ANNEX 1/d

PhD program: AGRICULTURAL, FOREST AND FOOD SCIENCES

ASSOCIATED WITH SALERNO UNIVERSITY

XXXVIII CYCLE – a.y. 2022-2023

Department	**School of Agriculture, Forest, Food and Environmental Sciences (SAFE) - Potenza**	
Coordinator	Prof. Giovanni Carlo DI RENZO e-mail: dottoratosafe@unibas.it	
Duration	3 years	
Web site	https://sites.google.com/unibas.it/safe-phd/	
Admission requirements	a) University degree obtained under the previous educational systems (ex ante D.M. 509/99, whose legal course has at least a four-year term); b) Laurea specialistica/magistrale (D.M. 509/99 and Dm 270/2004); c) Academic title obtained abroad and eligible for access to the PhD program, previously recognized by academic authorities, even in the context of inter-university cooperation and mobility agreements. In the absence of such approval, the candidate must apply a request in the application form according to the Art. 3 of this call.	
Available positions	**Agritech**	**3 scholarships**
	Tech4You	**2 scholarships**
	Other	**1 scholarship CREA**

SCHOLARSHIPS

"National Research Centre for Agricultural Technologies" - tematica "Tecnologie dell'Agricoltura (Agritech)"

Codice identificativo CN00000022 - CUP C33C2200025000

Scholarship n. 1	**Spoke n. 7 – Integrated models for the development of marginal areas to promote multifunctional production systems enhancing agro-ecological and socio-economic sustainability** **WP 2 - TASK 7.2.2**

Research topic

Provision of Ecosystem Services to implement smart policies, to improve economic and social benefits and for to develop of agro-forestry supply chains in marginal areas

Topic description

Evaluation and mapping ecosystem services (ESs) is essential to understand how ecosystems contribute to human wellbeing and to support policies that have an impact on natural resources. This implies that mankind is strongly dependent on well-functioning ecosystems and natural capital that are the basis for a constant flow of ES from nature to society. Starting from the identification of the ESs offered by the different terrestrial biomes, PhD will investigate the services provided by specific land types (e.g. forest and woodlands).

ES maps constitute a very important tool to promote the efficiency use of agro-forestry products and by-products in order to increase the relationship between the forestry sector, energy and food; strengthen the connection between the actors involved in the harvesting and processing forest products (food and no-food) in order to obtain economic and social benefits and, at the same time, guarantee the local sustainability of the resource.
To obtain this objective the PhD will develop approaches, models and tools to prioritize alternative and strategies able to strengthen the provision of ESs. The "economic/ecological" ES value has implications in the decision-making process in terms of future economic resource allocation (i.e. investments rather than suppression), defining priority areas for management or suppression activities.
Therefore, the activity will be focused on: 1. bibliography collection and cataloging of ESs for specific land biomes.2: Collection of quantitative data on the consistency and reproducibility of regional forest resources to obtain homogeneous areas, according to socioeconomic factors and land use data; 3. Optimization of a spatial analysis model aimed at evaluating the opportunity costs of the development of supply chains; 4: identification of new investments aimed at updating the range of uses of the resources and at compensating the owners of the forest resource for the supply of services to the community.

Scholarship n. 2	**Spoke n. 7 – Integrated models for the development of marginal areas to promote multifunctional production systems enhancing agro-ecological and socio-economic sustainability** **WP 4 - TASK 7.4.2**

Research topic

Models for the evaluation of the Quality of Life, for the identification of the smart socioeconomic development strategies and for the reduction of inequalities in inner marginal areas

Topic description

Marginal areas continue to face structural challenges, notably due to a combination of population loss and population ageing, making it more difficult to maintain their own living conditions. The proposed overall objective is to improve quality of life in marginal areas as a prerequisite to reducing youth out-migration and ensuring that marginal areas and communities remain attractive places to live and work. The drive of this Phd project is to identify and evaluate the most important territorial services, infrastructure, and geographic factors in order to measure several dimensions of quality of life in rural areas. By identifying the ex ante determinants of quality of life, the design, targeting, monitoring, and evaluation of policies can be more effective. In this way we want to identify any critical issues, as a low standard of quality of life may compromise any possibility of development.
Since quality of life is a multidimensional, integrated concept to evaluate the living states of people, and it often involves economic, social, cultural, political, ecological and other aspects, the PhD Project that we propose consists in: 1. Delineating the boundaries that define the dimension and value of well-being, both in terms of material elements (income, housing, infrastructure) and non-material elements (culture, landscape, spirituality) implemented through statistical-descriptive analysis; 2. Generating a Decision Support Tool (DSS) capable of increasing the effectiveness of the analyses and at the same time obtaining a composite view of the phenomena at work; 3. Setting up a sequence of procedures that start from local needs, develop through stakeholder participation and flow into the generation of efficient policies to aid the development of Marginal Areas.

Scholarship n. 3	**Spoke n. 2 – Crop Health: a multidisciplinary system approach to reduce the use of agrochemicals** **WP 3 - TASK 2.3.3**

Research topic

Precision farming, smart technologies and proximal sensing for a sustainable agriculture using less chemicals

Topic description

Agriculture and environment are emerging sectors for artificial intelligence (AI) applications. Precision farming, either digital or cognitive, relies on the collection and analysis of "big data" (often via drones, planes, or satellites), to provide farmers with decision support systems (DSS) allowing them to optimize production, reduce use and waste of resources and improve product quality. AI techniques are applied to genotyping and phenotyping to select climate-ready, stress-resilient and sustainably produced plants and farm animals.
The activity concerns the application of precision agriculture and digital technologies to the mechanization with a view to the sustainability of agricultural systems.
The state of the art of sensors of proximal remote sensing in the agricultural field will be examined. The focus is on the definition and design of a system for the monitoring of the health status of greenhouse crops. A multispectral sensor is used

being transported by the developed system in order to scan the crop.
The planned activities is focused on the approach of precision agriculture and smart technologies to reduce the use of agrochemicals through the use of "proximal sensing" systems for autonomous mapping of crop health in the field.
The activity aims to develop an intelligent system suitable for precision pesticide distribution and harvesting assistance. The activity includes the definition of the strategy, the selection of hardware / software components, the development of the prototype project, the cost analysis. The expected development is totally Open Access, using hardware currently available on the market and Open Access software for robotic development (Robot Operating System ROS). In addition, the system will allow to create a database useful to the farmers both for decision support and for real-time monitoring of crop health.

Ecosistema dell'Innovazione "Tech4You - Technologies for climate change adaptation and quality of life improvement" - ambito di intervento "5.Climate, Energy and Sustainable Mobility"

Codice identificativo ECS00000009 – CUP C43C22000400006

Scholarship n. 1	**Spoke 2 – Tecnologie per ridurre il consumo energetico e salvare la biodiversità** **GOAL 2.1 - PP 2.1.1**

Research topic

Economic and environmental sustainability evaluation in the use of end-of-cycle outputs

Topic description

The PhD project aims at assessing the economic-environmental sustainability of practices related to the utilisation of end-of-pipe outputs (wastewater, sewage, production waste, etc.) in agro-forestry production systems. This assessment will require a careful analysis of the production process and the technical and organisational changes required to utilise the new inputs, as well as the identification of the socio-economic factors influencing the adoption of innovations at farm level. These elements will be the basis for assessing the economic sustainability of the new practices and for identifying any aspects that need to be addressed for their diffusion. The economic and social effects will be integrated with the analysis of environmental impacts on biodiversity, ecosystem services, fertility, impacts assessed through techniques such as Life Cycle Assessment (LCA) and direct and indirect estimation methods. The analysis of trade-offs and complementarities between economic and environmental sustainability of the end-of-life products' management system will be carried out using integrated models (e.g. ecological-economic and bio-economic models) that will be suitably structured to take into account the specific characteristics of the production and territorial system.

Scholarship n. 2	**Spoke 4 – Resilienza e accessibilità per la valorizzazione del patrimonio locale (culturale e naturale**) **GOAL 4.3 - PP 4.3.2**

Research topic

Validation of management models of territories and their promotion

Topic description

The potential candidates will present a research proposal based on the pilot topic "Development of sustainable management models for the conservation and valorization of forests characterised by a prime ecological value in marginal areas". The high structural and biological complexity of old-growth forests represents a great ecological, environmental and cultural value. Thus there is a need to protect and enhance these sites through the adoption of innovative and sustainable management measures. For example, the adoption of multi-criteria analysis methods constitutes a useful tool in the evaluation procedures, especially in environmental contexts where the information is extremely diverse and hard to be compared. The research activities will be focussed on: i) to characterize the ecological and structural level of old-groth forests; ii) to identify an innovative parameter capable of quantifying the old-growtness value in the sites analysed; iii) to define new multi-criteria models aimed at ensuring higher efficiency in the conservation and enhancement of old-growth forest sites.

OTHER SCHOLARSHIPS	
Scholarship n. 1	**CREA "Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria"**

Research topic

Innovative plants for energy saving, precision and quality control of dairy products

Topic description

The proposed project intends to improve the quality, environmental sustainability and added value of dairy production, with a particular focus on traditional southern products, through an in-depth theoretical experimental study aimed at introducing plant innovations to improve dairy processes, reduce water and energy consumption in production, optimize logistics and distribution, and promote precision control of raw milk and dairy products.
Methodologically, the project intends to use many of the hardware and software tools currently commercially available, with the aim of developing low-cost user-friendly tools for process monitoring. The research pathway will include the following activities: a) preliminary investigation aimed at defining the technological level and critical issues of the current setting of the southern dairy industry, b) theoretical experimental study of the chemical-physical and qualitative properties of dairy products collected from representative companies, c) design definition of a prototype for the inteligent monitoring of energy consumption during dairy processing; d) innovative interventions for the precision control of critical points in the process of milk processing into dairy products.
The results of the PhD project, will be transferred continuously to companies in the sector, identifying one or more companies to be used as demonstrators in order to introduce and validate the proposed innovations and the results of the research, evaluate the effectiveness in bringing better competitive conditions and better economic and commercial conditions.

A period in the company or research center (max 6 months) and abroad (max 6 months) is mandatory.

Admission procedure	The admission procedure is conducted through the: **a) evaluation of qualifications** **b) evaluation, as part of the interview, of a research project**, drawn up in Italian and English using the format set out in **Annex C** to the call for proposals, concerning the subject/type of grant for which you are competing (Agritech, Tech4You, other) **c) video conference interview** using google meet di Google	
Evaluation criteria	**a) evaluation of qualifications:** up to a maximum of **25 points** minimum score to access the interview **15 points** **b) interview:** up to a maximum of **75 points** the interview is passed for a score not less than **45 points** **Minimum total score: 60 out/100.**	
Assessable qualifications	**Graduation Thesis** (The candidate must also submit a summary in Italian or English of the thesis of max 16.000 characters)	max **10** points

	Degree mark (For candidates who have not yet obtained the degree, the weighted average of the marks obtained in all the exams of the degree program, taken on the date of submission of the application for admission, will be evaluated)	max **10** points
	Scientific publications (Articles in national and international scientific journals, proceedings of scientific conferences, books or book chapters)	max **3** points
	Other titles (University degrees or Master Specialization, Research Grants, Scholarships, Erasmus scholarships and periods of activity abroad, …)	max **2** points
Interview program	The interview, which can be held in Italian or English, will focus on the discussion of the submitted research project and is aimed at ascertaining the candidate's scientific interests and aptitude for research. During the interview, the knowledge of the Italian language will be ascertained for foreign candidates.	
Foreign language	**English** (knowledge of a foreign language will be assessed during the interview)	
Schedule of the admission tests	**Evaluation of qualifications: results will be available from <u>January 26, 2023</u>** on the website http://portale.unibas.it/site/home/didattica/dottorati-di-ricerca.html **Day of the interview: <u>January 30, 2023 - 10:30 a.m.</u>**	