Syllabus

Course Description

Course Title	Mountain crop ecosystems
Course Code	47301
Course Title Additional	
Scientific-Disciplinary Sector	AGRI-03/A
Language	English
Degree Course	Master in Smart Sustainable Agriculture Systems in Mountain Areas
Other Degree Courses (Loaned)	
Lecturers	Prof. Damiano Zanotelli, Damiano.Zanotelli@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/18696
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	3
Teaching Hours	18
Lab Hours	12
Individual Study Hours	45
Planned Office Hours	9
Contents Summary	The course aims to impart a scientific background to understand the ecological and productive dynamics of crop ecosystems in mountainous regions. Building on an understanding of environmental resources and regulatory factors, it will focus on efficient production practices (e.g., efficient water use, orchard floor management, nutrient application, and optimal utilization of light). Emphasis will also be placed on advancements in smart digital agriculture and the guiding principles of agroecological transition.
Course Topics	- Introduction to the specific features of mountain agriculture

	(facts and figures, challenges, and opportunities) - Crop production protocols, sustainability, and principles of agroecology - Sustainable soil and water management in mountain agriculture - Adaptation to and management of key climatic variables in mountain agricultural systems - Analysis of selected case studies in mountain agriculture through lectures, exercises, field visits, and assignments
Keywords	Agroecosystems, resource management, sustainability, crop productivity, mountain agriculture
Recommended Prerequisites	Background in Agricultural Sciences
Propaedeutic Courses	No
Teaching Format	Lectures, field excursions and laboratories, group project
Mandatory Attendance	No
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding --> - Actively participate in research projects in the field of mountain agriculture - Apply the fundamental principles of occupational safety (internal and external) in the field of mountain agriculture - Collaborate with other professionals in the fields of architecture, engineering, and natural sciences - Work in interdisciplinary, national, and international teams - Organize continuing education in the field of mountain agriculture Ability to apply knowledge and understanding --> Graduates of the Master's degree program (Master SAM) are equipped with a solid scientific and technical foundation that enables them to address and solve complex problems. Thanks to their scientific and technical training in agriculture, economics, and management, graduates are able to develop analyses and plans for the development and management of agricultural businesses in mountain regions, taking into account their specificity and multifunctionality (ecosystem services). In these specialized fields, graduates are able to coordinate interdisciplinary teams in the agricultural sectors. The ability to apply acquired specialized knowledge is achieved

	through critical reflection on the course materials and classroom learning activities, complemented by case study analysis and practical exercises conducted by instructors. Furthermore, practical exercises in the laboratory, on the computer, and in the field are included, as well as excursions, literature research, the development of individual and/or group projects, and the preparation of the final thesis. Assessment of success (oral and written exams, seminar reports) and practical exercises are designed to ensure that graduates demonstrate mastery of the tools and methods learned, as well as a critical and independent approach to working. Autonomy of judgement --> - choose the best production techniques while taking environmental protection into account; - analyze data and information to independently assess the quality and effectiveness of results obtained when designing strategies to manage difficulties. - make independent decisions on professional issues. These may specifically concern the feasibility of projects in the agricultural sector. - evaluate quality assurance systems for agricultural products, including those in the tourism sector, and methods for defining internal and external quality criteria. - plan activities and strategies based on predefined objectives, taking into account time and methods. Communication skills --> Graduates will be able to work professionally in one or more foreign languages. Mandatory courses and elective courses are taught in English. Additionally, some elective courses may be offered in Italian or German. In accordance with unibz's trilingualism policy, the unibz Language Centre offers the opportunity to take extracurricular courses (levels A1-C1) in Italian and German. Graduates will be able to communicate confidently with other professional groups and will be able to participate in European projects with foreign partners, thanks to the international focus of the master's program. Written and oral communication skills are developed through seminars, field trips, exercises, and teaching

	activities, which include the preparation of reports and written documents and their oral presentation in English, and optionally in Italian and German in elective subjects. The acquisition and assessment/verification of these communication skills also occurs through the writing of the final thesis and its defense in English. The master's program also promotes the acquisition of additional language skills in German and Italian. This should enable graduates to successfully enter the international job market (e.g., Austria-Switzerland-Italy-Germany). Learning Capacity --> Graduates will be able to manage complex projects thanks to the specialized knowledge acquired during their studies. They will be able to continuously expand and update the specialized knowledge acquired during their studies. They will learn to use the most modern methods to competently perform analyses, project planning, and management measures in their professional lives. Graduates will be able to use various information systems to further their cultural and professional development. They will also be able to choose the methods and training paths best suited to their cultural and professional development. Graduates will be able to manage complex projects thanks to the specialized knowledge acquired during their studies. They will be able to continuously expand and update the specialized knowledge acquired during their studies. They will learn to use the most modern methods to competently perform analyses, project planning, and management measures in their professional lives. Graduates will be able to use various information systems to further their cultural and professional development. They will also be able to choose the methods and training paths best suited to their cultural and professional development. Learning skills are encouraged throughout the degree program. Special emphasis is placed on individual study, especially in completing group work on proposed topics. This skill is enhanced during compulsory lectures, which include group work, and subsequently in the preparation of the final thesis. Learning progress is assessed regularly throughout the courses and during the preparation of the final thesis. Specifically, this practice-oriented program involves working in small groups (3-5 students) on a shared project (e.g., a plan for the development of

	agricultural businesses in mountain areas), from the initial stages (development of objectives and measures, collection of available data) to cooperation with various stakeholders (e.g., public administration, mountain agriculture advisory center, farmers' association), which also includes communication activities for agriculture and society. The projects are carried out under the supervision of two or more professors, with exchanges between students and the private companies and/or public authorities involved. Learning skills are assessed through continuous assessment during the learning units and in the preparation of the final thesis.
Specific Educational Objectives and Learning Outcomes (additional info.)	Knowledge and understanding Demonstrate a thorough understanding of the unique characteristics of mountain agriculture and the sustainable crop production protocols and management strategies relevant to mountain agricultural systems. Understand the influence of climatic variables on agricultural systems in mountain areas and strategies for adaptation and resilience Applying knowledge and understanding Design and evaluate sustainable management plans for agricultural resources in mountain areas. Conduct practical evaluations and provide recommendations based on case studies of mountain agriculture Making judgements Critically assess the sustainability of current agricultural practices in mountain regions using agroecological and environmental frameworks Communication skills Effectively communicate insights and findings related to mountain crop production using clear, evidence-based reasoning in both written and oral formats. Collaborate with peers and stakeholders during field visits, exercises, and group assignments to share knowledge and develop practical solutions. Learning skills Develop the ability to independently acquire and synthesize new

	knowledge related to sustainable agriculture in mountain contexts. Cultivate critical thinking and problem-solving skills to address complex and evolving challenges in mountain agriculture.
Assessment	Oral examination and project-work assessment: In the oral examination, the correctness of the answers, the mastery of the concepts, and the ability to critically evaluate the different management options covered in the course will be assessed. A written project report done in groups and completed by a presentation in class will contribute to the final mark
Evaluation Criteria	The oral exam and the project work will account for 70% and 30% of the final grade, respectively. The following criteria will be considered in the evaluation: - For the oral exam: clarity of answers; ability to summarize, evaluate, and establish connections between topics - For the group project: ability to work in a team; creativity; critical thinking skills; ability to summarize in one's own words
Required Readings	The oral exam will be based on the content discussed in class and on the lecture handouts, which will be uploaded to the dedicated Teams platform. The group assignment consists of analyzing and presenting a selected case study of mountain agriculture, using references provided on the Teams platform, which may be further integrated by each group.
Supplementary Readings	The reference book regarding the management of agricultural resources and regulators is: • Principles of Agronomy for Sustainable Agriculture. Villalobos F.J., Fereres E., 2016. Springer ISBN 978-3-319-46115-1 Additional references on selected topics are provided during the lectures in the form of articles from scientific journals.
Further Information	
Sustainable Development Goals (SDGs)	Good health and well-being, Clean water and sanitation, Decent work and economic growth, Life on land, Responsible consumption and production, Climate action, Sustainable cities and communities