

COURSE OF STUDY Agricultural Science and Technology (L25)

ACADEMIC YEAR 2023/2024

ACADEMIC SUBJECT Agricultural zoology (I.C. Applied entomology and agricultural zoology, total CFU: 9)

General information	
Academic subject	Agricultural zoology (I.C. Applied entomology and agricultural zoology, total CFU: 9)
Degree course	Agricultural Science and Technology (L25)
Academic Year	2023/2024
European Credit Transfer and Accumulation System (ECTS)	3
Language	Italian
Academic calendar (starting and ending date)	First semester (25 September 2023 – 19 January 2024)
Attendance	optional attendance

Professor/ Lecturer	
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Department and address	Ex Facoltà di Agraria (Campus)
Virtual headquarters	Teams
Tutoring (time and day)	Wednesdays from 15.30 to 17.30, by appointment (e-mail), at the Entomology and zoology section (see above), or on Teams/Skype/Zoom

Syllabus	
Learning Objectives	The course aims to provide students with basic morphological, biological and ecological knowledge of the main groups of animals of economic interest in agriculture. The study of the levels of organization and functional systems, intra and interspecific relationships, adaptations to the environment and animal behaviour, will allow the student to develop solid skills regarding control options for harmful organisms in agriculture while safeguarding the environment and beneficial fauna.
Course prerequisites	Knowledge of general biology.
Contents	Organization of living matter – histology (epithelial and connective tissues). Structures involved in nutrition, food uptake and digestion. Respiration and gas exchange (by means of integument, tracheae, gills, lungs; respiratory pigments. Body fluid circulation and involved structures; blood and haemolymph. Excretion, osmoregulation and involved structures. Nervous tissue and system, sensorial organs and perception. Glands and secretion organs. Integument and its derived structures, skeleton; locomotion (muscular tissue). Reproduction and involved structures. Symmetry and metamery. Reproduction and life strategies – Reproductive modalities and strategies: agametic (schizogony, gemmation, fragmentation, polyembryony) and gametic

	<p>reproduction; gonocorism and hermaphroditism; gametogenesis, egg and spermatozoa morphology; amphigony, fecundation and parthenogenesis. Oviparous, ovoviviparous and viviparous organisms. Sex determination (progamic, syngamic, metagamic). Egg classification, embryonic and postembryonic (direct and indirect; continuous and discontinuous; allometry) development. Neoteny. Dimorphism, polymorphism.</p> <p>Evolutionary theory and adaptation. Concept of species.</p> <p>Ethology and ecology – Innate and acquired behaviour; tactism and tropism. Communication and social behaviour (mating, aggression, parenting). Mutualistic and antagonistic symbiosis. Trophic relationships (trophic levels, chain, pyramid and net). Animal adaptations: communications, foberism, mimetism. Biological rhythms and clock. Dispersion mechanisms within the space (active, passive, migration) and time (diapause, quiescence, hibernation and aestivation). Zoogeographic areas. Biotope, biocoenosis, populations, population density and dynamics, biotic potential, natural ecosystems, agroecosystem.</p> <p>Phyla of potential pests in agriculture – Details of the main animal Phyla with details of the a few phytophagous species: Nematoda (Ditylenchus, Heterodera, Globodera, Meloidogyne); Acarina (Tetranychoida, Eriophyoidea); Gasteropodes (Helicidae, Arionidae, Limacidae); Mammalia Rodentia (Muridae).</p> <p>Practical classes – Means, tools and instruments for investigations; methods of collecting and preserving zoological materials; basic principles of breeding certain animal groups in the laboratory; identification of the main animal taxa.</p>
<p>Books and bibliography</p>	<ul style="list-style-type: none"> • Notes of the lectures • De Bernardi et al., 2012 – Zoologia (general part) – Idelson-Gnocchi (In alternative: Mitchell L.G., Mutchmor J.A., Dolphin W.D., 1992 – Zoologia. Zanichelli Ed., Bologna; or Dorit R.L., Walzer W.F., Barnes D., 1997 – Zoologia. Zanichelli Ed., Bologna) • Suss L., Locatelli D.P., 2001 - I parassiti delle derrate (Il Sole 24 ore Edagricole, Bologna) <p>Study schemes:</p> <ul style="list-style-type: none"> • presentations and other didactic material provided during the lessons <p>Additional readings:</p> <ul style="list-style-type: none"> • Baccetti B., Barbagallo S., Suss L., Tremblay E., 2000 – Manuale di Zoologia agraria. A. Delfino Ed., Roma. • Chapman J.L., Reiss M.J., 1994 – Ecologia. Principi e applicazioni. (chapters 2.1÷2.3, 4.1÷4.6, 5.1÷5.28, 13.8, 18.1÷18.2, 19) Zanichelli Ed., Bologna. • Pellizzari Scaltriti G., 2002 – Parassitologia animale dei vegetali. CLEUP Editore. <p>For foreign students (LLP-Erasmus, Tempus, etc.): Integrated principle of Zoology (Cleveland et al., 2005, McGraw-Hill).</p>
<p>Additional materials</p>	<p>Students will be provided with a copy of all presentations utilized for lectures, including also those eventually needed for the practical activities.</p>

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours

Hours			
75	16	14	45
ECTS			
3	2	1	
Teaching strategy			
The subjects will be provided with several examples and illustrations by means of Power Point presentations, movies, practical drills in the classroom and laboratory. The course will be delivered in e-learning mode in case of need.			
Expected learning outcomes			
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge and understanding on the basic aspects concerning the biology of the animals 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Ability to distinguish the fauna composition which could be involved in the activities related to the crop productions 		
Soft skills	<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Ability of understanding biological, ethological and ecological phenomena which allow the success of the injurious animals in the considered context ○ Ability of application of treatments able to limit the development of injurious animals in the considered context • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability of describing the animals and the biological, ethological and ecological phenomena involving the animals in the considered context • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability of updating the own knowledge on the animals and the biological, ethological and ecological phenomena involving the animals in the considered context ○ The results of the expected learning, in term of knowledge and ability, are listed in the Annex A of the Didactic Regulation of the Bachelor Degree Course (expressed by the European descriptors of the study title). 		
Assessment and feedback			
Methods of assessment	<p>Only the students enrolled in the academic year during which this module is offered, can have an intermediary exam during the teaching period of module. The result of this intermediary exam remains valid for the whole academic year and concurs to the final evaluation of the student.</p> <p>The intermediary exam will be given on the subjects treated during the lessons and the practical activities as reported in the Didactic Regulation in Agricultural Science and Technology (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period. The evaluation of the intermediary exam is expressed in thirtieths.</p> <p>At the end of the module teaching period, the students, who passed positively the intermediary exam, can give the final exam concerning on the subjects treated during the lessons and the practical activities since the intermediary exam, as reported in the Didactic Regulation in Agricultural Science and Technology (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period.</p> <p>Students who did not pass or give the intermediary exam will be examined on the whole subjects treated during the lessons and the practical activities as reported in the Didactic Regulation in Agricultural Science and Technology (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period.</p>		

	<p>The intermediary and the final exams consist of an written examination (oral if necessary). The evaluation of the student is based on criteria previously fixed such as reported in the Annex A of the Didactic Regulation in Agricultural Science and Technology.</p> <p>The exam for foreign students can be given in English according to the above reported modalities.</p>
Evaluation criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ Description of the basic morphological, biological, ecological and ethological characteristics of the animals and interpretation of their functional correlations • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ Description of the factors favouring the success of the different ecological classes of the animals in the crop production • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ Formulation of potential treatments on the factors favouring the success of injurious animals within the crop production sector • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Exhaustive description and illustration, with appropriateness of term, richness of examples and correlation of the basic aspects which favour the success of the animals • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Adaptation of the basic cognitive tools acquired during the module in order to explain and solve numerous applied problems and diversified case of study
Criteria for assessment and attribution of the final mark	The final grade is awarded out of thirty. The exam is passed when the grade is greater than or equal to 18.
Additional information	