

Syllabus

Course description

Course title	Entomology and Phytopathology
Course code	40192
Scientific sector	AGR/11 and AGR/12
Degree	Bachelor in Agricultural and Agro-Environmental Sciences/ Bachelor in Agricultural, Food and Mountain environmental Sciences
Semester	II
Year	II
Academic year	2021/22
Credits	6+6
Modular	Yes

Total lecturing hours	36+36
Total exercise hours	24+24
Attendance	Recommended
Prerequisites	See single modules
Course page	https://www.unibz.it/de/faculties/sciencetechnology/bachelor-agriculture-food-sciences-mountain-environment/study-plan

Specific educational objectives	<p>The module Entomology is part of the core subjects of the Bachelor in Agricultural and Agro-Environmental Science/Bachelor in Agricultural, Food and Mountain environmental Sciences. The frontal lectures will start by an introduction on fundamentals in entomology. Students are introduced to arthropod structures and functions, classification, identification, development, behaviour and ecology. Emphasis is placed on herbivores, predators and parasitoids occurring in agro-ecosystems. Methods of arthropod control, in particular biological control, are outlined and discussed. The practical part provides instruction in the insect morphology and physiology, identification of agriculture and forest relevant arthropod groups, mainly key pest insects occurring in agricultural and forest ecosystems. The module Phytopathology provides fundamental knowledge and skills in the field of plant pathology. Students are first introduced into the basic concepts and terminology of plant disease, followed by the abiotic and biotic causes of plant diseases as well as the biology of the major pathogen groups and the etiology of diseases they induce. Further emphasis will be put on the understanding of how phytopathogens interact with their host plants as well as the role of environmental and genetic factors for the development of disease. Students will also acquire theoretical and practical knowledge on different diagnostic techniques for the detection of phytopathogens. Finally, students will be</p>
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acquainted with basic concepts in epidemiology and different strategies for plant disease management and control.

Module 1	Entomology
Lecturer	Sergio Angeli, Building K, Room 4.04, email: sergio.angeli@unibz.it, http://pro.unibz.it/staff2/sangeli/
Scientific sector of the lecturer	AGR/11- GENERAL AND APPLIED ENTOMOLOGY
Teaching language	English
Office hours	After class or by appointment. Please write to: Sergio.Angeli@unibz.it
Teaching assistant (if any)	Riccardo Favaro, Building K, Room 3.04, email: riccardo.favaro@unibz.it
Office hours	After class or by appointment. Please write to: Riccardo.Favaro@unibz.it
List of topics covered	<p>The course will cover the following topics:</p> <ol style="list-style-type: none"> 1. Reasons of insect success; 2. Insect taxonomy and nomenclature; 3. Arthropoda; 4. Insect classification: apterygota, exopterygota, endopterygota; 5. Insect orders and most relevant families; 6. Insect morphology: head, thorax and abdomen; 7. Types of mouthparts: chewing, piercing-sucking, rasping-sucking, sponging, siphoning, etc.; 8. Types of antenna, wings and legs; 9. Male and female genital organs, types of ovipositors; 10. Insect cycles, development and metamorphosis; 11. Cuticle and insect integument; 12. Feeding and digestion; 13. Excretory, circulatory and respiratory; 14. Nervous system, sensory organs; 15. Insect chemical ecology: semiochemicals and pheromones; 16. Insect sampling and insect monitoring; 17. Insect natural enemies; 18. Cultural, mechanical and chemical control of insects; 19. Overview on insecticides; 20. Toxicity, health and economic threshold; 21. Integrated pest management (IPM) in fruit orchards; 22. Sustainable agriculture and biological control; 23. Introduction of key pest insects in European agriculture and forest ecosystems; 24. Exotic pest insects; 25. Case topics selected by the students.
Teaching format	The module is a lecture-lab course in which topics are presented by the Professor. Practical parts, lab activities and excursions are explained by the Professor and the Teaching Assistants. Generally, Power Point presentations will be available in the course reserve collection database.

	Additional material will be provided by the Professor.
Learning outcomes	<p>Knowledge and understanding Knowledge of the most important scientific aspects related to insects, with a particular focus on pest insects of agricultural and forestry ecosystems.</p> <p>Applying knowledge and understanding Be able to recognize and identify insect groups, in some cases at species level. Understand the differences in morphological and philological features of insects, their cycles and metamorphosis, in comparison to other animal groups. Be able to identify signs of damages and the impact of insects in agricultural production (e.g. orchards, forests, stored products). Understand the advantages and disadvantages of using insecticides, genetically modified plants in pest control, Integrated Pest Management and Biological Control techniques in order to minimize insect damage and economic agricultural losses.</p> <p>Making judgments Through the critical evaluation of knowledge. Through the critical evaluation of different strategies in pest control.</p> <p>Communication skills Ability to communicate the acquired knowledge by using a correct scientific and technical language.</p> <p>Learning skills Ability to extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation. Ability to develop a critical thinking for the professional skills.</p>

Module 2	Phytopathology
Lecturer	Prof. Dr. Sanja Baric, Building K – Room 4.04, Tel. 0471-017 118, sanja.baric@unibz.it Dr. Selena Tomada, Building K – Room 4.01, selena.tomada@unibz.it
Scientific sector of the lecturer	AGR/12 - PHYTOPATHOLOGY
Teaching language	ENGLISH
Office hours	According to timetable and by appointment
Teaching assistant (if any)	-
List of topics covered	The course will cover the following topics: <ol style="list-style-type: none"> 1. Concept of disease in plants; types of plant diseases 2. Economic impact of plant diseases 3. Parasitism and disease development; stages in the development of disease: disease cycles 4. Environmental factors that cause plant diseases 5. Plant pathogenic viruses and viroids 6. Plant pathogenic prokaryotes: bacteria and mollicutes 7. Plant pathogenic fungi and fungal-like organisms:

	<p>Ascomycetes; Basidiomycetes; Oomycetes</p> <p>8. Plant pathogenic nematodes and other parasitic organisms</p> <p>9. Genetics of plant disease: genetic variability; genetics of virulence in plant pathogens and resistance in host plants</p> <p>10. Mechanisms of pathogen attack and defense of plants against pathogens</p> <p>11. Environmental effects on the development of infectious plant diseases</p> <p>12. Epidemiology of plant diseases and population dynamics of pathogens</p> <p>13. Diagnosis techniques for plant pathogens</p> <p>14. Strategies for plant disease management and control</p>
<p>Teaching format</p>	<p>This is a lecture-lab course with PowerPoint presentations and interactive elements, such as discussions and descriptive case examples. In the practical part, selected contents covered in the lectures, will be examined in greater depth in the field (during a didactic excursion) and in the laboratory. Short presentations on a topic of choice will be prepared by the students and presented to the class. Power Point presentations and additional teaching material will be made available in the Reserve Collection database of the University.</p>

<p>Learning outcomes</p>	<p>Knowledge and understanding Students will gain fundamental knowledge on the biology of economically important plant pathogens and the etiology of diseases, and understand how plant pathogens and their host plants interact in the environment.</p> <p>Applying knowledge and understanding Students will be able to recognise and identify disease symptoms and signs, and formulate hypotheses about the causes of diseases.</p> <p>Making judgements Students will gain the ability to make informed judgments about the appropriate diagnostic technique and develop a strategy for disease control.</p> <p>Communication skills Students will improve their writing abilities by preparing short laboratory reports. Communication and presentation skills will be enhanced during interactive classes and student presentations.</p> <p>Learning skills Students will learn to retrieve scientific literature and to autonomously extend the knowledge acquired during the course by reading and compiling technical and scientific documents.</p>
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Assessment	<p>The overall mark of the course will be calculated as the average of the marks of the two modules.</p> <p>The assessment of the module Entomology consists of three parts:</p> <ul style="list-style-type: none"> • Written exam with multiple-choice and review questions (if possible) (70%); • Presentation on a given topic (15%); • Insect collection (15%). <p>The assessment of the module Phytopathology consists of two parts:</p> <ul style="list-style-type: none"> • Written exam with review questions (if possible) (70%); • Project work consisting of written lab reports, in which the results of the experiments are interpreted, and a presentation on a given topic, all performed in groups (30%).
Assessment language	English
Evaluation criteria and criteria for awarding marks	<p>Criteria for the evaluation of the written exam: correctness of answers; ability to summarize, evaluate, and establish relationships between topics of relevance; develop critical and independent thinking.</p> <p>Criteria for the evaluation of the report on exercises and excursions: ability to work in a team, ability to summarize in own words, skills in critical thinking.</p> <p>Criteria for the evaluation of the project work: correctness of the contents, ability to summarise in own words, quality and clarity of presentation, and the ability to establish a context with other related topics.</p>

Required readings	Teaching material available in the course reserve collection and additional materials provided by the professors of each module.
Supplementary readings	<p>Entomology:</p> <ul style="list-style-type: none"> - Teaching material in the course reserve collection. - Gullan, P. J. and Cranston, P. S. (2005). The Insects: an outline of entomology. Malden, MA. Blackwell Publishing. - Daly, H. V., Doyen, J. T. & Purcell III, A. H. 1998. Introduction to Insect Biology and Diversity, 2nd Edition. Oxford University Press. - Pedigo, L. P. 1999. Entomology and Pest Management, Third Edition. Prentice Hall, Upper Saddle River. - Price, P. W. 1997. Insect Ecology, 3rd edition. John Wiley and Sons, Inc. <p>Phytopathology:</p> <ul style="list-style-type: none"> - Agrios G. N. 2005. Plant Pathology, 5th Edition. Elsevier LDT, Oxford, 921 pp, ISBN: 978-0120445653 - Schumann G. L. & D'Arcy C. J. 2009. Essential Plant Pathology, 2nd Edition, APS Press St. Paul, MN, 384 pp, ISBN: 978-0890543818 - Hallmann J., Quadt-Hallmann A., von Tiedemann A. 2009.

Phytomedizin: Grundwissen Bachelor, 2. überarbeitete Auflage. Ulmer Verlag (UTB) Stuttgart, 516 pp, ISBN: 978-3825228637
- Poehling H.-M., Verreet J.-A. 2013. Lehrbuch der Phytomedizin, 4. Auflage. Eugen Ulmer Verlag Stuttgart, 600 pp, ISBN: 978-3800151646