

FORM A

DEPARTMENT OF BIOMEDICINE, NEUROSCIENCES AND ADVANCED DIAGNOSTICS SSD (Didactic Scientific Sector) BIO/10 BIOCHEMISTRY

PNR 2021/27 Main framework	FOOD PRODUCTS, BIOECONOMICS, NATURAL RESOURCES, AGRICULTURE, ENVIRONMENT
Framework	GREEN TECHNOLOGIES
Project title	<i>Enhancement of Sicilian mango waste products and biochemical characterization of their effects</i>
Brief description	<p>Mango is a fruit very rich in active ingredients with an undisputed nutritional and nutraceutical value whose cultivation has recently spread to Sicily. The edible part of the mango is only the pulp and therefore the peel and seeds are discarded. The waste and by-products of the agricultural supply chains of Sicily have always been considered more an expense for their disposal rather than a precious resource. However, they represent an important source of biomolecules that can be recovered and used as nutraceuticals. The project idea aims to evaluate in in-vitro systems whether extracts of Sicilian mango peel and seeds have antioxidant and anti-inflammatory properties and if they are also capable of exerting a lipolytic action through modulation of the metabolism of adipocytes. This study will lay the foundations for the preparation of nutritional creams enriched with Sicilian mango extracts with anti-aging properties or capable of reducing local adiposity. The design idea aims to create a "new Sicilian supply chain of mango", through the adoption of product innovations: natural cosmetics deriving from industry by-products. This will allow an increase in the market share of the farms involved, also conferring the product to cosmetic industries, in a perspective of a circular and profitable economy, in compliance with Area 5.6 of the PNR - Food, bioeconomy, natural resources, agriculture, environment.</p> <p>Competition sector 05/E1, SSD BIO/10 is strictly relevant to the proposed research activity with particular reference to biochemical applications in biotransformations</p>
Siege of the research activities	Department of Biomedicine, Neurosciences and Advanced Diagnostics (Bi.N.D.)
Siege of the Didactic activities	School of Medicine and Surgery of the University of Palermo

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent.

FORM B

**DEPARTMENT OF ARCHITECTURE
SSD (Didactic Scientific Sector) ICAR/17- DESIGN**

PNR 2021/27	HUMANISTIC CULTURE, CREATIVITY, SOCIAL TRANSFORMATIONS, SOCIETY OF INCLUSION
Main framework	
Framework	CULTURAL HERITAGE (5.2.1) - Section 1: Digitization of protection, conservation and enhancement processes
Project title	<i>The architectures not realized in the archives of the Modern in Sicily. Creation of an open access 3D web repository.</i>
Brief description	<p>The documentary heritage in the archives of the Department of Architecture, public and private, in its space-time continuity, is the evidence of the history of ideas and expression of the culture of the time. Drawings, models, sketches, photographs, project reports constitute the legacy of making architecture.</p> <p>This heritage fuels value production chains and crossover effects for the benefit of creative cultural industries, digital platforms and collective memory.</p> <p>The project concerns the identification, interpretation, safeguarding, conservation and transmission to the future of the heritage, for the enhancement, education and creation of culture, placing itself in the Digital Heritage sector (PNR 21-27, 5.2.1, Section 1). The planned activities are:</p> <ol style="list-style-type: none">1) digitization of archival materials (texts, drawings, photographs) stored in public and private archives;2) 3D reconstruction from period photographs of destroyed buildings and demolished artifacts;3) digital reconstruction of architectural works designed and never built;4) experimentation on the use of rapid prototyping techniques for the creation of physical scale replicas of the investigated artifacts.
Duty station	Department of Architecture
Siege of the research activities	Department of Architecture
Siege of the Didactic activities	Department of Architecture

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM C

**DEPARTMENT OF PHYSICS AND CHEMISTRY
SSD (Didactic Scientific Sector) FIS/01 – EXPERIMENTAL PHYSICS**

PNR 2021/27	
Main framework	DIGITAL, INDUSTRY, AEROSPACE
Framework	Quantum Technologies
Project title	<i>Experimental study of innovative nanostructured materials for optoelectronics</i>
Brief description	The progress of modern technologies is nowadays linked to the success of scientific research in developing and characterizing of innovative materials, with optical and electrical properties functional to their use in numerous sectors: energy, environment, medicine. To this end, this research project is aimed at the study of nanostructured materials, both insulating and semiconductors, which show peculiar properties conferred by quantum confinement in the 0D, 1D and 2D dimensions and to the high value of the specific surface area. The planned activity will be purely experimental and will be based on the combined use of complementary techniques of optical spectroscopy, MRI and microscopy in order to have a comprehensive understanding of the physico-chemical characteristics of nanomaterials. The results obtained will aim at their use in numerous applications in the field of optoelectronics: light emitters; environmental parameters sensors; power devices. The project complies with the trajectories defined in the PNR: Main sector DIGITAL, INDUSTRY, AEROSPACE; area of intervention: quantum technologies.
Duty Station	Department of Physics and Chemistry – Emilio Segrè
Siege of the research activities	Department of Physics and Chemistry – Emilio Segrè
Siege of the Didactic activities	Department of Physics and Chemistry – Emilio Segrè for the degree courses of the same Department

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM D

**DEPARTMENT OF ENGINEERING
SSD MAT/05 MATHEMATICAL ANALYSIS**

PNR 2021/27	
Main framework	5.5. CLIMATE, ENERGY, SUSTAINABLE MOBILITY
Framework	5.5. Industrial energy
Project title	Mathematical models for optimizing the energy efficiency of electronic power converters
Brief description	<p>Electrification, already widely present in the Italian industrial sector, can further develop thanks to the application of renewable energy solutions. In this context, there is ample room for development in power electronics. The project aims to study mathematical models that allow to optimize the energy efficiency of electronic power converters.</p> <p>Starting from an accurate study of the most efficient models already known in the literature, it is expected to consider possible generalizations to be applied to the management and control of high efficiency conversion and long-distance transmission of electricity. All of this will involve the need to deal with ordinary and / or partial differential equations, which are totally non-linear. By making use of sophisticated techniques of Non Linear Analysis such as, for example, variational, direct or topological methods, the existence and regularity of solutions of the above equations will be studied. Finally, when possible, using the Matlab platform, the mathematical results obtained with power converter simulators will be compared.</p>
Duty station	Department of Engineering
Siege of the research activities:	Department of Engineering
Siege of the research activities:	Department of Engineering

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM E1

**DEPARTMENT OF CHEMICAL BIOLOGICAL SCIENCES AND TECHNOLOGIES
 AND PHARMACEUTICALS (STEBICEF)
 SSD BIO/05 ZOOLOGY**

PNR 2021/27	
Main framework	FOOD PRODUCTS, BIOECONOMICS, NATURAL RESOURCES, AGRICULTURE, ENVIRONMENT
Framework	Agricultural and forestry activity to protect the environment and natural resources
Project title	<i>Animal diversity of natural and semi-natural ecosystems</i>
Brief description	<p>With a view to the ecological-environmental optimization of agricultural and forest systems aimed at using their natural resources in a sustainable manner, respecting their integrity and preventing their degradation, the assessment of the animal diversity of agroforestry systems with a high ecological value is of primary importance.</p> <p>The study of the animal diversity of these ecosystems should be carried out based on the analysis of the distribution patterns of target species, such as representatives of different groups of terrestrial and aquatic vertebrates, including the genetic characterization of the populations present.</p> <p>The implementation of a biomolecular approach will allow the solid identification of taxa, the assessment of the intraspecific diversity of the different populations, the estimation of their health status, and the verification of the levels of connectivity existing between the populations.</p> <p>The analysis of the data obtained will allow the identification and promotion of high efficiency and high natural value agroecosystems use models, therefore suitable for both productive activities and the protection of habitats and the conservation of biodiversity.</p>
Duty station	Department Of Chemical Biological Sciences And Technologies And Pharmaceuticals (SteBiCeF)
Siege of the research activities:	Department Of Chemical Biological Sciences And Technologies And Pharmaceuticals (SteBiCeF)
Siege of the research activities:	Department Of Chemical Biological Sciences And Technologies And Pharmaceuticals (SteBiCeF)

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM E2

**DEPARTMENT OF CHEMICAL BIOLOGICAL SCIENCES AND TECHNOLOGIES
 AND PHARMACEUTICALS (STEBICEF)
 SSD BIO/09 PHYSIOLOGY**

PNR 2021/27	
Main framework	HEALT (<i>Reference: 5.1.1-Articulation 3</i>)
Framework	
Project title	<i>Evaluation of the role of obesity on the development and progression of chronic degenerative diseases and preventive and curative impact of nutritional interventions</i>
Brief description	<p>According to recent WHO data, 86% of deaths are caused by chronic non-communicable diseases (NCDs) (cardiovascular disease (CVD), type 2 diabetes, cancer, neurodegenerative diseases), accumulated by various risk factors such as obesity. NCDs and obesity have in common a chronic low-grade inflammatory state, responsible for morphofunctional alterations in various organs, including the brain. To date, for disorders related to obesity, knowledge of the mechanistic alterations triggered by the inflammatory state and the increase in fat mass is still partial.</p> <p>The project aims to investigate new tissue and molecular targets that correlate type 2 diabetes, CVD and neurodegeneration with obesity and to verify the preventive / therapeutic impact of functional foods, natural extracts rich in anti-inflammatory substances and secondary metabolites. of vegetables. It is believed to be in line with PNR 2021/27 as the research activity developed will have an impact on the pathophysiology of NCDs on an inflammatory and chronic-degenerative basis (see expected impact of Horizon Europe n. 3).</p>
Duty station	Department Of Chemical Biological Sciences And Technologies And Pharmaceuticals (SteBiCeF)
Siege of the research activities:	Department Of Chemical Biological Sciences And Technologies And Pharmaceuticals (SteBiCeF)
Siege of the research activities:	Department Of Chemical Biological Sciences And Technologies And Pharmaceuticals (SteBiCeF)

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM E3

**DEPARTMENT OF BIOLOGICAL, CHEMICAL AND PHARMAUCETICAL SCIENCES AND TECHNOLOGIES (STEBICEF)
SSD BIO/18 GENETICS**

PNR 2021/27 Main framework	5.1.1 HEALTH
Framework	Section 3. Implementation of diagnosis, therapy and follow-up systems for non-communicable and / or aging-related diseases
Framework	Section 5. Evaluation of the impact of the environment on the outcomes of acute and chronic-degenerative diseases
Main framework	5.1.3 <i>Biotechnology</i>
Framework	Section 6. Gene therapy and personalized medicine
Project title	<i>Use of new genetic, epigenetic, epigenomic and cellular methodological approaches for the identification of biomarkers involved in chronic non-communicable diseases (NCDs) and aging.</i>
Brief description	Progress has made it possible to increase the average life span which is accompanied by an increase in diseases related to aging and chronic non-communicable diseases (NCDs). In this context, the interaction of genetic, cellular and environmental factors (mutagens, mechanical stress, pollution) has the effect of altering functions at the cellular and molecular level, making the identification of early markers of pathogenesis, diagnosis and follow up more complex. For the identification of these factors involved in aging and NCDS, the project aims to use innovative genetic, epigenetic, epigenomic and cellular methodologies. In particular, the role of genetic instability, of the DNA methylation state, of the alteration of nuclear structures, of the presence of epimarkers and specific miRNAs will also be investigated in response to the environment in animal and cellular model systems for the study of NCDS and aging. The proposed transdisciplinary approach will be able to identify new molecular targets to address therapeutic choices in a personalized medicine perspective.
Duty station	Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (SteBiCeF)
Siege of the research activities	Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (SteBiCeF)
Siege of the Didactic activities	Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (SteBiCeF)

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM E4

**DEPARTMENT OF BIOLOGICAL, CHEMICAL AND PHARMAUCETICAL SCIENCES AND
TECHNOLOGIES (STEBICEF)
SSD CHIM/06 ORGANIC CHEMISTRY**

PNR 2021/27	
Main framework	5.6. FOOD PRODUCTS, BIOECONOMICS, NATURAL RESOURCES, AGRICULTURE, ENVIRONMENT.
Framework	5.6.1 Green technologies
Project title	<i>Green processes for the synthesis and applications of organic compounds and materials</i>
Brief description	<p>The project addresses the issues of sustainability of chemical synthesis processes and green applications of the products and methods developed.</p> <p>On the product side, the research will concern the development and characterization of molecules and / or organic materials or functionalized organic/inorganic hybrids that can be modulated for green applications. On the process side, the research will concern the application, development and optimization of innovative and sustainable technologies that exploit, for example, sonochemistry, photochemistry and photocatalysis, mechanochemistry, microwaves, microfluidics and innovative reaction media such as, for example, ionic liquids, DES (Deep Eutectic Solvents), hydro- and organogels, for the synthesis of bioactive molecules, the development of new organic materials of application interest, the development of pollutant removal and environmental recovery protocols.</p>
Duty station	Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (SteBiCeF)
Siege of the research activities	Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (SteBiCeF)
Siege of the didactic activities	Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (SteBiCeF)

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent

FORM F

DEPARTMENT OF PSYCHOLOGICAL, PEDAGOGICAL, PHYSICAL EXERCISE AND HUMAN MOVEMENT SCIENCES (SPPEFF)
SSD M-PED/03 - METHODOLOGIES OF TEACHING AND SPECIAL EDUCATION

PNR 2021/27	
Main framework	CLIMATE, ENERGY, SUSTAINABLE MOBILITY
Framework	
Project title	Social innovation and teacher training: living labs for underactivation and implementation of inclusive processes.
Brief description	The launch of educational and didactic research aimed at proposing a new architecture of the educational and training systems is promoted in the NRP 2021-27. The research activity aims at creating a participatory training environment, to reduce the gap between educational research and innovation in schools and at ensuring the participation of all the protagonists of educational processes, taking advantage of the most recent technological advances. The project aims at the study and prototyping of an innovative system for the training of support teachers and educators through the Living Lab, an open environment of innovation in real-life settings in which user-promoted innovation is integrated into the co-creation process for new social services and infrastructures. The creation of a participatory planning model, with attention to the ethical design of a digital service, will see participation in the planning extended to all the protagonists of the educational and training processes, starting with people with disabilities and / or their caregivers.
Duty station	Department of Psychological, Pedagogical, Physical Exercise and Human Movement Sciences (SPPEFF)
Siege of the research activities	Department of Psychological, Pedagogical, Physical Exercise and Human Movement Sciences (SPPEFF)
Siege of the didactic activities	Department of Psychological, Pedagogical, Physical Exercise and Human Movement Sciences (SPPEFF)

This document is the English version of the annex A to the call for applicants, issued by D.R. (Rector Decree) n. 1683 and dated 31st March 2022, written in Italian. In case of doubts or misunderstandings, the Italian version is prevalent