

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



UNIONE EUROPEA
Fondo Sociale Europeo



PROGRAMME'S NAME	CHEMISTRY
DURATION	3 years
PROGRAMME START DATE	01/01/2022
LANGUAGE	English
COORDINATOR	Prof.ssa Domenica Tonelli (domenica.tonelli@unibo.it)
CURRICULA	1. Chemical Sciences 2. Industrial Chemistry
RESEARCH TOPICS	Detailed list at the bottom of the present document
PhD POSITIONS	4
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	New green technologies for the synthesis of peptides and peptidomimetics
	2	PhD Scholarship	Sustainable and safe batteries for a circular economy
	3	PhD Scholarship	Development of Green Synthetic Carboxylative Methodologies with CO ₂
	4	PhD Scholarship	Sustainable valorisation of lignocellulosic biomass for the production of chemicals and fuels

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
Degrees	Documents attesting the awarding of the first and second cycle degrees (see Art. 3 of the Call for Applications)
Research proposal	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"> - it cannot exceed 20,000 characters, 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);

AFORM Settore Dottorato di ricerca

Strada Maggiore 45 | 40125 Bologna | Italia | Tel. + 39 051 2094620 | aform.udottricerca@unibo.it

	- 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.
SUPPORTING DOCUMENTS	
Publications	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

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

Research Topics

n. 1 - GREEN

Thematic area SNSI 2014-20	Smart and sustainable industry, energy and environment <i>Development trajectories:</i> 1. Innovative, highly efficient production processes for industrial sustainability 2. Evolutionary and adaptive production systems for customised production
PNR 2021-2027*	Digital, industry, aerospace Section 1. Circular, clean and efficient industry Section 5. Competitive industry Food, bio-economy, natural resources, agriculture, environment Section 4. Reduction of waste and demand for critical raw materials through disassembling and materials recovery, remanufacturing and refurbishing approaches Bioindustry for the bioeconomy Section 2. Circular bio-industry
Project title	New green technologies for the synthesis of peptides and peptidomimetics
Project description	Peptides are growing in the pharma area, mainly for treatment of diabetes, cancer and rare diseases. Current production technologies are not sustainable and are a priority for the ACS Green Chemistry Institute Roudtable. The project target is the design of new green solid phase, liquid and chemoenzymatic synthesis in flow based on green solvents and auxiliaries. Green catalytic reactions will be used for late stage modifications of peptides to increase their pharmacological profile.
Mandatory traineeship	6 months
Company type	Company in the field of medical device manufacturing and global management of services for the treatment of kidney failure
Stay abroad	NO

n. 2 - GREEN

Thematic area SNSI 2014-20	Smart and sustainable industry, energy and environment <i>Development trajectories:</i> 1. Innovative, highly efficient production processes for industrial sustainability 2. Evolutionary and adaptive production systems for customised production 3. Innovative and environmentally friendly materials
-----------------------------------	--

	4. Technologies for smart grids, renewable sources and distributed generation
PNR 2021-2027	Sustainable mobility Section 4: Green and clean networks and vehicles Environmental Energetics Section 1: Energy generation from RES, energy storage and European and intercontinental networks Section 5. The national energy system and land, sea and air transport systems
Project title	Sustainable and safe batteries for a circular economy
Project description	The goal is to investigate materials for more sustainable batteries by optimizing the specific and volumetric energy and power, always trying to maintain a high level of safety of lithium-based batteries or making sodium ion batteries more sustainable by using water-based electrolytes. Lithium batteries will be studied for applications where reduced weight and volume are essential, such as in the automotive sector, while sodium ion batteries will be investigated for the use in combination with renewable sources in large plants, where economy and safety play a fundamental role.
Mandatory traineeship	6 months
Company type	Companies in the sector of production of automatic machines for lithium-ion batteries and capacitors, and in the sector of sustainable production of carbon materials for catalysts and electrodes.
Stay abroad	6 months

n. 3 - GREEN

Thematic area SNSI 2014-20	Smart and sustainable industry, energy and environment <i>Development trajectories:</i> 1. Innovative, highly efficient production processes for industrial sustainability 2. Technologies for smart grids, renewable sources and distributed generation
PNR 2021-2027*	6. Food, bioeconomy, natural resources, agriculture, environment 5.6.1 Green technologies Section 1. Biochemicals, bioproducts and sustainable chemical processes in synergy with biofuels, bioenergy and agro-energy
Project title	Development of Green Synthetic Carboxylative Methodologies with CO₂
Project description	Organic carboxylic compounds are playing a prominent role in diversified nowadays technological areas, encompassing both basic as well as applied researchers. However, their synthetic access suffers from a poor environmental sustainability due to the use of hazardous reagents and harsh conditions. Within the present PhD project the candidate will address the design and the development of new catalytic carboxylative protocols by means of low-pressure CO ₂ gas as a C1-synthon. Environmentally benign organo-, metal-, photo- and electrocatalytic tools will be adopted during the optimization processes.
Mandatory traineeship	6 months
Company type	Pharmaceutical company
Stay abroad	6 months

n. 4 - GREEN

Thematic area SNSI 2014-20	Smart and sustainable industry, energy and environment <i>Development trajectories</i> 3. Innovative, highly efficient production processes for industrial sustainability 4. Technologies for biomaterials, bio-based products and biorefineries 5. Technologies for smart grids, renewable sources and distributed generation
PNR 2021-2027*	6. Food, bioeconomy, natural resources, agriculture, environment 5.6.1 Green technologies Section 1. Biochemicals, bioproducts and sustainable chemical processes in synergy with biofuels, bioenergy and agro-energy 5.5.3 Industrial energy Section 3. Decarbonisation of industry: local production from RES, efficient and sustainable use of energy and materials, transformation of energy carriers

Project title	Sustainable valorisation of lignocellulosic biomass for the production of chemicals and fuels
Project description	2nd generation biomass can be considered as a suitable renewable source for the production of chemicals and fuels. In this context, innovative H2 based fractionation processes will be investigated in order to separate lignin and hemicellulose from cellulose. Project aims will range from the optimisation of the fractionation process to the catalytic valorisation of cellulose, hemicellulose and lignin for the production of chemicals, fuels and H2 through the Aqueous Phase Reforming. The process will be compared with higher TRL route for H2 and fuel production.
Mandatory traineeship	6 months
Company type	A company in the sector of the valorisation of raw materials and waste lignocellulosic biomass to obtain chemicals and fuels (including hydrogen).
Stay abroad	NO

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