

**Aquaculture and Ictiopathology**

Code: 102618  
ECTS Credits: 3

Degree	Type	Year	Semester
2502445 Veterinary Medicine	OB	3	1

## Contact

Name: Roser Sala Pallarés

Email: roser.sala@uab.cat

## Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

## Teachers

Roser Sala Pallarés

Francesc Padros Bover

Sara Maria Dallares Villar

Maria Constenla Matalobos

## Prerequisites

There are no official prerequisites to access the subject, although it is recommended to have knowledge on subjects such as Bases of Animal Production and Management, Animal Nutrition, Pathology, Parasitology and/or Microbiology.

## Objectives and Contextualisation

It is a core third-year subject. The main objective is to introduce the student into the bases of the production and

Following these studies, the students should:

- a) Know the main characteristics of the aquatic environment and understand the influence in the physiology, the c
- b) Know and understand the characteristics and diversity of the main aquatic production systems.

c) Know and identify the most relevant diseases in aquatic/aquaculture species, their diagnosis, prevention and treatment.

This subject includes activities carried out in English, identified in this teaching guide as DA (English Teaching/Documentation).

#### Main skills

- Analyze, synthesize, solve problems and make and take decisions.
- Communicate the information obtained during the professional practice with fluency, speaking & writing, with others.
- English communication skills.
- Diagnose the different animal diseases, individually and in groups. Knowledge of preventive measures, with specific knowledge of the aquatic environment.
- Diagnose the most common diseases by using different general and instrumental techniques.
- Carry out a necropsy, including the description of the lesions found, sampling, storage, transport and processing.
- Collect, preserve and send all kinds of samples with the corresponding report.

#### Learning outcomes

- Analyze, synthesize, solve problems and make/take decisions.
- Communicate during the professional practice in a fluid way, orally and in writing, with other colleagues, authorities and the public.
- Demonstrate knowledge of English to communicate both orally and in writing in contexts.
- Describe the strategies of prevention, diagnosis and control of the main diseases in aquaculture according to the aquatic environment.
- Prepare anatomo-pathological reports specifying the concise and precise description of the pathological findings.
- Identify the lesions of the domestic and wild aquatic species.
- Obtain the appropriate samples from an animal or a group of animals, as well as send and process the samples.
- Recognize the relevance of the aquatic environment on the physiology and health status of the aquatic animals.
- Assess the relevance and the opportunity of necropsy as a method for the diagnosis of diseases.
- Assess the importance of infectious and parasitic diseases in the field of animal health, public health and animal welfare.

## Competences

- Analyse, synthesise and resolve problems and make decisions.
- Collect, preserve and issue all types of samples with the corresponding report.
- Comunicar la informació obtinguda durant l'exercici professional de manera fluïda, oralment i per escrit, amb altres col·legues, autoritats i la societat en general.
- Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
- Diagnose different individual and collective animal diseases, and know about prevention measures, with emphasis on zoonoses and notifiable disease.
- Diagnose the most common diseases using different general and instrumental techniques.
- Perform a necropsy, including a record of the injuries found, sample taking and storage and posterior transport.

## Learning Outcomes

1. Analyse, synthesise and resolve problems and make decisions.
2. Communicate information obtained during professional exercise in a fluid manner, orally and in writing, with other colleagues, authorities and society in general.
3. Demonstrate knowledge of English to communicate both orally and in writing in academic and professional contexts.
4. Describe the strategies for prevention, diagnosis and control of the main diseases in aquaculture by harvest type and system.
5. Evaluate the importance and appropriateness of necropsy as a method for diagnosing disease.
6. Evaluate the importance of infectious and parasitical diseases in the field of animal health, public health and animal productions.
7. Identify the characteristic lesions of diseases in domestic and wild species.
8. Obtain appropriate samples from an animal or herd, and send to and process the samples in the laboratory.
9. Produce anatomopathological reports that specify a concise and precise description of the pathological findings, and that always include a lesional diagnosis.
10. Recognise the influence of aquatic medium on the physiology and state of health of animals of interest to aquaculture and its effect on production systems.

## Content

### UNIT 1: INTRODUCTION to AQUACULTURE and ICTIOPATOLOGY

#### Topic 1. Introduction to Aquaculture (TE)

Living aquatic resources: fisheries and aquaculture. Current situation and future perspectives of aquaculture. Ma

#### Topic 2. Importance of the aquatic environment in the production and health of animals. (TE) (DA)

The aquatic environment versus the terrestrial environment; the role of the veterinarian. Physical-chemical param

Topic 3: Anatomy and general physiopathology of aquatic organisms (TE) (DA)

Bases of anatomy and the physiology of aquatic organisms related to the environment. Specific aspects: ectother

Practices

Practice 1. Analysis of the physical-chemical parameters of water. (2h) (PLAB)

UNIT 2: PRODUCTIVE ASPECTS - ENVIRONMENTAL in AQUACULTURE

Topic 4. Production of mollusks and crustaceans (TE)

Biological characteristics of importance in the production and problems. Main species of culture in bivalve mollus

Topic 5. Fish production: Nutrition - Feed (TE)

External and internal anatomy. Physiology of the digestive system. Nutritional requirements Larval feeding: proble

Topic 6. Fish production: rearing systems main species (TE)

General characteristics of the various phases of the production in the most important species (salmonids, gilthead

Practices and seminars

Practice 2. - Feeding in aquaculture (2 h) (PLABEN)

Classroom practice 1. Presentation and discussion of self-learning work. (2h) (PAUL)

UNIT 3: HEALTH, ENVIRONMENTAL and ANIMAL WELFARE ASPECTS of relevant species.

Topic 7. General aspects of aquaculture health management (TE) (DA)

Basic aspects of the prevention and control of diseases in aquatic systems; introduction to the most specific aspe

Topic 8. Main viral and bacterial diseases in fish (TE) (DA)

Main groups of pathologies due to viruses and bacteria that affect marine and continental fish farming; especially

Topic 9. Main fungal, parasitic and technopathological diseases in fish (TE) (DA)

Main groups of pathologies by fungi and parasites that affect marine and continental fish farming;

Topic 10. Diseases in other aquatic species (TE) (DA)

Main diseases of the species of interest (economic, epidemiological, legislation) worldwide and the Mediterranean

Item 11. Legislation on fish health and welfare in fish (TE) (DA)

Legislation on diseases of aquatic species. Introduction on the most important aspects related to behavior, mana

Topic 12. Biosecurity in the management, production and products of aquatic origin. (TE) (DA) Introduction to zo

Practices and seminars

Seminar 1. Conference - Roundtable: Role of the veterinarian in aquaculture "(1h) (SEM)

Classroom practice 2. Presentation - Discussion of clinical cases (2h) (PAUL) (DA)

Practice 3. Diagnostic protocol and basic management in fish (I): Anesthesia and Management (2 h) (PLAB)

Practice 4. Diagnostic protocol and basic management in fish (II): Necropsy and basic diagnostic techniques (PL

Methodology

Learning is based on the student's own work. The mission of the teaching staff is to accompany them in this task

The activities planned to achieve this goal are:

1.- Work methodology based on classroom classes (lectures) with participation of the students .

The student acquires the knowledge of the subject attending the master classes, participating in them and compl

2.- Methods oriented to the discussion and / or teamwork.

Teamwork or working in groups is a basic tool to encourage the student an active role in learning: it increases the

Different activities are contemplated within this method:

2.1- Laboratory practices

These are done in small groups and each practice to be done is intended to work on practical and application as

2.1.1.- Analysis of the physical-chemical parameters of water

By carrying out the main methodologies of basic laboratory analysis of the physical-chemical parameters of fresh

#### 2.1.2 - Food used in aquaculture

Students will become familiar with the different food types available, depending on the species and the culture ph

#### 2.1.3 and 4.- Diagnostic protocol and basic management in fish

The students will be responsible for performing a basic procedure of anesthesia, necropsy, sampling, performing

#### 2.2. Seminars

Seminars are mainly aimed at a small number of students where the learning objective may vary depending on th

2.2.1.- Role of the veterinarian in aquaculture. Through the experience of former students of the Faculty of Veterinary Medicine who are currently professionals in the sector (production, feed manufacture, pathology services, basic and applied research, ...), we seek to have a current and future vision of expanding production systems and the role that the veterinarian. This seminar is expected to take place once the students have assimilated most of the knowledge seeking open debate among students

2.3.- Self-assessment on production systems This activity consists in the oral presentation and discussion of a work that the students should have done in groups of 4-5 people. The objective of this seminar is to present different aspects of current production of aquatic species

2.4.- Presentation - Discussion of clinical cases (AD) Oral presentation in English (DA) of a written report or PowerPoint presentation based in various proposals of specific problems/cases related to aquaculture and aquatic animal health areas. The work will be done in groups of 4-6 people per group. The work will be supervised by the corresponding professor according to the topic of the case. The presentation and defense of the work will take place in the classroom with the presence of the teachers and will be done orally in groups. The self-learning work seeks to get the student to develop skills in the planning and organization of their work, as well as the ability to solve problems from a real situation. The objective is to promote the ability of analysis, synthesis, reasoning and problem solving capacity that allows them a better positioning in view of their future incorporation into the professional collective.

## Methodology

Learning is based on the student's own work. The mission of the teaching staff is to accompany them in this task

The activities planned to achieve this goal are:

1.- Work methodology based on classroom classes (lectures) with participation of the students .

The student acquires the knowledge of the subject attending the master classes, participating in them and completing the assignments.

## 2.- Methods oriented to the discussion and / or teamwork.

Teamwork or working in groups is a basic tool to encourage the student an active role in learning: it increases the motivation and the understanding of the subject.

Different activities are contemplated within this method:

### 2.1- Laboratory practices

These are done in small groups and each practice to be done is intended to work on practical and application aspects of the subject.

#### 2.1.1.- Analysis of the physical-chemical parameters of water

By carrying out the main methodologies of basic laboratory analysis of the physical-chemical parameters of fresh water.

#### 2.1.2 - Food used in aquaculture

Students will become familiar with the different food types available, depending on the species and the culture phase.

#### 2.1.3 and 4.- Diagnostic protocol and basic management in fish

The students will be responsible for performing a basic procedure of anesthesia, necropsy, sampling, performing histology and microbiology.

### 2.2. Seminars

Seminars are mainly aimed at a small number of students where the learning objective may vary depending on the topic.

2.2.1.- Role of the veterinarian in aquaculture. Through the experience of former students of the Faculty of Veterinary Medicine who are currently professionals in the sector (production, feed manufacture, pathology services, basic and applied research, ...), we seek to have a current and future vision of expanding production systems and the role that the veterinarian. This seminar is expected to take place once the students have assimilated most of the knowledge seeking open debate among students.

2.3.- Self-assessment on production systems This activity consists of the oral presentation and discussion of a work that the students should have done in groups of 4-5 people. The objective of this seminar is to present different aspects of the current production of aquatic species.

2.4.- Presentation - Discussion of clinical cases (AD) Oral presentation in English (DA) of a written report or PowerPoint presentation based in various proposals of specific problems/cases related to aquaculture and aquatic animal health areas. The work will be done in groups of 4-6 people per group. The work will be

supervised by the corresponding professor according to the topic of the case. The presentation and defense of the work will take place in the classroom with the presence of the teachers and will be done orally in groups. The self-learning work seeks to get the student to develop skills in the planning and organization of their work, as well as the ability to solve problems from a real situation. The objective is to promote the ability of analysis, synthesis, reasoning and problem-solving capacity that allows them a better positioning in view of their future incorporation into the professional collective.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom classes	12	0.48	4, 7, 10, 6
Lab practices	9	0.36	8, 10, 5
Seminars	3	0.12	1, 2, 9, 6
Type: Supervised			
Clinical cases	12	0.48	1, 2, 9
Self-learning supervision	3	0.12	1, 2
self-learning: production	6	0.24	2
Type: Autonomous			
Autonomous study	28	1.12	4, 7, 10, 6

## Assessment

For the calculation of the final score of the subject the following qualifications will be taken into account:

1.- Theoretical exam. There will only be 1 final written exam (50% final score). The exam includes questions that can be answered in English (DA).

2.- Clinical cases and self-learning presentation - Presentation and Defense of aquaculture case (20%). The cap:

3- Presentation and Defense of clinical cases (20%). The capacity of the group and, where appropriate, of each individual person will be assessed. Active participation in the discussion in the classroom will also be valued. This activity will take place in English (DA) In both Works. The total score will have 3 main components:

(1) formal contents,

(2) work effort and

(3) clarity in the exposition related to the capacity for synthesis, expression and oral communication skills.

3. Attendance at seminars and practical classes (3%)



#### 4 Self-assessment exercise (7%)

To pass the subject

To pass the subject it is required necessary:

- 1.- A minimum of 4.5 points out of 10 in the theoretical exam written exam part .
- 2.- Obtain a minimum of 5 points out of 10 in the overall subject.
- 3.- A minimum of 4 points out of 10 must be obtained in each of the evaluable parts (except the theoretical exam,
- 4.- There is only one remedial/re-take exam for the theory exam. This exam can be used to rise the mark.
- 5.- Not qualified ( *no presentado*) those students who have only evaluated up to a maximum of 20% of the total of the mark will be

The remedial exam will be organized according to the EVALUATION RULES OF THE VETERINARY SCHOOL /

Note: Evaluation of Teaching in English (DA)

The evaluation of English communication skills will be exclusively related to the score level obtained in the activity carried out. English communication skills are counted only at bonus level. The teacher will decide the bonus level applied. The bonus range is established as follows: -

No bonus: few or very few communication skills in English. Vocabulary poor and difficult to understood

5% Bonus: reasonable communicative skills in English. It is possible to understands what he wants to express although he makes many mistakes. Limited vocabulary

10% Bonus: good communicative skills in English.

In the activities the student will only be eligible for a bonus if you answer it in English

#### ***\*Single (all-in-one) evaluation.***

*The single assessment consists of a single synthesis test in which the contents of the entire theory sprogramme of the subject will be assessed, as well as the contents taught during the laboratory practicals and classroom seminars (self-study assignments/case studies).*

*The single assessment test will be held on the same date set in the exam calendar.*

*Students who take the single assessment test must carry out the laboratory practicals in person with the assigned group of practicals. It will also be compulsory to attend the sessions related to the classroom seminars (self-study projects/case studies).*

## **Assessment Activities**



Title	Weighting	Hours	ECTS	Learning Outcomes
Attendance at seminars and practical classes	3%	0	0	10, 6
Defense of clinical cases	20%	0	0	1, 2, 3, 4, 10, 6
Presentation and Defense of aquaculture case	20%	0	0	1, 2, 10
Theoretical exam	50%	2	0.08	3, 4, 10, 6
self-appraisal exercises	7%	0	0	9, 7, 8, 10, 5

## Bibliography

Recommended books:

Beveridge, M.C.M. 1996. Cage Aquaculture. 2nd Ed. Fishing New Books. Oxford.

Black, K.D., Pickering, A.D. (Ed.). 1998. Biology of farmed fish. Sheffield, Academic Press.

Bone, Q and Moore, R.H. 2008. Biology of Fishes. Taylor & Francis Group.

Brown, .L . 1993. Aquaculture for veterinarians: fish husbandry and medicine. Pergamon Press. Oxford.7

Brown, .L . 1993. Aquaculture for veterinarians: fish husbandry and medicine. Pergamon Press. Oxford.

Bruno, DW, Alderman, DJ & Schlotfeldt, H-J 1995.What should I do? A practical guide for the marine fish farmer, The European Association of Fish Pathologists, Warwick Press, Dorset.

Bruno, D., Poppe, T.T. 1996. A colour Atlas of Salmonid Diseases. Academic Press. London.

Coll Morales, J. 1991. Acuicultura marina animal. 3ª ed. Mundi-Prensa. Madrid.

Ferguson, H. W. 2006. Systemic Pathology of Fish. A text and Atlas of normal tissues in teleosts and their responses in disease. Scotian Press. London.

Guillaume, J.; Kaushik, S.; Bergot, P.; Metailler, R. (Eds.) 1999. Nutrition et alimentation des poissons et crustacés. INRA Editions.

Halver, J.E. ; Hardy, R. W. ( ed. ) 2002. Fish Nutrition. 3rd ed. Academic Press. London.

Lucas, J.S.; Southgate, P. C. 2003. Aquaculture. Farming aquatic animals and plants. Fishing New Books.

Noga, E.J. 2010. Fish Disease. Diagnosis and treatment.Iowa State University Press, Ames. Iowa.

Ortega, A. 2008. Cuadernos de Acuicultura 1.Cultivo de Dorada (*Sparus aurata*).Fundación Observatoria Español de Acuicultura. Madrid

Ostrander, G. K. 2000.The Handbook of experimental Animals. The Laboratory Fish. Academic Press. London.

Roberts, H.E. 2010. Fundamentals of Ornamental Fish Health. Wiley-Blackwell

Roberts, R.J. 2012. Fish Pathology. 4th ed. John Wiley & Sons.

Schlotfeldt , H. J. and Alderman , D.J. 1995. What should I do? A practical guide for the fresh water fish farmer. Bulletin of the European Association of Fish Pathologists, 15 (4) (Supplement): 60 pp.

Stoskopf, M.K. 1993. Fish Medicine. W.B. Saunders Company, Philadelphia.

Wildgoose (2001). BSAVA Manual of Ornamental Fish, 2n ed. BSAVA ed.

Roberts, R.J. (2012). Fish Pathology. 4th ed. John Wiley & Sons.

Pillay, T. V. R. i Kutty, M.N. 2005. Aquaculture : principles and practices. 2nd Ed. Blackwell (Oxford)

Pillay, T. V. R. 2004 Aquaculture and the environment 2nd Ed. Fishing News Books. Blackwell publishing.Oxford.

Stickney R. R. 2000. Encyclopedia of aquaculture. John Wiley & Sons. New York

Vela Vallejo, S.; Ojeda González-Posada, J. 2007. Acuicultura: La revolución azul. Publicaciones científicas y tecnológicas del Observatorio Español de Acuicultura, Madrid.

Wedemeyer, G. 1996. Physiology of fish in Intensive culture systems. Chapman & Hall, International Thompson Publishing, New York.

Recommended webpages:

<http://aquaTIC.unizar.es/>

<http://mispecies.com/> (esta dispone de la mayoría de los enlajas con la mayoría de las páginas relacionadas con el sector de la acuicultura).

<http://fao.org/>.

<http://www.fundacionoesa.es>

## **Software**

No programmer is used.