UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche
ACADEMIC YEAR	2016/2017
MASTER'S DEGREE (MSC)	BIODIVERSITY AND ENVIRONMENTAL BIOLOGY
SUBJECT	APPLIED ENTOMOLOGY
TYPE OF EDUCATIONAL ACTIVITY	D
AMBIT	20490-A scelta dello studente
CODE	17697
SCIENTIFIC SECTOR(S)	AGR/11
HEAD PROFESSOR(S)	MANACHINI BARBARA Professore Associato Univ. di PALERMO ROSY INES
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**MANACHINI BARBARA** **ROSY INES** Tuesday 10:00 11:30 Viale delle Scienze, 13. Edificio 5A, stanza 004 Thursday 10:00 11:30 Ricevimento studenti polo Trapani c/o la sede del polo di Trapani, Via del principe di Napoli e on line su richiesta.

DOCENTE: Prof.ssa BARBARA ROSY INES MANACHINI

PREREQUISITES	Basic knowledge of biology, zoology and eventually entomology but not specific courses are requested to attend applied entomology.
LEARNING OUTCOMES	Short description of expected results: Students should be able, through the skills provided by the course, to identify and recognize the main insects of natural interested interest, determine their population density and therefore their potential harmfulness or biodiversity. Set up appropriate defence and conservation strategies using all available techniques and exploiting the limiting action of beneficial arthropods in the full respect and protection of the environment and of consumers. To achieve the goal of entomological literacy these standards provide students with basic understanding of insect biology as it relates to agriculture, animal and human health, ecosystem functioning and monitoring, and insect products. Students will investigate these entomological concepts through different experiences using the processes of inquiry. Knowledge/Skills; Students will have knowledge of insect identification, morphology, physiology and behavior. Critical Thinking Skills: Students will acquire, analyze, and synthesize entomological information Communication Skills: Students will demonstrate oral or written proficiency in the entomological sciences.
ASSESSMENT METHODS	Methods of Evaluating Student Performance At the beginning of each lesson the teacher will stimulate the debate and the opportunity to assess the knowledge and the understanding of the previous lessons. When the general and special parts of the programme are completed, the teacher will conduct a test of the teaching efficacy through oral questions on the main topics dealt with in order to highlight any learning problem. The interview has no value for the final evaluation, but it is helpful to the student to estimate the learning level. The final exam is an oral and written exam (with 15 specimens to be recognised) with questions on the general and special parts and on the field and laboratory activities carried out during the training. The interview aims to verify the capacity of reasoning and connecting the knowledge acquired. The Entomology exam mandates that students develop a general knowledge of entomology and an ability to think critically/conceptually, and it will identify any major weaknesses or deficiencies in their understanding of entomology and for further carrier steps. Moreover performance-based assessment does not rely solely on standardized or teacher-made tests that provide a one-time evaluation of a student's performance. It measures rather what the students can do or knowledge they can apply in addition to information they know. When developing the scoring criteria and quality levels of entomology course the following criteria will be applied. •Level 5 (score 30-30 Lode) is the Standard of excellence level. Descriptions should indicate that all aspects of work exceed grade level expectations and show exemplary performance or understanding, with personal input and excellent and appropriate language. •Level 4 (score 26-29) Approaching standard of excellence level with appropriate level of competence and criticisms. •Level 3 (24-25) is the Approaching standard of good level. Descriptions should indicate some aspects of work that exceed grade level expectations and demonstrate solid performance or understanding. •Level 2 (23- 21) Acceptable standard. This level should indicate minimal competencies acceptable to meet grade level expectations. •Level 1 (18-20) Performance and understanding are emerging or developing but there are some errors and mastery is not thorough. The student is not able to critical discussion. •Level 0 (failed). Not acceptable standard. This level indicates what is not adequate for grade level expectations and indicates that the student makes serious errors, and that his\her knowledge is full of omissions or misconceptions.
EDUCATIONAL OBJECTIVES	The course has the objective to illustrate the importance of symbioses in the animal world, and in particular in one of the most successful taxa within Animal Kingdom, namely Insects; the interactions that influence the biology, physiology, immunity and behaviour of the organism-system. To achieve the goal of applied entomological course, these standards provide students with basic understanding of insect biology as it relates to agriculture, animal and human health, ecosystem functioning and monitoring, and insect products. The aim is to provide basic knowledge of morphology, anatomy, physiology, bio-ethology and ecology of the main insects important for the natural area and for the agro-ecosystem. Beneficial insects (predators, parasites, pollinators) will be

	considered. Supply the ability to recognize the most common pests and alterations caused by them in plants and to assess infestation levels through direct and/or indirect sampling. Supply the ability to set up and develop defence plans using the most appropriate strategies and in accordance with local regulations. Insect as bio-indicator on different habitats. The program emphasizes the integration of basic and applied aspects of entomology in solving problems in biology, agriculture, and the environment. Students can specialize in a diversity of areas such as agricultural entomology, apiculture and bee biology, behaviour, biological control, environmental toxicology, insect physiology and biochemistry, host-plant resistance, parasitology, medical entomology, molecular biology, socio-biology, systematics, and others.
TEACHING METHODS	The course consists in 48 hours of classes. For lectures, the teacher makes use of presentations and slides as well as of other didactic devices. Presentations and slides used for the classes are available to the students.
SUGGESTED BIBLIOGRAPHY	Articoli scientifici e materiale didattico (presentazioni PowerPoint) fornito dal docente verranno caricati sulla piattaforma Unipa. English Scientific papers and materials (PowerPoint presentations) provided by the teacher will be loaded on the platform Unipa. Testi consigliati: The recommended basic textbooks for the course are: -Tremblay E. (1981, 1985, 1986, 1991, 1994, 1997, 2000) - Entomologia applicata. Voll. I, II/1,2, III/1,2,3, IV, 1. Liguori, Napoli. -Schowalter T.D.. Insect ecology. An Ecosystem Approach. Academic Press, London. -Gullan P.J. & Cranston P.S.. Lineamenti di Entomologia. Zanichelli, -Fiori G., Bin F., Sensidoni A. (1983) – Atlante entomologico. Morfologia esterna. Galeno Editrice, Perugia. -Masutti L., Zangheri S. (2001) - Entomologia generale e applicata. CEDAM, Bologna -Padova. Pollini A. (1998) – Manuale di entomologia applicata: Edagricole, Bologna. -Plant-Animal Interactions in Mediterranean-Type Ecosystems. Arianoutsou-Faraggitaki, Margarita; Groves, R.H. (Eds.) 1994, 184 p. 77 illus., Hardcover. ISBN: 978-0-7923-2470-6 -Plant-Animal Interactions: An Evolutionary Approach Carlos M. Herrera (Editor), Olle Pellmyr (Editor). Wiley-Blackwell; ISBN-10: 0632052678 -Insect-Plant Biology Louis M. Schoonhoven (Author), Joop J. A. van Loon, Marcel Dicke. Garland Science. ISBN-10: 0412804808 - AA.VV. Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species, Second Edition. Editor(s): David Pimentel, Published: May 23, 2011 by CRC Press. ISBN 9781439829905 - Insect Ecology: Behavior, Populations and Communities 2012. Price, Denno, Eubanks, Finke, and KaplanCambridge University Press, Cambridge, UK2011; 801 pagesISBN: 978-0-521-54260-9 - Insect Species Conservation, 1st Ed. 2011. Tim NewCambridge University Press, New York2009; 256 pagesISBN: 978-0-521-73276

SYLLABUS

Hrs	Frontal teaching
1	Presentation of the course and examination procedures. Evaluation of the previous knowledge
6	Insects: origins and affinities with other arthropods. Integument system and colours. External morphology. Reproduction, eggs and ootaxis. Embryonic and postembryonic development. Moults, metamorphosis, preimaginal stages, adult.
8	Systematic of insect: Major orders and families
12	Symbiotic relationship: positive (e.g. pollination), negative (predation, phytophagia, parasitism), and neutral. Co-evolution plant-insect. Bitrophic and tritrophic relationships.
3	Legal and economic aspects of insects
6	Plant insect interaction: case study of genetically modified plants resistant to insect (eg. Bt maize).. Environmental risk assessment, effects on non-target species, Insect resistance management.
4	Cultural Entomology and insect as food
4	Functional biodiversity. Insect biodiversity for environmental risk assessment monitoring
4	Issues and subject proposed or in accordance with student related to the entomology and upcoming news (e.g. daily life, invasion of new species).