



<b>PhD Programme in INNOVATION SCIENCES AND TECHNOLOGIES</b>	
- Curriculum 1: REGENERATIVE MEDICINE, BIOMEDICAL APPLICATIONS AND MANAGEMENT OF COMPLEX HEALTHCARE SYSTEMS - Curriculum 2: METHODS AND SYSTEMS FOR THE ENVIRONMENTAL PROTECTION - Curriculum 3: METHODOLOGIES AND PROCESSES FOR THE TRANSFORMATION AND USE OF MATERIALS	
DISCIPLINARY SCIENTIFIC AREAS	03 - CHEMICAL SCIENCES; 04 - EARTH SCIENCES; 05 - BIOLOGICAL SCIENCES; 06 - MEDICAL SCIENCES; 08 - CIVIL ENGINEERING AND ARCHITECTURE; 09 - INDUSTRIAL AND INFORMATION ENGINEERING
COORDINATOR	PROF. MARIA FRANCESCA CASULA
HEAD DEPARTMENT	DEPARTMENT OF MECHANICAL, CHEMICAL AND MATERIALS ENGINEERING
DURATION	3 YEARS
LEARNING OUTCOMES AND RESEARCH TOPICS	<p>The PhD programme in Innovation Sciences and Technologies started as an international PhD program back in A.Y. 2013/14 based on the positive experience of the international PhD course in Environmental Sciences and Engineering (active from 2001/02, XVII cycle to 2012/13, XXVIII cycle) and of the PhD course in Biomedical Engineering (active from 2010/11, XXVI cycle to 2012/13, XXVIII cycle). As a consequence, the PhD Programme in Innovation Sciences and Technologies covers many of the topics which were developed within the aforementioned PhD courses and includes additional research topics such as those related to materials science and technology.</p> <p>The PhD Course, through a 3-year programme, is intended to introduce young graduates to the field of basic and applied research, though a highly multidisciplinary approach, with reference to the general themes associated with the following routes:</p> <ol style="list-style-type: none"> <li>1) regenerative medicine, biomedical engineering and management of complex healthcare systems;</li> <li>2) methods and systems for environmental protection;</li> <li>3) methodologies and processes for the transformation and uses of materials.</li> </ol> <p>The PhD students will carry out their project within the research groups related to the PhD committee members and will understand aspects related to:</p> <ul style="list-style-type: none"> <li>- Management of the developed research activities;</li> <li>- The main aspects related to writing a proposal to be submitted for regional, national, or international grants;</li> <li>- The main routes for valorization of the results of the research activities (such as writing scientific papers, preparation of posters and oral presentations at conferences);</li> <li>- The most relevant ways to promote valorization/protection of intellectual property, a skill of great interest among the members of the PhD board.</li> </ul> <p>English will be the language used for the presentation of the results and writing of scientific papers, and therefore a minimum C1 certification of English level must be acquired. To this end, the Language Center at UniCA will organize English courses devoted to all PhD students at the University of Cagliari. For those PhD projects which require specific computer skills, specific courses and tutoring activities will be arranged.</p> <p>Course Objectives:</p> <p>The dramatic employment situation, which is even more pronounced in Sardinia, determines the need to activate instruments to restore the</p>



competitiveness of the economic and production system through an extensive dissemination of scientific and technological knowledge, both for the production of primary goods and for public and private services. This involves the implementation of specific actions to create more advanced qualifications, at various levels, of researchers and technicians; the aim is to broaden the labor market towards new skills for activities of technical and economic support for enterprises, such as valorization, transfer, control and management of the innovation process of a scientific and technological approach compatible with the necessary scientific and technological innovation.

These objectives are the cornerstones of the three-year PhD course in Science and Technology for Innovation, and can be summarized as follows:

- education of PhD students towards basic and applied research;
- promotion of the attitude towards international scientific cooperation and connection with external users of research;
- advanced education of the PhD students.

Particular care will be devoted to the development of advanced and independent research ability, both in relation to scientific understanding and of technological outcome of the research topics covered by the PhD course according to the three curricula.

The main activity towards education to research is represented by in-depth investigation by the PhD students, under the guide of the Supervisors.

The following typologies of educational activities can be associated to the teaching credits:

- Courses aiming at strengthening the PhD preparation;
- Specific classes organized within the PhD course;
- Official courses from bachelor courses within the University of Cagliari or from other Universities (including outside Italy);
- Summer schools, seminars, and other activities related to specific topics of interest of the PhD course.

Additional educational activities might be organized related to relevant aspect to the education of PhD students and proper and effective management of research (such as methods of management of research activities, protection of intellectual property, economic-financial aspects of research, analysis and planning of public actions within PNRR).

Cognitive goals associated to the research activity of the PhD students will be identified with the Supervisor assigned to each student by the PhD board.

With respect to the year of reference, among the specific cognitive objectives of doctoral candidates, depending on the chosen route, the following ones, by way of example, can be taken into account.

1) As for the topic Regenerative medicine, biomedical engineering and management of complex healthcare systems topic:

- acquiring skills in the design of biomaterials and supports for regenerative medicine
- acquiring skills in stem cells and artificial liver
- infection and microbiology of mouth, molecular biology, new antimicrobics
- mental health effect of epidemiological events (COVID-19)
- circulatory apparatus regulation in healthy people and in people affected by cardiovascular and neurodegenerative diseases.

2) As for the topic related to Methods and systems for environmental



	<p>protection topic:</p> <ul style="list-style-type: none"><li>- acquisition of skills relating to microalgae processes for the production of bio-fuels</li><li>- acquiring skills in sustainable industrial processes</li><li>- acquiring skills in the study and management of morphological changes in coastal systems</li><li>- acquiring skills in processes for the exploitation of renewable resources.</li></ul> <p>3) As for the methodologies and processes for the transformation and uses of materials topic:</p> <ul style="list-style-type: none"><li>- acquiring skills in model simulation of comminution, grinding and mechanical alloying processes and technology.</li><li>- acquiring skills related to the synthesis, sintering, and advanced characterization of materials for advanced application (aerospace catalysis, solar thermodynamics, diagnostics, etc.)</li><li>- acquiring knowledge on materials with controlled porosity</li><li>- acquiring skills on the thermodynamic stability of nanocrystalline metallic alloys.</li></ul>
ELIGIBILITY AND OTHER REQUIREMENTS FOR CANDIDATES (ART. 2 - NOTICE OF COMPETITION)	EVERY ITALIAN 2ND CYCLE DEGREE ( <i>LAUREA MAGISTRALE/SPECIALISTICA/VECCHIO ORDINAMENTO</i> ) AND EQUIVALENT AND SUITABLE FOREIGN ACADEMIC DEGREES
ADMISSION TESTS	ASSESSMENT OF QUALIFICATIONS AND CURRICULUM VITAE, AND VIDEO CONFERENCE INTERVIEW  The interview will be aimed at ascertaining the candidate's ability to orienting himself/herself on the main fields of study inherent to the PhD programme and verifying its analytical, processing and communication skills, as well as discussing a research project possibly already carried out by the candidate or in progress.  The interview can also be conducted in English.
ADMISSION TESTS FOR FOREIGN CANDIDATES APPLYING FOR RESERVED POSITIONS SUPPORTED BY A SCHOLARSHIP	ASSESSMENT OF QUALIFICATIONS AND CV, VIDEO CONFERENCE INTERVIEW  The interview can also be conducted in English.  Reference letters (up to 3) must be written in English, using the form available on the webpage <a href="https://unica.it/dottoratiricerca">https://unica.it/dottoratiricerca</a> (How to apply for PhD selection: Guidelines and forms- Annex C), 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 <a href="mailto:phdcall_referenceletter@unica.it">phdcall_referenceletter@unica.it</a> (object: surname and name of the candidate being evaluated and name of the PhD programme for which he/she is applying).
POSITIONS	5
SCHOLARSHIPS	4 funded by MUR PL, 1 of which reserved for foreign candidates with a degree awarded abroad
POSITIONS WITHOUT SCHOLARSHIP	1
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