

## PhD Programme table 37th cycle – PON Call for application “Ricerca e Innovazione” 2014 – 2020



UNIONE EUROPEA  
Fondo Sociale Europeo



PROGRAMME'S NAME	Mechanics and Advanced Engineering Sciences (DIMSAI)
DURATION	3 years
PROGRAMME START DATE	01/01/2022
LANGUAGE	Italian, English
COORDINATOR	Prof. Marco Carricato ( <a href="mailto:marco.carricato@unibo.it">marco.carricato@unibo.it</a> )
CURRICULA	<ol style="list-style-type: none"> <li>1. Engineering and Industrial Design, Machine Construction, Metallurgy, and Manufacturing Technologies</li> <li>2. Fluid Machinery, Energy Systems, Mechanics of Machines, and Industrial Mechanical Plants</li> <li>3. Thermal Physics, HVAC Systems, Acoustics, Nuclear Technologies and Industrial Applications of Plasmas</li> </ol>
RESEARCH TOPICS	<a href="#">Detailed list at the bottom of the present document</a>
PhD POSITIONS	5
ADMISSION PROCEDURE	Qualifications and research proposal evaluation

### Available Positions and Scholarships

Actions	Pos. n.	Financial Support	Research topic
Action IV.5 – PhDs on green topics	1	PhD Scholarship	PCM-based Latent Thermal Storage Systems for Smart Energy Communities – Curriculum 3
	2	PhD Scholarship	Strategies, Models, and Methods for Generation Expansion Planning (GEP): Meeting Sustainability and Costs for Energy Transition – Curriculum 2
	3	PhD Scholarship	Development of polymeric thin film transducers for the mechatronics applied to the green transition – Curriculum 2
	4	PhD Scholarship	Sustainable Hydrogen Mobility – Curriculum 2
	5	PhD Scholarship	Thermo-fluid dynamics modeling and simulation of concentrating solar power plants (CSP) – Curriculum 3

### Required and Supporting Documents to be attached to the application

(only documents in Italian, English, French, German and Spanish shall be considered as valid and be assessed by the Admission Board)

Only qualifications obtained during the last 5 calendar years shall be taken into consideration, except for the University Degree. **The Admission Board will assess the relevance of the supporting documents to the criteria listed in Art. 3 of the Ministerial Decree 1061/2021 (see also Art. 4 of the Call for applications).**

REQUIRED DOCUMENTS	
Identity document	Valid identity document with photo (i.e. identity card, passport)
Curriculum Vitae	No specific CV format is required. The Curriculum Vitae shall contain <b>all the mandatory information</b> detailed in the <a href="#">form attached at the bottom of the present document</a> . <b>If the CV lacks</b>

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	<b>such information, the second-cycle degree final mark or Weighted Average Mark will receive a score equal to zero.</b>
<b>Degrees</b>	Documents attesting the awarding of the first and second cycle degrees (see Art. 3 of the Call for Applications)
<b>Research proposal</b>	Multi-annual research proposal, with special emphasis on the activities to be completed during the first-year course. The proposal must meet the following requirements: <ul style="list-style-type: none"> <li>- <b>maximum length of 20,000 characters</b>, including spaces and formulas, if present. This figure does not include: the title, the outline, references and images (such as graphs, diagrams, tables etc. - where present);</li> <li>- it must be written following the template provided for Action IV.5 “PhDs on Green topics”. The template is attached to the Call for Application and available for download on the University website.</li> </ul>
<b>SUPPORTING DOCUMENTS</b>	
<b>Publications</b>	Lists of publications (i.e. monographs, articles on scientific journals), minor publications (conference papers, etc.), abstracts and posters presented during national and international conferences, etc.

## Evaluation criteria

The **results of the admission exams** will be available **from 03/11/2021** on [Studenti Online](#) (select “summary of the requests in progress” > “see detail” and open the .pdf file at the bottom of the page). **No personal written communication will be sent to applicants concerning the examinations results.**

Scores will be expressed in points out of 100, as follows.

Minimum score for eligibility: 60 points, Maximum score: 100 points

<b>Qualifications evaluation</b>	University degree final mark. Graduands shall be evaluated according to the Weighted Average Mark (WAM)	10 points max
	Publications	10 points max
<b>Research proposal evaluation</b>		80 points max

## Research Topics

### n. 1 - GREEN

<b>Thematic area SNSI 2014-20</b>	Technologies for smart building, energy efficiency, environmental sustainability
<b>PNR 2021-2027*</b>	5.5.3 Industrial Energetics; 5.5.4 Environmental Energetics
<b>Project title</b>	PCM-based Latent Thermal Storage Systems for Smart Energy Communities
<b>Project description</b>	The project is aimed at studying thermal storage systems based on phase change materials (PCM) for use in thermal smart grids in order to optimize the use of distributed thermal generation and the use of renewable sources. The objective is to obtain thermal storage systems more compact than the current ones and able to reduce the time of thermal loading/unloading by using metal inserts (porous media or regular periodic structures) to increase the effective thermal conductivity of the PCM.
<b>Mandatory traineeship</b>	6 months
<b>Company type</b>	Design and production of chillers, heat pumps and fan coils
<b>Stay abroad</b>	NO

### n. 2 - GREEN

<b>Thematic area SNSI 2014-20</b>	Smart and sustainable industry, energy and environment
<b>PNR 2021-2027*</b>	5.5.3 Industrial Energetics; 5.5.4 Environmental Energetics
<b>Project title</b>	Strategies, Models, and Methods for Generation Expansion Planning (GEP): Meeting Sustainability and Costs for Energy Transition.
<b>Project description</b>	In the framework of circular economy, the diffusion of renewable energy sources in response to the growing demand for energy is crucial and desirable (see SDG-7 of the UN, OT2-3 of the European Green Deal, SNSI, research area "Climate, energy and sustainable mobility" of the NRP, etc.). The Research Project aims to study, develop and transfer to the industrial sector innovative strategies, models, decision-making methods and technical-management approaches for Generation Expansion Planning (GEP), able to integrate technical, economic, environmental and social dimensions.
<b>Mandatory traineeship</b>	6 months
<b>Company type</b>	Industrial manufacturing
<b>Stay abroad</b>	6 months

### n. 3 - GREEN

<b>Thematic area SNSI 2014-20</b>	Smart and sustainable industry, energy and environment
<b>PNR 2021-2027*</b>	5.4.6 Innovation for the manufacturing industry; 5.5.3 Industrial Energetics; 5.6.1 Green technologies
<b>Project title</b>	Development of polymeric thin film transducers for the mechatronics applied to the green transition
<b>Project description</b>	This project addresses the development and validation of polymeric thin-film transducers for at least one of the following applications: 1) actuators for manufacturing machines; 2) automated de/re-manufacturing/sorting/recycling systems for products with critical materials; 3) ocean wave energy converters. The developed transducers and their applications will be more energetically efficient, environmentally sustainable, reliable and cost-effective than existing ones.
<b>Mandatory traineeship</b>	6 months
<b>Company type</b>	Production of automatic packaging machines / renewable energy from the sea
<b>Stay abroad</b>	NO

### n. 4 - GREEN

<b>Thematic area SNSI 2014-20</b>	Smart and sustainable industry, energy and environment
<b>PNR 2021-2027*</b>	5.5.1 Sustainable mobility
<b>Project title</b>	Sustainable Hydrogen Mobility
<b>Project description</b>	The project aims to explore emerging technologies that involve the use of hydrogen in the context of mobility, in the broadest sense of the term. The analysis will cover different aspects, from the production of hydrogen to its use, both in internal combustion engines and in fuel cells. The objective of the research is the identification of the most suitable technological solutions for the different mobility cases, through a modeling approach supported by experimental results.
<b>Mandatory traineeship</b>	6 months
<b>Company type</b>	Development of components and control systems for powertrains
<b>Stay abroad</b>	NO

#### n. 5 - GREEN

<b>Thematic area SNSI 2014-20</b>	Smart and sustainable industry, energy and environment
<b>PNR 2021-2027*</b>	5.5.3 Industrial Energetics
<b>Project title</b>	Thermo-fluid dynamics modeling and simulation of concentrating solar power plants (CSP)
<b>Project description</b>	The PhD project focuses on Concentrating Solar Power (CSP) technology by integrating national and European technological competences (NEXTOWER \CEN-CENELEC Award 2020"). In the project we intend to integrate modeling and CFD simulations of energy carriers in order to improve the performance/cost ratio of these plants and pursue the development of materials, technologies and thermodynamic cycles capable of operating at temperatures above 700 C.
<b>Mandatory traineeship</b>	6 months
<b>Company type</b>	Consulting in safety, environment, energy, reliability
<b>Stay abroad</b>	NO

\*The translation of the PNR 2021-2027 references has been carried out by the PhD Unit

**REQUIRED INFORMATION** (to be detailed in the CV)

Surname \_\_\_\_\_ Name \_\_\_\_\_ Date of birth \_\_\_\_\_

**EDUCATION**

**Bachelor's Degree** (or equivalent first cycle degree)

Programme's name: \_\_\_\_\_

Programme's type (es. Bachelor's degree, ...): \_\_\_\_\_

Awarding institution: \_\_\_\_\_

Degree final mark: \_\_\_\_\_ (Highest possible mark: \_\_\_\_\_)

**Master's Degree** (or equivalent second cycle degree)

Programme's name: \_\_\_\_\_

Programme's type (es. Master's degree, ...): \_\_\_\_\_

Awarding institution: \_\_\_\_\_

Degree final mark: \_\_\_\_\_ (Highest possible mark: \_\_\_\_\_)

**For graduands only**

Programme's name: \_\_\_\_\_

Programme's type (es. Master's degree, ...): \_\_\_\_\_

Awarding institution: \_\_\_\_\_

Weighted Average Mark (WAM): \_\_\_\_\_ (Highest possible mark: \_\_\_\_\_)