



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2017/2018
MASTER'S DEGREE (MSC)	NATURAL SCIENCES
SUBJECT	APPLIED ENTOMOLOGY
TYPE OF EDUCATIONAL ACTIVITY	B
AMBIT	50510-Discipline agrarie, gestionali e comunicative
CODE	03014
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	1
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 mandatory or requested to attend applied entomology.
LEARNING OUTCOMES	<p>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.</p> <p>Knowledge/Skills; Students will have knowledge of insect identification, morphology, physiology and behavior.</p> <p>Critical Thinking Skills: Students will acquire, analyze, and synthesize entomological information</p> <p>Communication Skills: Students will demonstrate oral or written proficiency in the entomological sciences.</p>
ASSESSMENT METHODS	<p>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 at least 5 specimens to be identified). For each specimens the candidate should indicate Order, suborder, eventually the family, systematic characteristics, reproductive strategies and post-embryonic development, ecology and ethology of the taxa. Other questions on the general and special parts and on carried out during the course and the exam. The interview aims to verify the capacity of reasoning and connecting the knowledge acquired.</p> <p>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.</p> <ul style="list-style-type: none">•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. Deep knowledge on the all orders and full identification of all specimens.•Level 4 (score 26-29) Approaching standard of excellence level with appropriate level of competence and criticisms. Knowledge on all order sub order and some inferior taxa level.•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. Knowledge on all orders but not inferior systematic level.•Level 2 (23- 21) Acceptable standard. This level should indicate minimal competencies acceptable to meet grade level expectations. Knowledge on the majority of the orders.•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. Knowledge on some orders.•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

	<p>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.</p> <p>The aim is to provide basic knowledge of morphology, anatomy, physiology, bioethology 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.</p> <p>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.</p>
TEACHING METHODS	<p>The course consists in 48 hours of classes. For lectures, the teacher makes use of presentations, slides as well as of other didactic devices as movies, website, plastic model, journal article etc..</p> <p>Presentations and slides used for the classes are available to the students on the web-site of the course after subscription to the course of applied entomology.</p>
SUGGESTED BIBLIOGRAPHY	<p>Di seguito sono riportati 3 testi base che vengono considerati sostanzialmente equivalenti per la preparazione, tuttavia poiche' alcuni argomenti trattati sono recenti il docente fornira' articoli scientifici e materiale didattico (presentazioni PowerPoint) , che verranno caricati sulla piattaforma Unipa, ad integrazione e come complemento del contenuto dei testi ed eventuale supporto alla preparazione. Verranno altresì forniti dei materiali per l'approfondimento di alcune tematiche (es. PGM insect resistant) ma che sono considerati facoltativi.</p> <p>Book and alternative books are suggested in addition scientific papers and materials (PowerPoint presentations) provided by the teacher will be loaded on the platform Unipa. Other materials will be up-loaded for specific subject but not all them will be mandatory for the exam, this will be indicated on the beginning of the document.</p> <p>Testi Base/ 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,</p> <p>Altri possibili testi che lo studente può consultare per approfondire alcune tematiche (Other alternative suggested books). -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 Kaplan Cambridge University Press, Cambridge, UK2011; 801 pages ISBN: 978-0-521-54260-9 - Insect Species Conservation, 1st Ed. 2011. Tim New Cambridge University Press, New York 2009; 256 pages ISBN: 978-0-521-73276</p>

SYLLABUS

Hrs	Frontal teaching
2	Presentation of the course and examination procedures. Evaluation of the previous knowledge. The role of insect in the ecosystem and in the human life, from food to art.

SYLLABUS

Hrs	Frontal teaching
8	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.
10	Systematic, biology, ecology, of insect orders, sub-order and families. Collembola, Thysanura, Protura, Ephemeroptera, Odonata (Anisoptera (Libellule - Dragonflies) and Zygoptera (donzelle Damselflies), Exopterygota: Plecoptera, Embioptera, Orthoptera, Dermaptera, Dictyoptera Mantophasmatidae (discovered in 2001, gladiators) (Phasmatodea, Blattaria, Mantodea), Isoptera, Psocoptera, Thysanoptera (thrips), Hemiptera (hetroptera, Omoptera) Endopterygota or Holometabola: Hymenoptera, Coleoptera, Strepsiptera, Raphidioptera, Megaloptera, Neuroptera, Mecoptera, Siphonaptera, Diptera, Trichoptera, Lepidoptera.
2	Active and passive diffusion of insect species, population dnamic, biodiversity and bioindicators. Abiotic and biotic factors.
4	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. Alien invasive insect species
2	Insect control and Integrated pest managment. Biological control
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	Functional biodiversity. Insect biodiversity for environmental risk assessment monitoring. IBE
2	Cultural Entomology and insect as food
2	By studying the insect communities, ecological sequences and population and the developing larval stages, forensic scientists can have applied useful information (Basic forensic entomology)
3	Issues and subject proposed or in accordance with student related to the entomology and upcoming news (e.g. daily life, invasion of new species).