



# UNIVERSITÀ DEGLI STUDI DI PALERMO

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| DEPARTMENT              | Scienze della Terra e del Mare  |                      |                  |
| ACADEMIC YEAR           | 2023/2024   |                      |                  |
| BACHELOR'S DEGREE (BSC) | NATURAL AND ENVIRONMENTAL SCIENCES  |                      |                  |
| INTEGRATED COURSE       | ZOOLOGY - INTEGRATED COURSE   |                      |                  |
| CODE                    | 07744   |                      |                  |
| MODULES                 | Yes   |                      |                  |
| NUMBER OF MODULES       | 2   |                      |                  |
| SCIENTIFIC SECTOR(S)    | BIO/05  |                      |                  |
| HEAD PROFESSOR(S)       | CAMMARATA MATTEO  | Professore Ordinario | Univ. di PALERMO |
| OTHER PROFESSOR(S)      | PARISI MARIA<br>GIOVANNA  | Professore Associato | Univ. di PALERMO |
|                         | CAMMARATA MATTEO  | Professore Ordinario | Univ. di PALERMO |
| CREDITS                 | 12  |                      |                  |
| PROPAEDEUTICAL SUBJECTS |   |                      |                  |
| MUTUALIZATION           |   |                      |                  |
| YEAR                    | 2   |                      |                  |
| TERM (SEMESTER)         | 1° semester   |                      |                  |
| ATTENDANCE              | Not mandatory   |                      |                  |
| EVALUATION              | Out of 30   |                      |                  |
| TEACHER OFFICE HOURS    | <p><b>CAMMARATA MATTEO</b><br/>Monday 09:00 11:30 Viale delle Scienze ED 16 Dipartimento della terra e del mare</p> <p><b>PARISI MARIA GIOVANNA</b><br/>Monday 10:00 12:00 Viale delle Scienze, Edificio 1690128 Palermo<br/>Tuesday 11:00 13:00 Polo territoriale di TrapaniSedi di svolgimento delle attività didattiche (Principe di Napoli, TP)Colloquio on line per appuntamento<br/>Wednesday 10:00 12:00 Viale delle Scienze, Edificio 1690128 Palermo</p> |                      |                  |

**DOCENTE:** Prof. MATTEO CAMMARATA

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|---------------------------|---|
| <b>PREREQUISITES</b>      | none  |
| <b>LEARNING OUTCOMES</b>  | <p>Knowledge and comprehension</p> <p>Acquisition of theoretical and methodological knowledge in the field of zoology for the understanding of the basic tools of the taxonomy and classification. Knowledge on current and historical causes of species distribution and adaptations. Recognition, through the use of specific systematic keys, of the main species that constitute the Italian fauna.</p> <p>Applying knowledge and comprehension.</p> <p>Ability to use independently the acquired knowledge that are in naturalistic preparation in an evolutionary context. Ability to process biological data to describe the state of the environment depending on the present species.</p> <p>Autonomous thinking.</p> <p>Personal interpretation of the data and an informed assessment of the level of integration of the animal component in natural and altered systems.</p> <p>Communication ability.</p> <p>Ability to present results and the acquired skills with good use of language and to disclose knowledge with scientific Strictness. Acquisition of the relational capabilities which are indispensable to collaborate in multidisciplinary studies in the laboratory and in the field. Learning ability. Acquired skills to find information from the international zoological literature and to deepen and constantly update the material.</p>                      |
| <b>ASSESSMENT METHODS</b> | <p>EXAM: final oral tests. The student will be evaluated based on the level of knowledge of the subjects and the ability to link between them, the clarity and the use of a specialized scientific language.</p> <p>EVALUATION CRITERIA</p> <ul style="list-style-type: none"><li>-assessment: excellent, grade: 30 - 30 cum laude, excellent knowledge of the topics of the course, excellent use of language, excellent analytical capacity, ability to apply knowledge to problem solving;</li><li>- assessment: very good, grade: 26-29, good knowledge of the topics of the course, correct use of language, good analytical capacity, ability to apply knowledge to problem solving;</li><li>- assessment: good, grade: 24-25, good knowledge of the main topics of the course, correct use of language, limited ability to autonomously apply knowledge to problem solving;</li><li>- assessment: satisfactory, grade: 21-23, partial knowledge of the topics of the course, satisfactory use of language, limited ability to autonomously apply knowledge to problem solving;</li><li>- assessment: sufficient, grade: 18-20, minimal knowledge of the main topics of the course and of technical language, scarce ability or inability to autonomously apply knowledge to problem solving;</li><li>- assessment: fail, insufficient knowledge of the topics of the course.</li></ul> |
| <b>TEACHING METHODS</b>   | <p>The course includes hours of classroom lectures and laboratory. The teaching will be developed integrated in parallel by the two teachers in relation to their relative skills and integrations, with classroom lectures and teaching methodology laboratory. The teachers, during the course, will also provide students with specific study material and presentations of the lessons.</p>   |

## MODULE GENERAL ZOOLOGY

*Prof. MATTEO CAMMARATA*

### SUGGESTED BIBLIOGRAPHY

Hickman et al. Fondamenti di Zoologia Ed. Mc GrawHill De Bernardi et al Zoologia Parte generale Idelson Gnocchi Baccetti et al. Trattato Italiano di Zoologia. Vol. I Ed. Zanichelli

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|-------------------------------|---------------------------------|
| <b>AMBIT</b>                  | 50176-Discipline naturalistiche |
| <b>INDIVIDUAL STUDY (Hrs)</b> | 94                              |
| <b>COURSE ACTIVITY (Hrs)</b>  | 56                              |

### EDUCATIONAL OBJECTIVES OF THE MODULE

Objective of the course is provide students with a comprehensive knowledge of Animal Kingdom biodiversity applying an evolutionary approach. The course aims to raise awareness of the theories, the scientific foundations of systematic and phylogeny of animal evolution, the levels of organization and training plans of the major phyla. The course also highlights the body interactions / population environment.

## SYLLABUS

| Hrs | Frontal teaching   |
|-----|--|
| 12  | BASIC CONCEPTS OF SYSTEMATIC, PHYLOGENESIS AND EVOLUTION<br>Animal classification, theoretical assumptions and methods. The theories and the scientific basis of evolution. Microevolution. The concept of population and species. the biological basis of the evolution   |
| 4   | Introduction to Systematic Zoology<br>Levels of hierarchical organization of animal complexity, systematic profile. The bauplan of the main phyla and their evolution.<br>Origin and evolution of the main taxa.   |
| 4   | Principles and methods of classification. Use and Application of morphological and molecular data in the phylogenetic reconstruction   |
| 6   | MORPHO-FUNCTIONAL ZOOLOGY<br>General concepts and basic principles of animal life; heterotrophic, motility; reproduction and reproductive strategies.<br>Bauplan and organization levels; symmetry; segmentation; body cavity; musculoskeletal systems.  |
| 2   | MORPHO-FUNCTIONAL ZOOLOGY Main functions: nutrition, breathing, bloodstream, excretion, osmoregulation, thermoregulation, support, movement, nervous and endocrine coordination, reception sensory, sexuality and reproduction , development and life cycles. Interactions between organisms: symbiosis, commensalism, parasitism. |
| 4   | BEHAVIORAL ZOOLOGY Migration, environmental adaptations, Mimicry. reproductive biology, eco-ethology.  |
| 2   | Sistematic: definition and comlessity<br>Protists: unicellularity, support, locomotion, feeding, osmotic regulation, multiplication, reproduction. Outline of group systematics. Classification.   |
| 2   | Porifera: Appearance of multicellularity. Characteristics and systematics of the Phylum  |
| 2   | Cnidarians: habitats and life cycles (Hydrozoa, Sciphozoa, Staurozoa, Anthozoa). Ctenophores   |
| 2   | Platelmintes: triblastic and acheloma condition. The protonephridial system. Turbellaria.<br>Trematoda and Cestoda: general characters and organization of the body  |
| Hrs | Workshops  |
| 16  | Behavioral morpho-functional zoology, Development of animal models   |

## MODULE SYSTEMATIC ZOOLOGY

*Prof.ssa MARIA GIOVANNA PARISI*

### SUGGESTED BIBLIOGRAPHY

De Bernardi et al. (2012). Zoologia. Parte Generale. (Idelson-Gnocchi Ed.)  
Hickman et al. (2016). Diversità animale. (McGraw-Hill Ed.)  
Casiraghi et al. (2018) Zoologia. (Utet Ed.)

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|-------------------------------|-----------------------------|
| <b>AMBIT</b>                  | 50170-Discipline biologiche |
| <b>INDIVIDUAL STUDY (Hrs)</b> | 94                          |
| <b>COURSE ACTIVITY (Hrs)</b>  | 56                          |

### EDUCATIONAL OBJECTIVES OF THE MODULE

The course intends to offer students an in-depth overview of the complexity and diversity of the animal kingdom. The animal phyla will be reviewed, following an evolutionary logic, presenting their characteristics and adaptations. The aim is to provide future graduates with the basic knowledge on the functioning of living animal organisms starting from cellular or sub-cellular structures, up to the level of individuals, populations or species. At the same time, the basic indications useful for the systematic recognition of the main animal groups will be provided with an evolutionary analysis and the notions for understanding the ecosystem services of biodiversity

## SYLLABUS

| Hrs | Frontal teaching   |
|-----|--|
| 4   | Morphological characteristics, adaptations and phylogeny of MOLLUSKS   |
| 2   | Morphological characteristics, adaptations and phylogeny of the Annelids   |
| 3   | The process of arthropodization and the moult. Main characteristics of Arthropods.<br>The Myriapods: Organization of the body and evolutionary tendencies.<br>Insects: morphology and adaptation   |
| 3   | Arthropods Chelicerates and Crustaceans: Organization of the body, adaptation and evolution  |
| 5   | LOPHORATES AND MINOR ECDISOZOA<br>Rothiphere, Acanthocephala, Lophophorata, Gastrottricha, Chetognatha, Nemathoda, Nemathomorpha, Kinorincha, Priapulida, Loriciphera, Tardigrada and Onychophora  |
| 2   | Deuterostomes: Echinoderms: organization and functions of the aquifer system.<br>Crinoids, Asteroids, Ophiuroids, Echinoids and Holoturoids.   |
| 3   | The organizational plan of the Chordates: dorsal chord, neural tube and branchial pharynx.<br>Morphological and evolutionary characters of Urocordates and Cephalochordates  |
| 8   | Living agnates. The Chondrichthyes and the Osteitties. Internal and external morphology of Amphibians and larval development. The Reptiles. Adaptations to terrestrial life and embryonic appendages of the egg of the amniotes.   |
| 4   | Animal biodiversity<br>Definition of biological diversity: genetic diversity, diversity at the species level, diversity at the community/ecosystem level.<br>The value and function of biodiversity. Threats to animal biological diversity: extinctions, types and causes; overexploitation of species and natural resources; biological invasions and introduction of alien species. |
| 6   | Birds. On-the-fly adaptations. Mammals, characteristics of prototheres, metatheres and euthers.  |
| Hrs | Workshops  |
| 16  | Animal observation and recognition. systematic key use with particular emphasis to Mediterranean fauna   |