Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	**Beekeeping**
Course code	43016
Scientific sector	AGR/11
Degree	Bachelor in Agricultural and Agro-Environmental Science
Semester	I
Year	II, III
Academic year	2019/20
Credits	3
Modular	No

Total lecturing hours	18
Total lab hours	12
Total exercise hours	-
Attendance	Attendance of front lectures is not strictly required, attendance of exercises is strongly recommended.
Prerequisites	Students should be familiar with basic concepts of biology, general zoology and general entomology of agricultural systems. They shall have followed the courses of Biology (n. 40126), particularly the module of Zoology, and the course of Agricultural and Forest Entomology (n. 40129) but they are not strictly mandatory.

Specific educational objectives	This course is an elective subject of the Bachelor in Agricultural and Agro-Environmental Science, consisting of 18 h of frontal lectures and 12 h of practical part. This course is designed to provide a broad overview of bee biology, practical beekeeping and research frontline in apiculture. The frontal lectures starts by a first part on fundamentals in biology of honey bees, emphasizing the development of sociality. Students are introduced to *Apis mellifera* anatomy, physiology, classification, identification, development, behavior, ecology, pheromones, dance language and orientation. Races of honey bees are discussed as the Italian, Carniolan and European dark bee. Emphasis is placed on honey bees products (honey, wax, royal jelly, propolis, pollen and venom) and on the impact of honey bees as pollinators in nature and in agriculture. Bees and bee-products as a bio-indicators is discussed. Finally, the relationship between honey bees and humans from prehistoric through modern times will be emphasized. A second part of the course is on beekeeping management, how to start and maintain an apiary, types of beehives, where to install an apiary, inspections of

	beehives, best management practices, hive management in spring, summer, autumn and winter, migratory beekeeping, how to prevent swarming, honey harvesting, how to raise queens, how to produce new nucleus colonies. A third part of the course deals with the current bee diseases, pests and predators, with special emphasis on biological control and recent control strategies. The practical lab part provides instruction to bee morphology and physiology, identification of glands, grafting larvae into artificial queen cell cups, quantification of Varroa infestation and acaricide treatments. The most common types of Alpine honey are examined. Excursions to the Experimental Apiary of the University of Bolzano and other Reserch Institutions as well as to professional beekeepers are planned.
Lecturer	Sergio Angeli, Building K, Room 4.04, email: sergio.angeli@unibz.it.
Scientific sector of the lecturer	AGR/11
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	-
List of topics covered	The course will cover the following topics: 1. *Apis* classification and taxonomy. 2. Honey bees anatomy and physiology. 3. Metamorphosis, development and social organization. 4. Behavior and ecology. 5. Pheromones and dance language. 6. Races of honey bees. 7. Bee products. 8. Humans and bees. 9. Types of beehives and beekeeping tools 10. A new apiary: where and how to install. 11. Inspection of a beehive. 12. Acquiring bees and spring management. 13. Summer management. 14. Autumn and winter management. 15. Grafting larvae and rearing new queens. 16. Diseases, pests and predators of honey bees. 17. American and European foul brood diseases, viruses 18. Varroa infestation and biological control 19. Honey types and melissopalynology
Teaching format	This 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 Assistant. Generally, Power Point presentations are available in the course reserve collection database of the Faculty one day after each single lecture. Additional material will be provided by the Professor. Lecture attendance is strongly encouraged.

Learning outcomes	By the end of the course, students should be able to: 1. Have basic knowledge of bee morphology and physiology; 2. Associate apiculture with local agriculture products, ecosystem services and human history; 3. Understand the importance of honey bees as critical pollinators for both natural environments and crops productions; 4. Start and maintain an apiary; 5. Control bee diseases and pests; 6. Have a broad idea of international research in apiculture.

Assessment	Coursework will be weighted as follows: oral exam (80%), report on exercises and excursions (20%). It will not be possible to pass the course if the final written exam has a mark lower than 18.
Assessment language	English
Evaluation criteria and criteria for awarding marks	Criteria for the evaluation of the oral exam: correctness of answers; ability to summarize, evaluate, and establish relationships between topics of relevance; develop critical and independent thinking. 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.

Required readings	Teaching material in the course reserve collection and additional material provided by the Professor.
Supplementary readings	Delaplane, K.S. 2006. Honey Bees and Beekeeping: A Year in the Life of an Apiary, 3rd Edition. The Georgia Center for Continuing Education, Athens, USA. Ross, C. 2007. Natural Beekeeping : Organic Approaches to Modern Apiculture, White River Junction, London, UK. Dadant C.P., Dadant C.C., Dadant M.G., Dadant J.C. (eds.) The Hive and The Honeybee. Dadant and Sons, Inc. Hamilton, USA. Sammataro D., Avitabile A. 2011. The Beekeeper's Handbook, 4th edition. Cornell University Press, USA.