Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	**Transversal agricultural knowledge and skills**
Course code	47309
Scientific sector	G08B (ex AGR/16)
Degree	Smart Sustainable Agriculture Systems in Mountain Areas (SAM)
Semester	2nd
Year	1st
Credits	3+3 (6 ECTS)
Modular	Yes

Total lecturing hours	18 (Microbiology of farming systems) + 12 (Geomatics)
Total lab hours	12 (Microbiology of farming systems) + 8 (Geomatics)
Total exercise hours	
Attendance	Strongly recommended
Prerequisites	None
Course page	

Specific educational objectives	The course is part of the transversal course combining the disciplinary fields of agricultural microbiology and geomatics. The aim of the course is to provide the students with general scientific contents and methods and, in addition, to transfer specific and professional competencies. The first disciplinary aim of the Course is to describe the advanced knowledge enabling the comprehension of the role of microorganisms on the farm system, including livestock, under the One Health approach. The second disciplinary aim is to gain knowledge on the geomatics elements useful for smart and sustainable agricultural systems in mountain areas. They include real-time, high-precision GNSS positioning, aerial-land survey techniques, modern geomatics products (raster and vector maps, orthophotos, point clouds, digital terrain models), GIS technology.

Module 1	Microbiology of farming systems
Lecturer	Lorenzo Brusetti, NOI A2.3.133.h, lorenzo.brusetti@unibz.it, +39 0471 017123, https://www.unibz.it/it/faculties/agricultural-environmental-food-sciences/academic-staff/person/27178-lorenzo-brusetti
Scientific sector of the lecturer	G08B (Ex AGR/16)
Teaching language	English

Office hours	From Monday to Friday, on appointment
Teaching assistant *(if any)*	-
Office hours	-
List of topics covered	This module will cover the following topics: (1) Revision of the main concept of microbial ecology in environments, including molecular-based knowledge; (2) Microbiology of grass, forages and silages; (3) Microbiology of rumen and livestock gut systems; (4) Basis on pathogenic microorganisms and animal health, including farm-related food spoilers; (5) Bee microbiology; (6) Antibiotic resistomes and the One Health approach, including agricultural soils, manure and irrigation waters; (7) PC-based laboratory including data analysis and survey of existing knowledge on the topic.
Teaching format	Teaching activities will consist of frontal lectures, where theoretical aspects are presented and discussed, and exercise in computer rooms, where technical and practical problems will be solved. The lectures will be supported by digital presentations. Presentations, recordings, scientific articles, and spreadsheets used during the course will be at disposal of the students.

Module 2	Geomatics
Lecturer	Andrea Andreoli, office K3.04 (K building, piazza Università 5, 3rd floor), andrea.andreoli@unibz.it, tel: +39 0471 017171, https://www.unibz.it/it/faculties/agricultural-environmental-food-sciences/academic-staff/person/35911-andrea-andreoli
Scientific sector of the lecturer	AGRI-04/A
Teaching language	English
Office hours	From Monday to Friday, on appointment
Teaching assistant (if any)	
Office hours	
List of topics covered	• Definitions and concepts of geomatics; • geomatics for smart and sustainable agricultural systems in mountain areas; • Fundamentals of cartography and digital cartography; • Introduction to Geographic Information System (GIS), Global Positioning System (GPS), unmanned aerial vehicle (UAV) and remote sensing (RS); • Spatial analysis and basics of geostatistics; • Laboratory (PC based) of GIS and RS; • Laboratory (external) of GPS and UAV;
Teaching format	In this course the theoretical concepts are presented in the class by the Professor, who also leads PC based laboratory and the field excursions (along with Teaching Assistant); Power Point presentations of the lectures will be made available on TEAMS, along with links to external resources

	and exercises. Additional material will be provided on selected topics.

Learning outcomes	**Knowledge and comprehension capacity** of the role of microorganisms in farm system under a One Health approach, and the fundamental concepts of Geomatics, including Geodesy, surveying techniques, GIS, and cartography to comprehend the challenges of agricultural systems in mountain areas and how geospatial technologies address them. Moreover the students will gain expertise in modern surveying methods, such as satellite-based positioning, photogrammetry, and laser scanning. **Capacity to transfer the knowledge and the comprehension** through the development of the horizontal integration of the acquired information (technological, microbiological, etc.) and the ability to draw information from practical excursions and laboratory activities to support / integrate theoretical information of the lectures; ability to define best farm management practices in accordance to the microbiological factors; ability to collect, visualize, manage, and analyse geospatial data, particularly in the context of agricultural environments in mountainous areas. **Autonomous judgement** ability to identify the information necessary to understand the farm processes supported by microbial communities, and to critically evaluate geospatial data and tools for their applicability in different agricultural scenarios, assess and propose innovative solutions for sustainable agriculture using geospatial analysis. **Communication ability to present knowledge** to a specialized and non-specialized audience with a proper vocabulary and pertinent to the discipline, and develop independent projects, demonstrating critical thinking and problem-solving skills. **Capacity of permanently knowledge** through the use of technical tools enabling the independent acquisition of information and updated knowledge in the microbiological and geomatics technologies. Cultivate the ability to stay updated with emerging technologies and knowledge and their applications in agriculture.

Assessment	The exam consists of two written tests comprising questions to verify the knowledge and capacity gained during the two modules of the course and questions aimed to evaluate the transfer capacity of such competencies to case studies inherent to farm microbiology and geomatics. In the geomatics module, a group project will also be evaluated.
Assessment language	English

Evaluation criteria and criteria for awarding marks	**A single final grade** will be given through the average of the grades obtained in the two modules of the Course. **Criteria**: clarity of the answers and the lexical appropriateness (in relation of the language of the course), synthesis capacity, pertinence of the discussion, pertinence of the treated topics, autonomous judgment, capacity of elaboration. Successful completion of the examination will lead to grades ranging from 18 to 30 with honors.

Required readings	Keynotes provided by the lecturers
Supplementary readings	Ottinger M.A., Geiselman C. "One Health Meets the Exposome Human, Wildlife, and Ecosystem Health", 2023, Elsevier