

COURSE LAYOUT

1. GENERAL

SCHOOL	Animal Biosciences		
DEPARTMENT	Animal Science		
STUDY LEVEL	<i>Undergraduate</i>		
COURSE CODE	168	SEMESTER	6 th
DEPARTMENT IN WHICH IT IS TAUGHT	Animal Science (Mandatory)		
COURSE TITLE	Ichthyology - Benthology		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	ECTS
Theory		3	3
Laboratory practice		3	2
Total		6	5
COURSE TYPE (Foundation course, General knowledge, Scientific area, Developing skills)	Scientific area		
PREREQUISITES			
LANGUAGE	Greek		
IS THE COURSE OFFERED for ERASMUS STUDENTS?	NO		
COURSE WEB PAGE	Theory: https://oeclasse.aua.gr/eclass/courses/EZPY193/ Laboratory practice: https://oeclasse.aua.gr/eclass/courses/EZPY215/		
TEACHING STAFF	Theory: Karakatsouli N., Miliou E., Kalogirou S., Dimitroglou A., Bitchava K. Laboratory practice: Kalogirou S., Dimitroglou A., Bitchava K.		

2. LEARNING OUTCOMES

Learning Outcomes
<p>Upon the completion of the course, the students will have the ability to:</p> <ul style="list-style-type: none"> • Understand and evaluate physiology adaptations and basic systems of fish and benthic invertebrates • Combine and assess abiotic and biotic factors that interact to form benthic communities • Compare benthic communities and explain differences in terms of synthesis and diversity • Familiarize with measurements of morphometrical characteristics, anatomy and isolation of internal organisms and combine morphological characteristics with ethology and fish nutrition. • Combine morphological characteristics of benthic organisms with environmental parameters, as well as feeding and respiration. • Identify, at the species level, finfish and benthic organisms and more specifically species of commercial interest for fisheries and aquaculture • Discover applications of Hydrobiology to Aquaculture and Biotechnology
General Competences
<ul style="list-style-type: none"> • Search, analysis and synthesis of data and information, utilizing modern technologies

- Adaptation in various conditions
- Independent personality
- Teamwork skills
- Project planning and management
- Consideration for the natural environment
- Develop judgement and self-criticism
- Promotion of free, creatinal and inductive thought

3. COURSE CONTENT (SYLLABUS)

THEOPY

ICHTHYOLOGY

- Systematics – External morphology of finfish
- Nervous system of finfish
- Fish sensory systems (lateral line, auditory system and sound production, electric and magnetic stimulus detection, taste, olfactory, vision, bioluminescence)
- Muscular system, skeletal system, fish skin
- Finfish swimming (floating, motion)
- Fish respiration (respiratory system, gas exchange, blood, circulatory system) - excretory system - acid-base balance
- Fish reproduction (reproduction system, behavior and types of mating, ontogenesis)
- Fish immune system
- Fish Endocrine system (glands, organs, hormones)
- Fish Digestive system (ingestion and swallowing, digestive track, organs and glands of for digestion)
- Trophic classification of fish, feeding behaviour and adaptation
- Ionic and osmotic regulation of fish
- Fish behaviour

BENTHOLOGY

- Estuaries
- Systematics – External morphology of benthic invertebrates (Mollusca, Crustacea, Echinodermata, Annelida, Cnidaria, Porifera etc.)
- Internal anatomical and morphological characteristics of benthic mollusks and decapod crustaceans
- Benthic communities of low tide zone
- Ecology of intertidal zone and organism adaptation (resistance to water loss, respiration, feeding, etc)
- Meiofauna (environmental characteristics, adaptations, ecology etc)
- Coral reefs. Symbiosis in benthic communities
- Population dynamics of marine organisms. Anthropogenic impact on the ocean (fisheries, aquaculture, pollution)

LABORATORY PRACTICE

ICHTHYOLOGY

- Laboratory practical on fish species identification of commercial value for fisheries and aquaculture
- Laboratory practical on anatomical and morphological characteristics of finfish

BENTHOLOGY

- Laboratory practical on anatomical and morphological characteristics of benthic mollusks
- Laboratory practical on anatomical and morphological characteristics of decapod crustaceans

4. TEACHING and LEARNING METHODS - Evaluation

TEACHING METHOD	Physical (face-to-face)	
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	<ul style="list-style-type: none"> • PowerPoint slideshows and video projections during teaching • Teaching activity support through e-class platform • Contact with the students via e-mail 	
TEACHING ORGANISATION (Lectures, individual or group assignments, field trips, individual study et.c.)	Activities	Workload per semester
	Lectures	39
	Laboratory practicals focusing on methodology implementation and case studies in small student groups	39
	Team projects on a case study	
	Field trip/ Personal assignment	
	Individual study	47
	Total contact hours and training	125
STUDENTS EVALUATION	<p>I. Theory</p> <p>(a) Optional attendance of Lectures by students (progress, assignments, etc.).</p> <p>(b) Final written examination (100%) including short answer or multiple-choice questions.</p> <p>II. Laboratory practice</p> <p>(a) Mandatory monitoring of the laboratory exercises by the students, with attendance records (progress, assignments, exercises, etc.).</p> <p>(b) Assessment of skills in laboratory measurements/observations and written examination with short answer or multiple-choice questions.</p> <p>III. The evaluation language is Greek.</p> <p>III. The evaluation criteria are communicated to the students.</p>	

5. RECOMMENDED LITERATURE

Recommended Literature for Theory:

(A) Related scientific journals – Publications:

Journal of Fish Biology, Aquaculture, Applied Animal Behaviour Science, Aquaculture Research, Fishes

(B) Digital Educational Materials (e-class):

1. Karakatsouli N., 2022. Introduction to Ichthyology, Fish Taxonomy, Fish Habitats, Fish Gas Exchange-Blood, and the Circulatory System, Fish Endocrine Systems, Fish Nervous System, Fish Sensory Systems-Communication (lecture presentation, ppt), Dep. of Animal Science, Agricultural University of Athens (AUA)
2. Dimitroglou A., 2022. Fish Digestive System and Feeding, Fish Reproduction (lecture presentation, ppt), Dep. Animal Science, AUA
3. Bitchava K., 2022. Fish Immune System (lecture presentation, ppt), Dep. Animal Science, AUA
4. Miliou E., 2022. Benthic communities of low tide zone, Ecology of intertidal zone, Meiofauna (lecture presentation, ppt), Dep. Animal Science, AUA
5. Kalogirou S., 2022. Fish Swimming-Buoyancy, Estuaries, Fish Osmoregulation, Fish Behaviour, Fisheries, Coral reefs, Symbiosis in benthic communities, Mangrove Forests, (lecture presentation, ppt), Dep. Animal Science, AUA

(C) Recommended Textbooks (EVDOXOS):

1. BIOLOGY OF FISHES. O. BONE, R.H. MOORE. PEDIO PUBLICATIONS S.A., Book Code in Evdoxos: 68402738 (IN GREEK)
2. ICHTHYOLOGY. NEOFITOU C. & NEOFITOU N. UNIVERSITY STUDIO PRESS, Book Code in Evdoxos: 68372912 (IN GREEK)
3. MARINE BIOLOGY. Nybakken James. ION - STELLA; PARIKOU & SIA OE, Book Code in Evdoxos: 14619 (IN GREEK)
2. MARINE BIOLOGY. Peter Castro, Michael E. Huber. UTOPIA PUBLISHING, Book Code in Eudoxos: 102124728 (IN GREEK)
3. MARINE BIOLOGY. Levinton Jeffrey S. BROKEN HILL PUBLISHERS LTD, Book Code in Eudoxos: 86055640 (IN GREEK)

Recommended Literature for the Laboratory practice:

(A) Related scientific journals – Publications:

(B) Digital Educational Materials (e-class):

1. Dimitroglou A., 2022. External Fish Anatomy, Fish Species Identification (lecture presentation, ppt), Dep. Animal Science, AUA
2. Bitchava K., 2022. Internal Fish Anatomy (lecture presentation, ppt), Dep. Animal Science, AUA
3. Kalogirou S, 2022. Mollusks and Decapod Crustaceans (external and internal anatomy), Decapod Crustaceans (external and internal anatomy), Bivalves and Crustaceans Species Identification (lecture presentation, ppt), Dep. Animal Science, AUA