured as follows: - Training activities offered by the PhD in Industrial Engineering consisting of academic courses, such as: Methods of energy analysis and optimisation, Eco-sustainable industrial development, Power System Operation, Energy Economy. - Research activity at the partner company aimed at developing and implementing innovative ways to assess the need of ancillary services in the presence of high RES shares. - Research activity at the foreign institution to understand the models used to estimate system service requirements and evaluate investment plans at the international level. - Study and research activities aimed at preparing journal papers, communication at international conferences and reports on the themes of the energy trilemma.
COMPANY/RESEARCH INSTITUTION	TERNA S.p.A. Legal head office: via Egidio Galbani 70, 00156 Roma, Italy Contact person: Eng. Chiara Vergine (Person in charge of Real Time)
NO. OF MONTHS TO BE SPENT IN THE COMPANY/RESEARCH INSTITUTION	12
FOREIGN INSTITUTION	Joint Research Center of the European Commission Petten, the Netherlands Contact person: Eng. Gianluca Fulli (To be confirmed officially)
NO. OF MONTHS TO BE SPENT IN THE FOREIGN INSTITUTION	6