



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Scienze della Terra e del Mare		
<b>ACADEMIC YEAR</b>	2023/2024		
<b>MASTER'S DEGREE (MSC)</b>	NATURAL SCIENCES		
<b>INTEGRATED COURSE</b>	ZOOLOGY AND ENTOMOLOGY APPLICATIONS - INTEGRATED COURSE		
<b>CODE</b>	22413		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	AGR/11, BIO/05		
<b>HEAD PROFESSOR(S)</b>	LO VALVO MARIO	Professore Associato	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	MANACHINI BARBARA ROSY INES	Professore Associato	Univ. di PALERMO
	LO VALVO MARIO	Professore Associato	Univ. di PALERMO
<b>CREDITS</b>	12		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	1° semester		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>LO VALVO MARIO</b></p> <p>Monday 9:00 11:00 plesso di Biologia Animale – Via Archirafi, 18 – 90123 Palermo</p> <p>Tuesday 9:00 11:00 plesso di Biologia Animale – Via Archirafi, 18 – 90123 Palermo</p> <p><b>MANACHINI BARBARA ROSY INES</b></p> <p>Tuesday 10:00 11:30 Viale delle Scienze, 13. Edificio 5A, stanza 004</p> <p>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.</p>		

**DOCENTE:** Prof. MARIO LO VALVO

<b>PREREQUISITES</b>	Basic knowledge of Entomology and Vertebrate Zoology
<b>LEARNING OUTCOMES</b>	<p>Capability to understand the importance of invertebrates, in particular insects in the ecosystem and in human life. understand the importance of symbioses (positive and negative ones) in the animal world, and in particular in one of the most successful taxa within Animal Kingdom, namely Insects;</p> <p>Capability to understand adaptation and the basis of evolution. Acquisition of the tools for preparing ecological and conservation studies. Making autonomous judgments. Capability to evaluate results and implications of the results obtained. To evaluate with critical spirit the information supplied by the media which regard own competences by using the competences acquired during the course. Capability to communicate the results of investigations. To be able to evaluate the environmental fall-out of conservation activities. Capability to update by searching appropriate publications and literature.</p>
<b>ASSESSMENT METHODS</b>	<p>The final oral exam consists in a talk aimed at demonstrating knowledge and understanding of the program topics (including lab practicals), ability to analyze and combine information obtained during the course, verbal communication skills and use of appropriate scientific terminology. The sufficiency threshold (18 to 20/30) will be met by demonstrating to the examination board at least a general knowledge and understanding of the subjects and basic communication skills. Grades between 21/30 and 26/30 will be granted to students with good communication and language skills, and able to co-ordinate different topics. Students with excellent communication and language skills who will deepen the subjects with critical spirit will obtain grades between 27 and 30/30. Laude will be granted to students who will independently deepen the subjects by consulting scientific papers available through the data-bases of Unipa.</p>
<b>TEACHING METHODS</b>	Lessons, labs and field observations

**MODULE  
ZOOLOGY APPLICATIONS**

*Prof. MARIO LO VALVO*

**SUGGESTED BIBLIOGRAPHY**

ISPRA. 2007. Linee guida per l'immissione di specie faunistiche.  
 Lovari - Riga, 2016. Manuale di gestione della fauna. Greentime  
 Meriggi, Dessi-Fulgheri. Principi e tecniche di gestione faunistico venatoria. Greentime  
 Primack e Carotenuto. Conservazione della Natura. Zanichelli  
 Dispense del docente

<b>AMBIT</b>	50512-Discipline biologiche
<b>INDIVIDUAL STUDY (Hrs)</b>	94
<b>COURSE ACTIVITY (Hrs)</b>	56

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The main goal of the module is the acquisition of students' knowledge of the laws and conventions about the fauna protection and conservation and the main techniques for the census and fauna monitoring, by the application, on field, of different methods, and analysis, in the classroom, of the data collected using specific softwares (also Using the Geographic Information systems) and electronic spreadsheets.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
6	Regional, national and international laws on the protection of animal species
9	Introductions, reintroductions, restocking and eradications
3	Biological invasions
9	Wildlife monitoring techniques
3	Use of Geographic Information Systems in wildlife conservation
10	Protection and management of Sicilian Fauna
<b>Hrs</b>	<b>Practice</b>
4	Radiotracking application
4	Application of GIS analysis in the management of fauna
4	Application of wildlife monitoring techniques

**MODULE  
ENTOMOLOGY APPLICATIONS**

*Prof.ssa BARBARA ROSY INES MANACHINI*

**SUGGESTED BIBLIOGRAPHY**

Di seguito sono riportati alcuni testi base che vengono considerati sostanzialmente equivalenti come supporto per la preparazione, tuttavia poiché alcuni argomenti trattati sono recenti il docente fornirà 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.

Books 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 they are supporting materials not mandatory for the exam.

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. EAN: 9788820706814. (Vanno comunque benne tutte le edizioni)  
- Schowalter T.D.. Insect ecology. An Ecosystem Approach. Academic Press, London. Hardcover ISBN: 9780128030332, eBook ISBN: 9780128030370

- Gullan P.J. & Cranston P.S.. Lineamenti di Entomologia. Zanichelli, EAN: 9788831919104

Altri possibili testi che lo studente può consultare per approfondire alcune tematiche (Other alternative suggested books).

- Colazza S., Peri ., Lo Bue P. (2018) - Lineamenti di Entomologia in agricoltura biologica. Plaermo University Press, pp 226. ISBN: 978-88-31919-13-5.

- 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. ISBN. 9788813231354

- Pollini A. (1998) – Manuale di entomologia applicata: Edagricole, Bologna. EAN: 9788850653782

- Arianoutsou-Faraggitaki, Margarita; Groves, R.H. 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, UK 2011; 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

<b>AMBIT</b>	50510-Discipline agrarie, gestionali e comunicative
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<b>INDIVIDUAL STUDY (Hrs)</b>	102
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<b>COURSE ACTIVITY (Hrs)</b>	48
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**EDUCATIONAL OBJECTIVES OF THE MODULE**

The course aims to illustrate the importance of invertebrates, in particular insects in the ecosystem and in human life. The different ecosystem services provided by insects and other invertebrates and how it is possible to study and manage these ecosystem services will be illustrated. The course has the objective to illustrate the importance of symbioses (positive and negative ones) 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. Ecosystem services of insects

**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.
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.

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.
8	THE ECOSYSTEM SERVICES PROVIDED BY ENTOMOFAUNA. ETTI AS DRIVING FACTORS THE MAINTENANCE OF BIODIVERSITY AND GENETIC RESOURCES IN LANDSCAPES. INSECTS AS PROMOTERS OF PLANT POLLINATION IN DIFFERENT HABITATS. . Importance of off-screen areas for pollinators other than honeybees. INSECTS AS INSECT CONTROL FACTORS. Parasitoids and predators. Predatory insects and predation. Herbivores. Seed predation. INSECTS AS SUPPORT OF THE FOOD NETWORK.
6	INVERTEBRATES AS A SUPPORT TO SOIL HEALTH. the various indices and management of the improvement of the fauna biodiversity of the soil. Practical examples. Ecological indices, Maturity index, Biodiversity indices.
2	Functional biodiversity and its management.
2	Legal and economic aspects of insects. Alien invasive insect species
4	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	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.
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).