Syllabus

Course Description

Course Title	Fundamentals of Plant Production
Course Code	40216
Course Title Additional	
Scientific-Disciplinary Sector	NN
Language	English
Degree Course	Bachelor in Sustainable Agriculture and Forestry in Mountain Environments
Other Degree Courses (Loaned)	
Lecturers	dr. Maria Dolores Asensio Abella, MariaDolores.AsensioAbella@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/45187 Prof. Massimo Tagliavini, Massimo.Tagliavini@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/209 dr. Simon Josef Unterholzner, SimonJosef.Unterholzner@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/41647
Teaching Assistant	
Semester	Second semester
Course Year/s	1
CP	10
Teaching Hours	60
Lab Hours	40
Individual Study Hours	150
Planned Office Hours	30
Contents Summary	Agricultural Ecology and Prin-ciples of Plant Production: Agrometeorology

	Soil (physical aspects) Crop productivity Interactions crops-physical environ-ment-organisms (e.g. competitions) Crop (monoculture, rotation, intercropping,…) and farming systems (organic, regenerative, agroecology,...) Management criteria (seed bed preparation, water/ nutrient supply, management of residues, …) Plant genetics: Classical genetics & molecular basics Regulation of gene expression Population genetics Plant breeding Biotechnology Functional genetics Developmental genetics
Course Topics	The course provides the basis for the comprehension of the functioning of agro-ecosystems by explainiong the principles of plant productivity and the characteristics of the genetic material. In details, the module Agricultural Ecology and Principles of Plant Production will cover the following topics: Agrometeorology Physical properties of agricultural soils Soil water relations and crop ET Plant photosynthesis, plant growth and development, phenological phases Crop and farming systems Seedbed preparation and cultural management techniques Criteria for managing irrigation, fertilization and weed control. In details, the module Plant Genetics will cover the following topics: Introduction to Plant Genetics Classical Genetics and Mendel's Laws Chromosome Theory Molecular Basis of Inheritance Genetic Variability Population Genetics Molecular Biotechnology

	Functional Genetics Developmental Genetics
Keywords	Agrometeorology, Crop productivity, Crop systems, Soil physics, Biotechnology, Plant breeding, Plant genetics,
Recommended Prerequisites	
Propaedeutic Courses	no
Teaching Format	The course combines lectures, field visits, field and laboratory exercises.
Mandatory Attendance	no
Specific Educational Objectives and Learning Outcomes	Knowledge and Understanding: The degree course provides advanced knowledge for the training of professionals capable of carrying out management and coordination activities in mountain and forestry agriculture, as well as effectively preparing students for possible further studies. All these skills will be transmitted to the graduates by means of face-to-face lecturing, technical and practical laboratory exercises, field exercises and educational-scientific excursions. The elaboration of the experimental thesis may be carried out both in the faculty's laboratories and in companies and local authorities At the end of their studies, the three-year graduate at Sustainable agriculture and forest management in mountain environment possesses basic knowledge of mathematics, physics, chemistry, statistics, and the biology of plant and animal organisms and microorganisms. The expected learning outcomes can therefore be summarised as: - knowledge of the atomic-molecular constitution of bodies and the role of chemical bonds and structure on the properties of materials - understanding of the main chemical and biochemical reactions in plants and soils - an understanding of the fundamental aspects of the biology, physiology and ecology of organisms with particular reference to those of agricultural and forestry interest, including their genetic improvement and relationships with beneficial or pathogenic organisms and micro-organisms - being able to read and understand advanced texts relating to the various aspects characterising the agrarian and agro-forestry environment in mountainous areas

	- being able to communicate and discuss issues relating to the training course in an appropriate manner in the three languages (Italian, English, German). The knowledge and comprehension skills listed above are achieved through participation in lectures, practical exercises, seminars, and through guided personal and individual study as envisaged by the training activities offered. Some courses in the syllabus may be offered in a dual mode (lectures face-to-face and in video-recorded form and made available on the university intranet platform). The assessment of the achievement of learning outcomes takes place mainly by means of exams and possible in -progress tests. The tests may be written and/or oral, and may also consist of reports and oral presentations of projects or seminars. Ability to apply knowledge and understanding: In addition to acquiring a solid scientific-technological foundation, the ability to tackle new problems, both practical and real, is stimulated, with the aim of enabling the student to acquire a working method. The three-year graduate in sustainable agriculture and forest management in a mountain environment, thanks to a technical-scientific training integrated with economic-managerial subjects, must: - know how to set up and manage sustainable agricultural/forestry systems in mountain environmental contexts, based on knowledge of agricultural production systems and their economic and marketing aspects, considering environmental impact, product quality and consumer health. The ability to apply knowledge is achieved through critical reflection on the texts proposed for individual study stimulated by classroom activities, the study of research and application cases shown by the lecturers, the performance of practical laboratory and field exercises, bibliographical research, individual and/or group projects as part of the fundamental and optional courses included in the teaching plan, as well as during the internship and preparation for the final examination. The tests carried out by means of written and/or oral examinations, reports and exercises include the performance of specific tasks in which the student demonstrates mastery of tools, methodologies and critical autonomy. In the internship activities, the verification takes place through the presentation of a report by the student to the teacher

	of reference. Making judgements: At the end of their studies, graduates possess an awareness and autonomy of judgement that enable them to acquire the necessary information, and to assess its implications in a production, environmental and market context, to implement interventions to improve the quality, efficiency and sustainability of agricultural/forestry production processes. Autonomy of judgement is developed and verified through the exercise activities, the organised seminars, the preparation of papers as part of the teaching, as well as during the internship activity and the activity assigned by the lecturer for the preparation of the final examination. Communication skills: The graduate has the ability to use the most modern and effective means of communication to disseminate the research carried out and the analyses relating to the problems of agro-forestry and forest management; he/she is able to deal with the production realities in the agro-forestry sector and to interact with figures from the sector and related sectors. Communication skills are particularly developed during exercises, the organised seminars, as well as during training activities that also involve the preparation of reports and written documents and the oral presentation of the same. Since the course is trilingual, graduates are able to communicate correctly, in written and oral form, in Italian and in two other languages (German and English). In tutorial activities and seminars, students are encouraged to speak publicly in order to improve their ability to describe clearly and comprehensibly any doubts and/or requests for clarification on specific topics. The acquisition and evaluation/verification of the achievement of communication skills are also provided for during the internship and the final report, as well as when writing and discussing the final paper. Learning skills: The degree course provides the basic cognitive tools indispensable for the continuous updating of knowledge, also with tools that

	make use of new communication and information technologies. The graduate is able to apply the developed learning methods and tools to update and deepen the studied contents, also in professional contexts and to undertake further studies.
Specific Educational Objectives and Learning Outcomes (additional info.)	Knowledge and understanding of the functioning of the agricultural systems and their interactions with the environment. Knowledge and understanding of fundamentals from classical and molecular genetics and biotechnological plant breeding approaches. Applying Knowledge: Understanding through the analysis of environmental and management variables involved in agricultural production process and through the assessment of the agronomical solutions most suitable to the environmental situations. Applying knowledge and understanding by developing practical laboratory skills and the ability to draw information out of practical laboratory activities in support/integration to the theoretical lessons. Making judgments: To be able to judge the level of sustainability of agronomical techniques and teh suitable genetic material for a given crop in a given environment. Communication skills: Ability to present and discuss the acquired knowledge using a scientific terminology and sound arguments. Learning skills: Ability to extend autonomously the knowledge acquired during the course by critically reading of scientific literature.
Assessment	The course examination for the module Agricultural Ecology and Principles of Plant Production is conducted on the basis of an oral test. The course examination for the module Plant Genetics is conducted on the basis of a written test (weight = 70%) and of outcomes of lab. exercises (30%). The final mark will be the average of the marks obtained from both modules. For both modules the assessemnt will test the knowledge acquired, its understanding and its application and transfer to applied cases.
Evaluation Criteria	Awarding a single final grade.

	Criteria for awarding the grade: the clarity of the answer, the appropriate use of the terminology, the ability to summarise, the argumentative pertinence, the autonomy of judgement and the ability to re-elaborate are assessed.
Required Readings	Copy of the slides presented by the lecturers.
Supplementary Readings	Book: Principles of Agronomy for Sustainable Agriculture. F. Villalobos e E. Fereres (Ed.). Springer 2016.
Further Information	
Sustainable Development Goals (SDGs)	No poverty, Zero hunger, Life on land, Responsible consumption and production, Climate action, Quality education

Course Module

Course Constituent Title	Agricultural Ecology and Principles of Plant Production
Course Code	40216A
Scientific-Disciplinary Sector	AGR/03
Language	English
Lecturers	Prof. Massimo Tagliavini, Massimo.Tagliavini@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/209 dr. Maria Dolores Asensio Abella, MariaDolores.AsensioAbella@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/45187
Teaching Assistant	
Semester	
CP	5
Responsible Lecturer	
Teaching Hours	30
Lab Hours	20
Individual Study Hours	75
Planned Office Hours	15

Contents Summary	Agrometeorology Soil (physical aspects) Crop productivity Interactions crops-physical environ-ment-organisms (e.g. competitions) Crop (monoculture, rotation, intercropping,…) and farming systems (organic, regenerative, agroecology,...) Management criteria (seed bed preparation, water/ nutrient supply, management of residues, …)
Course Topics	Introduction 1. Agricultural production, present and future challenges 2. Sustainability The crop environment 3. Climate and agricultural plants (25%)(radiation radiation balance, energy balance, temperature, wind, relative humidity and VPD, ..) 4. The agricultural soil (15%): soil texture, structure, mechanical resistance and physical properties, soil water 5. Water relations, ET. Plant productivity 6. From photosynthesis to plant productivity 7. Plant Growth and development, phenological phases (chil units, thermal time) 8. Plant response to environmental factors (light, temperature (frost), nitrogen, etc.) 9. Competitions and other interactions among organisms Crop and farming systems 10. Farming systems (organic, regenerative, agroecology,...); the agro-ecosystem and its stability 11. Agricultural systems (intercropping, monoculture, crop rotation….) 12. Soil tillage and main cultural management techniques 13. Criteria for managing irrigation, fertilization and weed control and management of residues. Field lab about agrometeorololgy, with the use of instruments (topics: frost; solar radiation, temperature, relative humidity, soil

	temperature aspects deepened during a field visit to the cultivation of asparagus) Field lab about agroecological aspects, soil moisture sensors, soil solution in-situ analysis, soil respiration and plant Pn. Field visits to rice paddies,and vegetable crops under tunnel and strawberry cultivation in the mountain environment with pratical examples of management of the crop environment and agroecological aspects. Lab of soil physic (topic: empirical method of detecting soil texture class) Exercise on how to schedule irrigation
Teaching Format	Lectures, tutorials, laboratory activities and excursion; face-to-face teaching
Required Readings	Hand-outs of selected material presented during classes and available in the “reserve collection”. Trilingual technical dictionaries *ad hoc* prepared and made available.
Supplementary Readings	Selected websites, articles, databases and photo collection. Book: Principles of Agronomy for Sustainable Agriculture. F. Villalobos e E. Fereres (Ed.). Springer 2016.

Course Module

Course Constituent Title	Plant Genetics
Course Code	40216B
Scientific-Disciplinary Sector	AGR/07
Language	English
Lecturers	dr. Simon Josef Unterholzner, SimonJosef.Unterholzner@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/41647

Teaching Assistant	
Semester	
CP	5
Responsible Lecturer	
Teaching Hours	30
Lab Hours	20
Individual Study Hours	75
Planned Office Hours	15
Contents Summary	Classical genetics & molecular basics Regulation of gene expression Population genetics Plant breeding Biotechnology Functional genetics Developmental genetics
Course Topics	Introduction to Plant Genetics Classical Genetics and Mendel's Laws Chromosome Theory Molecular Basis of Inheritance Genetic Variability Population Genetics Molecular Biotechnology Functional Genetics Developmental Genetics
Teaching Format	The course combines lectures and laboratory exercises. The laboratory activities will be explained by the instructor and/or teaching assistants. PowerPoint presentations will be made available via Microsoft Teams.
Required Readings	Lecture slides provided via Microsoft Teams.
Supplementary Readings	