



Faculty of Agricultural, Environmental and Food Sciences

PhD programme in MOUNTAIN ENVIRONMENT AND AGRICULTURE

Website:

<https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/phd-mountain-environment-agriculture/>

Duration: 3 years

Academic year: 2024/2025

Start date: 01/11/2024

Official programme language: English

Programme contents:

The full-time PhD programme foresees lectures and research activities. The PhD programme is based on the following milestones:

- Students develop and organize their research plan in the first six months of the course together with their supervisor and defend it in front of the PhD Committee.
- Students prepare, within 12 months of starting the programme, a public seminar in which they discuss the state-of-the-art of their research topic.
- Students take part in at least one international conference where they are expected to deliver an oral paper or present a poster.
- Students spend at least three months abroad conducting research.
- Students attend and pass specific compulsory courses and additional courses or summer/winter schools.

In order to be admitted to the final exam, PhD students must have at least one scientific paper, as first author, accepted for publication in an international peer-reviewed journal. Only in exceptional cases, the PhD Committee can authorize motivated exceptions.

Stages of the PhD:

During the first year PhD students attend courses, prepare and submit their research plan under the guidance of the main supervisor, and they also present a seminar on the state-of-the-art in the area of interest. PhD students are encouraged to develop an excellent command on methodological techniques and to start preliminary research activity. In the second and third year, they are expected to carry out research activities according to the research plan and schedule, to spend a training period in a foreign university or research centre, to process data and on to write the thesis.

Along the three-year period, PhD students are also required to attend seminars, summer/winter schools, present contributions to international conferences and write scientific papers for high-ranked international journals. The dissertation is expected to be a collection of scientific papers with a comprehensive introduction, discussion and conclusion. The final thesis must be written in English and include an abstract. Each PhD student is supervised by a main supervisor and two co-supervisors, at least one of whom is external to the PhD Committee.

This PhD course consists of 2 *curricula*.

Curriculum 1: Sustainable agricultural production systems

Producing healthy food through agricultural systems that avoid negative environmental impacts is one of the main challenges globally as well locally. The expertise of the research groups covers soil fertility, plant physiology and biochemistry, entomology, plant pathology, crop management, animal science, agricultural machinery, and agricultural economics, with special reference to problems of mountain areas. Studies mainly deal with the complexity of biological systems, the interactions among

organisms, precision farming, livestock performance and welfare, the effects of climate change and economic system evaluations.

The research activity aims at improving the quality of agricultural products and the sustainability of the production process at local, national and international level, by developing production systems and novel technologies that increase yields, the quality of the products and animal health and welfare, while reducing the use of non-renewable resources, environmental pollution and production costs.

Short Description of the research groups

Soil ecology (Prof. T. Mimmo, Prof. L. Borruso)

The research group is primarily focused on studying soil ecology and how biotic and abiotic factors affect the biogeochemical cycles of nutrients in the soil and rhizosphere. They use a multidisciplinary approach that analyses the chemical, biochemical, and physiological mechanisms involved in plant nutrient acquisition, translocation, and allocation. The group also examines the interactions between plant roots, soil, and microorganisms (such as bacteria and fungi), particularly in relation to biotic and abiotic stress. Further, the research group explores the role of taxonomic and functional biodiversity in soil health.

Insect chemical ecology and apiculture (Prof. S. Angeli)

The research group addresses issues related to the evolutionary biology of chemically mediated insect-plant interactions of agricultural ecosystems. The main goal is to provide novel tools to control pest insects in an environmentally friendly manner, with a chemical ecology approach. In particular, we combine different methodologies including GC-MS chemical characterization, electroantennography and behavioral assays to discover how host plants respond to insect attacks through the releasing of volatile compounds and which ecological functions these compounds may mediate. Our studies in apiculture focus on Varroa-Apis interactions, impact of insecticides, and monitoring of pesticides.

Applied molecular entomology (Prof. H. Schuler)

Our research group is broadly interested in the evolutionary ecology of insect pest species. We are using a combination of genomic and population genomic approaches as well as in vivo experiments in laboratory and semi-field experiments. One of our primary research questions addresses the association of microbes with insects and their impact on the ecology and evolution of their hosts. In particular we study insect vectors of phytoplasma diseases, we investigate the associations of bark beetles with symbiotic bacteria and fungi to understand their role in the population dynamics of this important pest species. Moreover, we study the invasion dynamics of invasive insect species. Our research combines fundamental and applied aspects of the biology of insect pest species with the orientation towards a more sustainable pest management.

Fruit tree physiology and ecosystems (Prof. M. Tagliavini, Prof. C. Andreotti, Prof. D. Zanutelli, Dr. D. Asensio)

The research focuses on the exchange of carbon, mineral nutrients, water and energy between soil, plants and atmosphere in orchards and in vineyards under climate change and multiple environmental (in cooperation with Prof. G. Wohlfahrt, University of Innsbruck, and Dr. G. Niedrist, Eurac Research). Research approaches include eco-physiological, micrometeorological, isotopic, biochemical, biotechnological and biometric methods, as well as the application of spectral analysis. The final aim is the enhancement of the use efficiency of resources in crop production systems and the development of sustainable management techniques with special emphasis on the quality of the produces.

Agrofood economics, management and marketing (Prof. C. Fischer)

The research activity in this area aims at improving the competitiveness of farms and agribusiness enterprises and the agrofood sector as a whole in South Tyrol and elsewhere. Current approaches and topics include: food supply and value chain economics and management; agribusiness economics

and management; market analysis and marketing research; food marketing; tourism and agritourism; regional, agricultural and rural development (in cooperation with Dr. T. Streifeneder); grassroots collective action, alternative agro-food networks, consumer study, sustainable consumption, statistical data evaluation and econometrics (cross-section, time series and pooled datasets).

Molecular and Structural Biology (Dr. K. Janik, Dr. S. Benini)

The Department of Molecular Biology and Microbiology and the Functional Genomics group of the Laimburg Research Center apply modern molecular biology techniques to decipher the functions of plant proteins and pathogens and to answer several research questions relevant to agriculture. The studies, carried out in collaboration with Dr. Alberto Ceccon, head of the NMR Spectroscopy Laboratory at the Laimburg Research Center, employ molecular biology, crystallography and NMR analysis to investigate the biophysical properties of molecules of an important plant pathogen.

Animal Science (Prof. M. Gauly, Prof. J. Sölkner, Dr. T. Zanon)

Research activities in the Animal Science Group focus on relevant questions of livestock production. For dairy cattle, evaluations and improvements of existing production systems is the main area of research. In particular, commonly used dairy cattle breeds are compared in terms of performance and functional traits (health, welfare) and different production systems are evaluated. For beef cattle, the group focuses on the development of high-quality beef production systems. In addition, grazing activity and grassland use depending on breed and species is another focus of the work.

Grassland farming (Dr. G. Peratoner, Prof. M. Gauly)

The research focuses on productive and environmental aspect of forage systems (addressing both meadows and pastures), depending on the management intensity and on the site conditions and meteorology. Research approaches include the analysis of vegetation dynamics, forage yield, forage production and nutrient fluxes by means of biometric methods and statistical modelling, with possible applications at the interface with remote sensing. The final aim is providing scientifically sound information and innovation for a sustainable agronomic management of grassland resources under the climatic and topographic challenges of the mountain agriculture.

Technologies for agroforestry innovations (Prof. F. Mazzetto, Dr. G. Carabin)

The topics involve the application of digital technologies for the management of agricultural and forestry processes in mountainous environments. The aims are: a) to improve the quality of farm management as a whole; b) to optimize the use of machines and process equipment, with the aim of mitigating environmental impacts (i.e.: reduction of drift phenomena during phytosanitary treatments, containment of energy consumption and related carbon footprints, optimization of the water footprint); c) enable the development of alternative niche crops to traditional mountain farming practices, creating alternative sources of income through new models of agriculture designed for extreme environments; d) improve ergonomic and safety conditions for farm operators. Research approaches include both laboratory activities, where the functionality of the machines can be tested in controlled environments and with particularly sophisticated measurement systems, and field activities, to evaluate the functionality of possible prototypes in their real working contexts. Investigation methodologies will include both the use of various types of sensors (including ground sensing and LiDAR), including new generation sensors, and modeling approaches for physical, environmental and management processes.

Curriculum 2: Ecology, environment and protection of mountain areas

The evaluation of the effects of management and climate change on natural ecosystems and humankind is at the core of this subject area: main topics include biodiversity, water quality, protection from natural disasters, and the mitigation of climate change through the maintenance or enhancement of carbon stocks. The use and development of advanced technologies for monitoring and the functional study of ecosystems, including innovative approaches, such as those involving the use of stable isotopes, are some of the features of this area.

Short Description of the research groups

Interdisciplinary landscape, vegetation and conservation ecology (Prof. C. Wellstein, Prof. N. Hölzel)

The working group addresses regional to global environmental issues, such as biodiversity research, functional diversity, climate change research, nature conservation, ecosystem restoration and sustainable and resource-efficient land use. We apply a large set of methods tailored for the scale of interest ranging from biogeography to molecular ecology and study various ecosystems, habitats and land-use types. We pursue studies on a global scale and focus on Europe, South America and South Africa. Our research covers Mediterranean, temperate and alpine regions. We combine research on ecological patterns and processes, management and conservation, under natural environmental variation and human impact.

Forest ecology (Prof. R. Tognetti, Prof. L. Montagnani, Dr. E. Tomelleri)

The focus of this research group is the ecology of montane forests and their dynamics in response to natural and human-induced perturbations with special emphasis to climate change and including the biogeochemical cycles. The group studies the ecophysiology of forests, integrating functional traits and processes over a range of temporal and spatial scales. The range spans from the single tree (physiology, IoT, proximal sensing) to stand and watershed (biodiversity, resilience, eddy covariance, lidar, UAVs), up to regional and national scales (climate-smart forestry, remote sensing).

River processes and natural hazards mitigation (Dr. A. Andreoli, Prof. L. Mao)

The group investigates the complex dynamics of mountain basins through their hydrological and sediment transport processes and by analyzing their morphological evolution, with a special focus on glacierized environments and on debris flow catchments. The activities are mostly related to field monitoring, GIS modelling and laboratory analysis, and tracers for both water runoff (EC, isotopes) and bedload transport (passive integrated transponders, PITs) are utilized. Ecohydrological issues relative to natural and anthropic-related vegetation are also investigated, as well as modern early warning systems and soil bioengineering techniques.

Research projects and supervisors		
Curriculum 1 Sustainable agricultural production systems		
Title	Supervisor(s)	Curriculum
<p>1. Exploring the potential of rearing insects on locally sourced organic wastes according to a circular economy approach</p> <p>Description - This research initiative explores the potential of using insects to valorize organic waste within the agri-food system of South Tyrol, embracing the principles of a circular economy. Insects offer a promising avenue for transforming large amounts of organic wastes, into a high conversion valuable resource. By rearing insect larvae on locally sourced organic waste substrates, this study aims to produce high-quality protein-rich insect biomass for animal feed and food, and reduce dependency from unsustainable protein sources and chemical fertilizers. The project seeks to answer critical questions regarding optimal growth substrates, attractive substances for insect oviposition, and the nutritional composition of the reared insects. The goal is to provide scalable,</p>	Prof. Angeli S.	1

<p>environmentally sustainable practices beneficial for both large-scale companies and small producers in achieving agricultural process sustainability and reducing environmental impact.</p> <p>The ideal PhD candidate should possess expertise in entomology, agricultural sciences, waste management, experimental design, data analysis, sustainability and circular economy principles.</p>		
<p>2. Characterization of volatile compounds in plant-insect interactions: towards the development of alternative pest control techniques</p> <p>Description - This research project focuses on the characterization of volatile compounds released by plants during interactions with insects, aiming to develop new control techniques to manage pest insects in a more sustainable way. Understanding the composition and function of these volatile compounds provides valuable insights for the development of ecological and targeted control strategies. The project involves the identification and characterization of volatile compounds involved in plant-insect interactions through advanced analytical techniques, such as gas-chromatography, mass spectrometry and electroantennography. Subsequently, potential applications of these volatile compounds for creating natural insecticides, repellents, or olfactory traps will be explored. The ultimate outcome of the project is to provide practical and innovative solutions for pest control, contributing to biodiversity conservation, crop protection, and the promotion of a more sustainable and resilient agriculture.</p> <p>The ideal PhD candidate should have expertise in entomology and agricultural sciences and preferentially some knowledge on plant-insect interactions, advanced analytical techniques (such as gas chromatography, mass spectrometry, and electroantennography), ecological pest management, and development of innovative solution.</p>	<p>Prof. Angeli S.</p>	<p>1</p>
<p>3. The role of semiochemicals in the tritrophic-interaction and the intraspecific communication of <i>Eriosoma lanigerum</i> and <i>Dysaphis plantaginea</i>: exploring new possibilities for the development of sustainable pest control measurements</p> <p>Description - The research project focuses on investigating the role of semiochemicals in the tritrophic interactions involving apple trees, the woolly apple aphid (<i>Eriosoma lanigerum</i>), and the rosy apple aphid (<i>Dysaphis plantaginea</i>). These aphid species are</p>	<p>Prof. Angeli S./Dr. S. Schmidt</p>	<p>1 funding Institution: Laimburg</p>

<p>significant pests of apple orchards, causing substantial damage to branches, leaves, and fruits, ultimately reducing yields not only during the initial outbreaks but also in subsequent years. They overwinter either as durable eggs or colonies on apple trees, perpetuating their life cycle and establishing themselves as persistent pests throughout the lifetime of an apple orchard. The pest management relies mainly on synthetic insecticides treatments. During last years a remarkable increase of damages has been registered for the woolly apple aphid, also due to the recent withdrawal or restricted use of certain broad-spectrum insecticides. The study aims to explore how semiochemicals mediate both interspecific and intraspecific communication among these aphid species, their host, the third trophic level (natural parasitoids and predators), with the goal of developing new sustainable pest management strategies for integrated as well as for organic farming.</p> <p>The ideal PhD candidate should possess expertise in aphid ecology, semiochemicals, tritrophic interactions, pest management, and experimental design.</p>		
<p>4. Climate change-driven effects on carbon and water fluxes in grapevines and vineyards</p> <p>Description - The PhD student will perform research on carbon and water fluxes at plant and ecosystem level. The PhD student will adopt several methodological approaches including eddy covariance. Candidates should possess a basic knowledge of plant physiology and agrometeorology. Skills in managing sensors, dataloggers and big data are an advantage.</p>	<p>Prof. Andreotti C., Prof. Zanotelli D., Prof. Tagliavini M., Prof. Wohlfahrt G.</p>	<p>1</p>
<p>5. Mitigation strategies in viticulture to cope with climate change-induced multiple abiotic stresses</p> <p>Description - The PhD student will investigate the potential of different mitigation strategies, at soil and canopy level, to contrast the negative effects caused by combines environmental stressors, such as drought, heat and excessive radiation. Candidates should possess a solid knowledge of statistics applied to the agronomic studies and of general plant physiology. He/she should have experience in the measure of plant main physiological indexes, and in the evaluation of fruit intrinsic quality. A general knowledge about viticulture is an advantage.</p>	<p>Prof. Andreotti C., Prof. Zanotelli D., Prof. Tagliavini M., Prof. Wohlfahrt G.</p>	<p>1</p>
<p>6. Use of agroecology principles and intercropping to increase sustainability of strawberry cultivation in mountain areas</p> <p>Description - The PhD will investigate the impact of intercropping on strawberry cultivation, both at plant and ecosystem level. The research will be conducted by</p>	<p>Prof. Andreotti C., Dr. Soppelsa S.</p>	<p>1 funding Institution: Laimburg</p>

<p>integrating different methodological approaches including the analysis of nutrients uptake and allocation in the different organs of the primary and secondary crops, the calculation of the water use efficiency of the cropping systems, the effect on soil quality and biodiversity. The general aim will be to provide insight into the potentiality and limitations of the agroecology principles when applied to a highly specialized crop such as strawberry.</p> <p>The candidate should possess a good knowledge about horticulture (berry cultivation) and general plant physiology. He/she should also have good knowledge in statistical procedures for agricultural research (experimental design and data analysis).</p>		
<p>7. Future agritourism in mountain areas – socio-economic perspectives</p> <p>Description – Agritourism is seen as a sustainable development option for mountain areas. Nevertheless, continuous improvements and innovation are needed to minimize existing negative economic, social and/or environmental impacts. For scientifically exploring novel approaches to a traditional tourism activity, candidates should have an educational background (MSc degree) in economics (agricultural, natural resources, environmental etc), or political or other social sciences with proven knowledge and interest in agricultural and/or environmental topics. Quantitative skills (statistics, econometrics etc.) and knowledge of the production particularities of mountain areas are an advantage. The topic is indicative and can be adapted to the PhD student’s interests and skills.</p>	<p>Prof. Fischer C., Dr. Streifeneder T.</p>	<p>1 Co-funding institution: Eurac Research</p>
<p>8. Sustainable regional and agricultural development strategies for mountain territories</p> <p>Description - Mountain territories are particularly vulnerable to over-development which creates pressures on local communities, wildlife habitats and natural ecosystems. How can future mountain land and resource use be managed more sustainably? For scientifically exploring novel regional, rural and/or agricultural development strategies, candidates should have an educational background (MSc degree) in economics (agricultural, natural resources, environmental etc), or political or other social sciences with proven knowledge and interest in agricultural and/or environmental topics. Quantitative skills (statistics, econometrics etc.) and knowledge of the production particularities of mountain areas are an advantage. The specified PhD topics are indicative and can be adapted to the PhD student’s interests and skills.</p>	<p>Prof. Fischer C., Dr. Streifeneder T.</p>	<p>1 Co-funding institution: Eurac Research</p>

Curriculum 2: Ecology, environment and protection of mountain areas		
Title	Supervisor(s)	Curriculum
<p>9. Effect of climate change and abandonment on the subalpine and alpine vegetation of South Tyrol</p> <p>Description - Using existing fenced off enclosures such as avalanche protection areas, the PhD student will study the effects of abandonment and climate change on vegetation and other ecosystem properties in traditional south-Tyrolian subalpine and alpine pasture landscapes. Candidates should possess a basic knowledge in plant, community and ecosystem ecology. Quantitative skills (statistics in R), experience in vegetation ecology and willingness to do field work in a high mountain environment are beneficial.</p>	<p>Prof. Wellstein C., Prof. Hölzel N.</p>	<p>2</p>
<p>10. Dry forests of inneralpine valleys under current climate change- stability, biodiversity, ecosystem functions and management options</p> <p>Description – The PhD student will compare forest plantations of Pinus nigra on steep south facing slopes of an inner-alpine dry valley (Vinschgau) with more natural successional forests of native species in terms of forest structure, vitality, ground vegetation and other parameters of biodiversity and ecosystem stability that can be selected according to the skills of the candidate. Applicants should possess a basic knowledge in plant, community and ecosystem ecology. Quantitative skills (statistics in R) and experience in vegetation, soil or animal ecology are beneficial.</p>	<p>Prof. Wellstein C., Prof. Hölzel N.</p>	<p>2</p>
<p>11. Management strategies for control works in mountain basins subject to extreme weather events</p> <p>Description - The maintenance of erosion control structures along rivers and slopes in mountain basins is gaining global significance and awareness. The exponential increase in these structures built since the mid-20th century poses new technical, economic and theoretical challenges. This includes structural features like check-dams and sills as well as modern approaches to river restoration aiming at rebalancing geomorphological and vegetation aspects. Through the analysis of the past intervention evolution, and studying of aerial imagery, this project aims to develop conceptual management models to address the decay of erosion control structures and the changing dynamics of mountain rivers and catchments in terms of sediment and vegetation. These models will guide maintenance schedules and alternative management strategies, such as river restoration initiatives. The results will aid in</p>	<p>Dr. Andreoli A., Prof. Mao L.</p>	<p>2</p>

<p>evaluating various options, including the possibility of no-intervention, to inform cost-benefit analysis and future planning. The PhD student will conduct research on the interactions between erosion control structures and fluvial processes in mountain environments, adopting various interdisciplinary methodologies. Candidates should have a fundamental understanding of fluvial geomorphology, hydrology, erosion processes, and sediment transport dynamics in mountain environments. Proficiency in remote sensing and GIS is essential, while data analysis and statistical skills are advantageous.</p>		
<p>12. Facing the changes in sediment supply due to climate change</p> <p>Description - The loss of the Alpine cryosphere (glaciers, permafrost, etc.) and disturbances on forest covers (windstorms, snow, insect attacks, etc.) are causing a change on sediment supply and balance to the river network of Alpine Basins, with deterioration of water quality and an increasing flood risk at some locations. Analyzing long-term data on glacier extent, solid and liquid discharge, and water quality in streams affected by such disturbances will allow us to develop detailed best management strategies for handling significant changes in sediment supply due to both intense (post-disturbance) and extensive (large-scale, long-term) alterations. This is crucial for addressing extreme events and extensive degradation of alpine landscapes, particularly in terms of sediment management strategies at the provincial level. The Phd candidate should possess fundamental understanding of hydrological processes, including solid and liquid discharge dynamics, and how they are influenced by land use changes. Ability in data analysis and statistical skills is essential, along with a basic knowledge of remote sensing techniques and Geographic Information Systems (GIS).</p>	<p>Dr. Andreoli A., Prof. Mao L.</p>	<p>2</p>
<p>13. Chemical ecology and population dynamics of the European spruce bark beetle</p> <p>Description - This project focuses on the chemical ecology and population dynamics of the European spruce bark beetle, <i>Ips typographus</i> (Coleoptera: Curculionidae) aligning with the PNRR through contributions to environmental sustainability, economic resilience, and scientific innovation. Enhancing and protecting natural ecosystems is a core pillar of sustainable development. Spruce forests, crucial for biodiversity, can be devastated by bark beetle infestations, causing significant ecological imbalances. This project aims to decipher the role of pheromonal communication and host/non-host plant volatile</p>	<p>Prof. Angeli S, Dr. Tomelleri E.</p>	<p>2</p> <p>Co-funding institution: EcoResearch (M.D. 630/2024)</p>

<p>interactions, to develop effective and sustainable pest management strategies. Headspace volatiles released by healthy and stressed host trees will be characterized using gas chromatography, electroantennography, and behavioral trials to determine their potential role as attractants or deterrents. Newly developed volatile blends will be tested in forests in collaboration with EcoResearch and the Forest Department of South Tyrol. Mitigating beetle infestations through a chemical ecology approach helps preserve spruce forests and their biodiversity. Better management of beetle populations maintain forest health and climate regulation, supporting the climate action objectives. Studying the population dynamics of <i>I. typographus</i> will enable outbreak predictions and preventative measures protecting timber resources and ensuring economic resilience. The ideal PhD candidate should possess expertise in entomology, forest sciences, advanced analytical techniques (such as gas chromatography, mass spectrometry, and electroantennography), ecological pest management, experimental design and data analysis.</p>		
<p>14. Extrapolating drought impacts on mountain forests from individual tree response to the landscape scale</p> <p>Description - The candidate will investigate the possibility of extrapolating drought impacts on mountain forests by monitoring carbon fixation and transpiration from individual trees to a regional scale. Physiological drought indices derived from a sound dataset of multiannual tree monitoring (xylogenesis, dendrometer, sap flow, wood anatomy) collected over two study areas in Lötschental (Valais, Switzerland) and Matsch/Mazia (province of Bolzano/Bozen) will be compared to local scale meteorological and soil moisture drought indices to assess tree vulnerability to drought, seasonality, and lag effects. Spatially explicit drought indices derived from multiscale and multispectral satellite data will be compared with regional scale meteorological and soil moisture drought indices to assess their potential and limitations to identify and quantify drought impacts in carbon and water use. In addition to spectral indices, satellite-based estimates of GPP and evapotranspiration will also be investigated. Based on this, the candidate will evaluate the variability in responses concerning ground- and satellite-based indices, tree species, and temporal and spatial scales. The PhD will investigate the possibility of upscaling observed drought impacts on carbon and water from ground-based drought responses to a landscape scale.</p> <p>Applicants should demonstrate experience with satellite data for ecological applications and possess a basic understanding of plant and ecosystem ecology.</p>	<p>Prof. Tognetti R., Dr. Castelli M.</p>	<p>2 Funding institution: Eurac Research</p>

Proficiency in R or Python for geospatial data processing and statistical analysis of timeseries is required.		
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When submitting their application, applicants must indicate on the portal one research project that represents the preferred choice. If the wish, they can additionally indicate two other research projects. The choice is not binding but will be used by the commission to assess the congruence of the academic qualification with the research projects chosen by the candidate (see evaluation criteria below).

Admission requirements

- One cycle degree according to the former Italian system: all
- Master degree (laurea specialistica/magistrale if obtained in Italy): all
- Foreign degrees - Applicants who have obtained their degrees abroad must have university education of at least five years and hold the requisites listed below.

Candidates are expected to have acquired an appropriate educational, and/or cultural and/or professional background in the field of agricultural, environmental, biological, animal or geosciences.

To apply for the PhD programme, applicants must upload in the application portal:

- a motivational letter written in English (max. 1 page).
- Curriculum vitae (CV) (in English and possibly following the EU format that can be downloaded here <https://europass.cedefop.europa.eu/en/documents/curriculum-vitae>). The CV should include the list of publications, presentations at conferences, awards, and any experience or activity that prove her/his qualification.
- Copy of the master degree (laurea specialistica/magistrale) or of the one-cycle degree (former Italian system) or of an equivalent foreign degree, with the final mark/grade and the marks obtained in each exam. For foreign degrees, if the marking system is different, the mark will be transformed. Those who have not obtained the diploma yet, but plan to get it before the enrolment date, must submit a certificate bearing the marks obtained in each exam.

If certificates or diplomas are awarded by **Italian** public bodies, the relevant **self-certifications** must be completed in the portal.

If the certificates or diplomas are awarded by **foreign** bodies, the certificates or diplomas must be uploaded to the portal.

Other documents to be included in the application if available:

- reference letters, written in English from a university lecturer or a researcher from a research institute (drawn up in the year of the call or in the previous one);
- copy of the publications (including the master thesis, published or accepted);
- any English language certificate at level B2 or higher.

Evaluation criteria and process

Admission to the programme is based on the evaluation of a) the academic qualification as it appears from the CV and other documents, b) of the motivational and reference letters, and c) on the outcome of the interview.

For those applicants who fulfil the admission requirements, the Evaluation Committee will first evaluate the application and draw up a short list of applicants admitted to the interview. The Committee will select the best applicants on the basis of a comparative assessment.

The following points will be awarded:

- up to 23 points for the academic qualification of the applicant to successfully carry out a PhD program in Mountain Environment and Agriculture, as it appears from the CV, from the master's mark/grade, from the motivational letter and from the other documents;
- up to 7 points for the congruence of the academic qualification with the topic chosen by the candidate among those present in the list of available projects visible in the dedicated portal;
- up to 20 points for the interview. During the interview, the commission will evaluate the scientific qualification of the candidate to carry out the research project in the area(s) of interest. As the program is offered in English, candidates must possess adequate English skills which will be assessed during the interview.

Points awarded for the academic qualification (A) and for the congruence of the curriculum with the topics (B) will entitle the Commission to prepare a shortlist of candidates, who will be invited to the interview (C). The lowest score to be admitted to the final ranking list is 25/50. One ranking per each curriculum will be issued. The final score will be used for ranking the applicants and to prepare A) the list of all admitted candidates and B) the list of candidates entitled to receive the fellowships. Separate rankings will be drawn up for the externally funded or co-funded projects. If two or more applicants have the same score, the younger candidate will be given priority.

The ranking list will be published on the website of unibz ([Ranking lists / Free University of Bozen-Bolzano \(unibz.it\)](https://www.unibz.it/it/ ranking-lists/)).

Examination dates:

Description	Date	Place
Personal Interview	23 rd - 24 th July 2024	The interview will be held in presence at unibz. Exceptions for an online interview might be granted upon request.

PhD-positions and grants

Total PhD-positions:	9
PhD-Positions with grants from the University:	4 (2 for curriculum 1, 2 for curriculum 2)
PhD-positions with other grants:	4 (3 for curriculum 1, 1 for curriculum 2)
PhD-Positions MD 630/2024 under PNRR:	1 (for curriculum 2)

PhD scholarship bound to specific research topics/areas:

- Scholarship in collaboration with Eurac Research about one of these 2 research topics:
- Future agritourism in mountain areas – socio-economic perspectives (Research project n. 7)
 - Regional and agricultural development strategies for mountain territories (Research project n. 8)

1 scholarship with bound research topic in collaboration with Eurac Research:

Research topic:

- Extrapolating drought impacts on mountain forests from individual tree response to the landscape scale (Research project n. 14)

2 scholarships with bound research topic in collaboration with Laimburg Research Centre:

Research topics:

- The role of semiochemicals in the tritrophic-interaction and the intraspecific communication of *Eriosoma lanigerum* and *Dysaphis plantaginea*: exploring new possibilities for the development of sustainable pest control measurements (Research project n. 3)
- Use of agroecology principles and intercropping to increase sustainability of strawberry cultivation in mountain areas (Research project n. 6)

1 scholarship funded by EcoResearch with bound research topic and minimum 6-month study period abroad and minimum 6-month in-company collaboration pursuant to MD 630/2024 funded by PNRR:

Research topics:

- Chemical ecology and population dynamics of the European spruce bark beetle (Research project n. 13)