COURSE DATA

DATA SUBJECT

Code: 43132
Name: Applied physiology
Cycle: Master's Degree
ECTS Credits: 3
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
2144 - Master's degree in Aquaculture	Facultat de Ciències Biològiques	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
2144 - Master's degree in Aquaculture	Applied physiology	COMPULSORY

COORDINATION

RAMO ROMERO JOSE JUAN DEL

TORREBLANCA TAMARIT AMPARO

SUMMARY

The "Applied Physiology" course provides basic knowledge about the physiology of animals of interest in aquaculture (fish, mollusks, crustaceans, etc.). The acquisition of this knowledge is accompanied by a series of competencies and skills that will lead to full professional training. Its study is essential for all those seeking to specialize in aquatic animal farming techniques aimed at mass production. Understanding the functioning of animals of interest in aquaculture is key to determining the specific needs of each species of commercial interest.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

2144 - Master's degree in Aquaculture

Ability to work in teams.

Apreciar la importancia de los trabajos multidisciplinares (incluyendo la dimensión ética) incluso en los aspectos aparentemente técnicos de la actividad profesional.

Comprender el funcionamiento fisiológico de los animales de interés en acuicultura y los mecanismos básicos subyacentes a dichos mecanismos.

Comprender el papel de los sistemas de coordinación e integración en el funcionamiento de los animales de interés en acuicultura.

Comprender la morfología funcional, fisiología y estrategias vitales de las especies cultivadas o potencialmente cultivables, con especial énfasis del impacto de las constricciones biológicas sobre la práctica de la acuicultura.

Conocer y saber manejar las fuentes documentales relacionadas con cada asignatura, con especial atención a las fuentes accesibles mediante redes informáticas.

Contemplar la acuicultura como una actividad con la dimensión no sólo productiva, sino también social y ambientalmente responsable.

Detectar los errores de planteamiento o procedimiento cometidos durante el trabajo en el laboratorio, y discernir su alcance sobre los resultados obtenidos.

Elaborar y exponer públicamente información técnica de forma efectiva.

Leer con fluidez y comprender textos científicos y técnicos, en especial trabajos originales de investigación.

Manejar correctamente la terminología científica y familiarizarse con las metodologías y fuentes de información en la Fisiología de los animales de interés en acuicultura.

Organizar y sintetizar información diversa para generar un todo coherente.

Poseer conocimientos básicos en el diseño de instalaciones, así como la evaluación del impacto ambiental de las mismas.

Poseer conocimientos básicos en la fisiología, producción, reproducción y nutrición de especies clave en acuicultura, así como de la función y manipulación de los ciclos biológicos y fisicoquímicos en tanques.

Poseer las habilidades manuales necesarias para el correcto manejo de los materiales e instrumental.

Reconocer la anatomía de los diferentes grupos de animales utilizados en acuicultura.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.

Students should demonstrate self-directed learning skills for continued academic growth.

Utilizar información fisiológica y etológica para evaluar el bienestar de las especies cultivadas.

DESCRIPTION OF CONTENTS

THEORY

1. Animal Physiology: general concepts and their application in Aquaculture.

Definition of the general principles of Physiology, with special emphasis on the concept of homeostasis and the overall coordination of the organism.

2. Coordination Systems: Nervous and Endocrine Control

The mechanisms of action and regulation of the different chemical messengers involved in coordination systems. Cellular excitability and the physical and chemical bases that explain electrical potentials at the membrane level and the mechanisms used in the generation and propagation of nerve signals. Functional organization of the neuroendocrine system in invertebrates and fish. Hormonal control of nutrients. Introduction to the control of reproduction, growth, and development.

3. Sensory Physiology

Mechanisms of chemoreception and photoreception in fish and invertebrates, highlighting their importance in the processes of foraging and obtaining food, and in reproductive processes.

4. Muscular Physiology and the Energetics of Locomotion

Structure and function of striated fish muscles.

5. Exchange and Transport of Respiratory Gases and Other Internal Substances.

Circulatory System: Distribution System and Integrating Element of Other Systems. Open and Closed Circulatory Systems. Cardiac Function. Hemodynamics. Mechanisms Involved in the Regulation and Control of the Cardiovascular System. Respiratory Pigments. Respiration: Gas Exchange and Ventilatory Mechanisms in Fish, Mollusks, and Crustaceans. Regulatory Mechanisms of Gill Respiration.

6. Physiology of Digestive Processes.

Comparative Description of the Digestive System in Fish, Mollusks, and Crustaceans. Regulation of Digestive Secretions and Motility of the Gastrointestinal Tract.

7. Hydrosaline Physiology

Salts and Water in the Body Fluids of Aquatic Animals. Osmoregulatory Organs. Mechanisms of ionic and osmotic regulation

8. Excretion of nitrogenous products

Mechanisms by which nitrogenous waste products are separated from tissue fluids and eliminated from the body

9. Welfare of farmed species: a physiological perspective

Animal welfare concepts for consumers, legislators, and producers: animal health, ethological needs, and product quality. Physiological bases of stress response and its manifestations

LABORATORY PRACTICES

- Determination of physiological parameters related to osmoregulation in aquatic animals
- Respiratory pigments and hematological parameters
- Determination of digestive enzyme activity

SEMINARS

Interdisciplinary seminar with Applied Zoology

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	0,80
Theory	15,00
Seminar	4,00
Laboratory	8,00
Total hours	**27,80**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	8,00
Independent study and work	0,00
Preparation of lessons	19,00
Preparation for assessment activities	16,00
Resolution of case studies	0,00
Total hours	**43,00**

TEACHING METHODOLOGY

The subject is structured in:

Theory classes, master classes that will be taught sequentially throughout the semester, so that they are integrated with the rest of the proposed activities.

Practical laboratory classes. The total contact hours are divided into 2 sessions lasting 3 hours and one session lasting 2 hours. In each session, students carry out the proposed activities after having read the instructions previously provided. You will not be able to pass the practical part if you have not attended all the sessions.

As part of the in-person activity, the following will be carried out:

Seminars: Students will orally present a work on topics proposed by the teaching staff.

Tutorials: Work may be proposed (individual or group) that helps consolidate the skills of the subject.

EVALUATION

The following distribution is proposed over a maximum of 100 points:

Assimilation of theoretical concepts (up to 50 points) by taking an exam. It is necessary to obtain at least 20 points to mediate with the rest of the activities.

Evaluation of practices (up to 20 points). Participation and the result of a written exam will be evaluated

Seminars. Up to 20 points

Evaluation based on rubrics (up to 10 points). Tutorial-type activities will be evaluated.

In order to pass the subject, the theory and practices must be approved separately. If this score is not achieved in either of the two parts, the approved grade may be saved until the next call.

REFERENCES

Alderman, S.L., Gillis, T.E. y Farrell, A. (2024). Encyclopedia of Fish Physiology (3 Volumes). Academic Press, Elsevier, Amsterdam, Netherlands

Bone, Q. y Moore, R. (2008). Biology of Fishes. Taylor & Francis Group. New York USA

Evans, D.H. et al. Eds. (2013) The Physiology of Fishes. CRC Press. Boca Raton, USA

Hill, R.W., Wyse, G.A. y Anderson, M. (2016) Animal Physiology. 4th Edition. Sinauer Associates, Inc, Sunderland, Massachusetts

Norris, D.O. Carr, J.A. (2013) Vertebrate endocrinology. Elsevier Academic Press. London UK

Willmer, T., Stone, G.N. y Johnston, I.A. (2004). Environmental Physiology of Animals. Blackwell Science, Oxford, UK