

## 28432 - Integration: Aquatic and Exotic Animals

### Información del Plan Docente

<b>Academic Year</b>	2017/18
<b>Faculty / School</b>	105 - Facultad de Veterinaria
<b>Degree</b>	451 - Degree in Veterinary Science
<b>ECTS</b>	6.0
<b>Year</b>	4
<b>Semester</b>	Annual
<b>Subject Type</b>	Compulsory
<b>Module</b>	---

### **1.General information**

#### **1.1.Introduction**

The subject of Integration of Aquatic and Exotic Animals is part of the subjects that are taken in the 4th year of the Veterinary Degree. It consists of a total of 6 ECTS credits, of which 1 is taught in the field of Aquaculture, 3 in Ichthyopathology and 2 in Clinic and Health of Exotic Animals. It is an annual and compulsory subject.

The fields of Aquaculture, Ichthyopathology and Clinic and Health of Exotic Animals constitute in themselves specific competences (Order ECI / 333/2008), which students must acquire in the degree for the exercise of the veterinary profession. While in the first of these fields will be laid the foundations and concepts in the production and management of aquatic organisms and the operation of facilities, Ichthyopathology in parallel forms as such in some basic pillars on which the diagnosis, the treatment and prevention of diseases that can affect these organisms, paying special attention to those notifiable diseases. The field of Exotic Animal Health and Clinics includes the study of the conditions of acclimatization, management, reproduction and feeding of birds, reptiles and small mammals, as well as the techniques of exploration, obtaining biological samples, diagnosis, treatment and prevention of diseases that affect these animal species.

#### **1.2.Recommendations to take this course**

In order to facilitate the understanding of the different contents of the fields that integrate this subject, it is advisable that the student has acquired and passed the knowledge of some previous subjects related to biology, chemistry, anatomy, ethnology and animal welfare, parasitology, microbiology and immunology, physiology, pharmacology, general pathology and clinical propaedeutic, general pathological anatomy and reproduction.

#### **1.3.Context and importance of this course in the degree**

The adaptation of the Spanish university qualifications to the EEES has forced to modify the structure, contents and methodologies of the curricula of the traditional veterinary degrees in our country. In the design of this new curriculum, it has been tried to give the Degree an approach based, fundamentally, on the competencies that the profession demands and the society needs of a titled and / or graduated in veterinary medicine. After an initial training where the students are acquiring a basic training that emphasizes in particular some general preclinical contents and / or basic productive and technological bases that must have a veterinary professional, they arrive at fourth grade, in which the subjects have been Organized jointly in subjects distributed by species following a completely new structure within veterinary studies, including aquatic and exotic organisms.

## 28432 - Integration: Aquatic and Exotic Animals

Aquaculture is one of the productive activities that has undergone greater evolution and technological growth during the last decades, due in large part to the need to seek solutions to the overexploitation of natural fishery resources, and our country has not been unaware of this change. In this sense, the veterinary profession has played and must continue to play a preponderant and very active role in the search for new formulas that better improve, if possible, the level of production and health of aquaculture farms, adapting to the new regulations that regulate sustainability The sector and therefore the aquatic environment. For all this, the formation of future veterinarians also in this field acquires a special relevance.

The field of Clinical and Health of Exotic Animals requires the training provided by basic subjects such as Embryology and Anatomy I and II and Physiology and is closely linked to subjects of the same course as Integration of Companion Animals or Integration in Birds and Rabbits. Its bases are centered around the knowledge of medical pathology, reproductive pathology, surgical pathology, infectious and parasitic diseases and special pathological anatomy of the most important diseases for exotic animals. The knowledge in this field will be complemented with the clinical practice of exotic animals that all the students must realize in fifth course.

### 1.4.Activities and key dates

The dates and key landmarks of the subject are described in detail, along with those of the other subjects of the Degree of Veterinary, in the Web page of the Faculty of Veterinary Medicine (<https://veterinaria.unizar.es/academico/plan-estudios> Veterinary degree). This link will be updated at the beginning of each academic year.

## 2.Learning goals

### 2.1.Learning goals

#### **1: The student, in order to pass this subject, must demonstrate in the field of Aquaculture that**

1. knows the general and basic terminology of the Aquaculture, as well as its history, evolution and current trends at local and global level.
2. knows the main production systems and the regulations that govern this activity.
3. knows the facilities and the techniques of feeding, reproduction and improvement, of application in the Aquaculture.
4. knows the impact this activity has on the environment and its legislation.

#### **2: The student, in order to pass this subject, must demonstrate in the field of Ichthyopathology that**

1. knows and understand the major pathological processes affecting aquatic animals.
2. is able to make a sampling according to the nature and characteristics of the disease establishing the most appropriate diagnostic tests.
3. is able to prescribe and apply the most appropriate treatments in each case.

## 28432 - Integration: Aquatic and Exotic Animals

4. is able to design and implement control and prevention programs according to the nature and the pathological process and the characteristics of the exploitation.

5. knows and applies the current legislation that regulates these species.

### **3: The student, in order to pass this subject, must demonstrate in the field of Clinical and Health of Exotic Animals that**

1. knows what an exotic animal is and know the legislation related to them. 2. knows the appropriate conditions of habitat and maintenance, as well as nutrition and reproduction of species of major veterinary interest 3. knows and understands the most frequent and important diseases that affect these animals. 4. is able to adequately address the diagnosis of the pathologies that affect them, make the sampling and select the most appropriate diagnostic techniques for each case and interpret the results. 5. knows and apply adequately the pharmacological and surgical treatment most appropriate to each pathology. 6. knows how to introduce preventive measures to prevent the emergence of the most important diseases of the most frequent exotic animals

### **2.2.Importance of learning goals**

Veterinary professionals trained in these disciplines will be able to contribute their comparative dimension, or what is the same, the ability to relate patterns of disease seen in fish populations compared to other animal populations and, on the other hand, the contribution of integrated knowledge, which arises from an epidemiological approach to the disease, which takes into account factors that condition the presentation and evolution of these pathologies over time, elements that will allow the subsequent implementation of health management measures capable of providing solutions to the needs of the aquaculture sector, improving the productivity and profitability of farms. The content of the subject of Exotic Animal Clinic and health is fundamental so that the student acquires the knowledge and precise skills to be able to develop, in his professional life, clinical activities in the field of exotic animals, since in this subject will be addressed all aspects related to the exploration and identification of disease symptoms, application of diagnostic techniques, application of medical and surgical treatments and establishment of preventive measures.

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

The subject and its expected results respond to the following approaches and objectives: The subject and its expected results are based on a single approach and objective: On the one hand, the graduate is able to respond to the needs and requirements of the aquaculture sector both in its productive and health management and can also act on those wild species closely linked to the natural environment and, on the other hand, learning the main diseases affecting exotic animals (birds, reptiles and mammals), knowing how to apply a proper diagnostic, therapeutic and preventive protocol.

#### **3.2.Competences**

**By passing the subject, the student will be more competent to ...** 1: know the general and basic terminology of aquatic and exotic animals. 2: analyze the different management systems of both productive and reproductive aquatic animals within the continental and marine environment. 3: evaluate the possible impact of a fish farm and apply the current legislation. 4: carry out methods and procedures for clinical examination, adequate sampling and diagnostic techniques based on the nature of the pathogen and according to each clinical case 5: recognize and diagnose the most common diseases in aquatic and exotic animals. 6: prevent and / or treat any disease taking into account the different mechanisms of transmission and maintenance of the same. 7: to solve those problems related to the health management of an operation, as well as the decision making that could lead to the implementation of a health program. 8: know and apply those legal and administrative provisions of the scope of these animal species. 9: maintain an ethical and responsible behavior in the exercise of the profession. 10: solve problems and make decisions in the professional veterinary field. 11: work in multidisciplinary teams and show respect, appreciation and sensitivity to the work of others.

#### **4. Assessment (1st and 2nd call)**

##### **4.1. Assessment tasks (description of tasks, marking system and assessment criteria)**

**The student must demonstrate that he / she has attained the expected learning goals through the following assessment activities**

**1: Written test:** The theoretical knowledge acquired in each of the fields that integrate this subject will be evaluated jointly by means of a final written test. This test will constitute 70% of the final grade and will include test questions (of four alternatives with a valid and without negative score) and short answer distributed in three independent blocks, one for each field, and weighted according to the number of credits of this. Test will take place in the dates indicated in the calendar of examinations elaborated and approved by the Faculty. However, those students who wish to do so may take a written partial test (in the dates determined by the Faculty), eliminating the theoretical part of the subjects taught in the first four months and the same characteristics described for the final test.

**2: Practical sessions:** The practical knowledge will be evaluated through the control of compulsory attendance, interest and attitude and the delivery of reports of practices and teaching work and will constitute the remaining 30% of the final grade. Those students who have not attended or performed these practices or have not reached the minimum grade to overcome them may carry out a theoretical-practical examination of the contents taught in all the practices of the subject. Such examination shall take place on the same dates as the final written test. Valuation criteria and levels of exigency  
The theoretical mark and the practical mark of each of the subjects will be valued on a total of ten points, applying the weighting factors 0,7 and 0,3, respectively. To pass the subject it will be required that in each of the fields the grade of both parts (theoretical and practical) is higher than 50% and the final grade of the subject is also higher than 50%. Thus, for students who exceed the minimum grade required in theory and practice of the three subjects, the final grade of the subject will be calculated according to the following formula:

$$NF = 0,17 (0,7 NTA + 0,3 NPA) + 0,5 (0,7 NTI + 0,3 NPI) + 0,33 (0,7 NTE + 0,3 NPE)$$

Where: NF = Final mark of the subject; NTA = Note on aquaculture theory; NPA = Note on aquaculture practices; NTI = Note of ichthyopathology theory; NPI = Note of ichthyopathology practices; NTE = Note of exotic theory; NPE = Note of exotic practices. In those cases in which the NF exceeds a five having suspended some theoretical part of the subjects taught, the subject will be considered suspended. The final numerical score will be determined from the score obtained in the theoretical part without adding the score obtained in practices, ie NPA = 0, NPI = 0 and NPE = 0 **Grading System** As a consequence of the entry into force of the DR. 1025/2003 of 5 September establishing the European credit system and the system of qualifications in university degrees, the qualification of the students will be double, numerical and qualitative.

0-4.9: Suspended (SS)

5.0-6.9: Approved (AP) 7.0-8.9: Remarkable 9.0-10: Outstanding (SB) Pursuant to Article 158 of the Statutes of the University of Zaragoza, provisional examinations will be publicly exposed for a minimum of 7 days, and students will be able to review their exams, indicating the place, date and time Provided for this purpose.

#### **5. Methodology, learning tasks, syllabus and resources**

##### **5.1. Methodological overview**

The learning process that has been designed for this subject is based on the following methodology:  
Following the guidelines set by the ANECA, the Governing Council of the University of Zaragoza approved a presence of 50%, so that the 6 ECT credits allocated to this subject mean in practice 75 hours of student work, structured in participatory master classes, resolution and discussion of problems and clinical cases and practices in farms and teaching laboratories.

##### **5.2. Learning tasks**

For the learning of this subject, the student will perform different types of activities.

- Participatory master classes. They include 9.5 h Aquaculture; 25,5 h of Ichthyopathology and 20 h of Clinic and Health of Exotic Animals.

## 28432 - Integration: Aquatic and Exotic Animals

- Resolution and discussion of problems and clinical cases related to Ichthyopathology (two sessions of 2 hours each), which seeks to promote the capacity for analysis and decision making as close as possible to actual professional practice, including Search for relevant information for this and placing special emphasis on the various ways of resolution and justification of the decisions taken that in addition, will have to present their colleagues in public.

There will also be a session of two hours of resolution and discussion of problems and clinical cases related to exotic animals, with the same methodology and objectives indicated above for Ichthyopathology.

- Practices in farms and teaching laboratories, in order that the student can achieve mastery of those skills and practical management essential in the acquisition of the corresponding professional competences. In the field of Ichthyopathology, these practices will be of a sequential type, starting at the farms where the corresponding management and / or sampling will be carried out and ending at the laboratories where the samples will be processed and the subsequent interpretation of the results. To do this, the student can follow the different steps following a script that will be provided at the beginning of each session. A practice of the field of exotic animals will be taught in the teaching farm, where students will manage, contain, explore and sample exotic animals.

In the matter of Aquaculture also includes a laboratory practice aimed at the practical knowledge on the part of the students of the techniques related to the reproduction of the fish species.

### 5.3.Syllabus

The program offered to the student to help him achieve the expected results includes the following activities ...

#### 1: EXOTIC ANIMAL CLINICS AND HEALTH PROGRAM

Master Classes (20 h)

##### I. Birds (**Psittacidae and Passeriformes**)

Unit 1: Anatomical and pathophysiological bases. Basic techniques in the bird clinic.

Unit 2: Maintenance and nutritional pathologies.

Unit 3: Digestive pathologies and associated organs.

Unit 4: Respiratory and systemic pathologies.

Unit 5: Dermatological pathologies.

Unit 6: Reproductive and genitourinary pathologies.

Unit 7: Emergency, intensive care and surgery.

##### II. Reptiles (**Chelonians, Lacertilians and Ophidians**)

Unit 8: Anatomical and pathophysiological bases. Basic techniques in the reptile clinic.

Unit 9: Maintenance and nutritional pathologies.

Unit 10: Digestive pathologies and associated organs.

Unit 11: Respiratory and systemic pathologies.

Unit 12: Dermatological pathologies.

Unit 13: Reproductive and genito-urinary pathologies.

Unit 14: Emergency, intensive care and surgery.

##### III. Mammals (**Rabbit, Rodents-Guinea Pig, Chinchilla, Hamster, Carnivores-Ferrets**)

Unit 15: Maintenance and nutritional pathologies.

Unit 16: Digestive and respiratory diseases.

Unit 17: Reproductive, genito-urinary, dermatological and systemic pathologies.

Unit 18: Emergency, intensive care and surgery.

Seminar 1. CITES and legislation related to the transportation and possession of NACs.

Seminar 2. Zoonoses transmitted by the NAC (epidemiology and international legislation).

Practical sessions (5 h)

Practice IAAEx-1. Clinical exploration and sampling in birds and reptiles (3 h).

Practice IAAEx-2. Problem solving and clinical cases (2 h).

#### 2: AQUACULTURE PROGRAM

Master Classes (9,5 h)

Unit 1: Introduction to aquaculture. General concepts. Historical evolution, current situation and perspectives.

Unit 2: Water as a means of fish production. Management of aquatic resources. Study of parameters of water quality and

## 28432 - Integration: Aquatic and Exotic Animals

minimum requirements.

Unit 3: Systems of production and management of continental species. Study of flow diagrams and development of facilities.

Unit 4: Systems of production and management of marine species. Study of flow diagrams and development of facilities.

Unit 5: General concepts. Study of raw materials. Nutritional requirements of fish species. Composition, formulation and manufacture of diets. Food behavior and feeding management.

Unit 6: Reproductive Bases and Characteristics of the Reproductive Cycle of Fish. Gametogenesis. Endocrinology of the reproduction cycle. Gametes and fecundation. Control of reproduction: hormonal, by photoperiod, control of sex.

Sterilization.

Unit 7: Environmental aspects derived from aquaculture. Main pollutant loads of effluents and establishment of corrective measures. Sustainable aquaculture.

Seminar 1. Production and economy. Socioeconomic aspects of aquaculture. Business base and economic management of aquaculture facilities.

Seminar 2. Reproductive and gametes management. Applied biotechnology in aquaculture breeding.

Practical Sessions (3 h)

Practice IAAEx-3. Sexual differentiation: Dissection, techniques of fertilization, sex change and triploidization.

### 3: PROGRAM IN ICTIOPATOLOGY

Lectures (25,5 h)

I. Basic concepts

Unit 1: Environmental factors that influence the disease.

Unit 2: Anatomical and pathophysiological bases in ichthyopathology.

Unit 3: Immunology of fish.

II. Abiotic disease factors

Unit 4: Diseases due to alterations in water quality.

Unit 5: Nutritional diseases and developmental disorders (malformations).

III. Biotic disease factors affecting fish

Unit 6: Viral haemorrhagic septicemia, infectious hematopoietic necrosis and infectious salmon anemia.

Unit 7: Koi herpesvirus, spring viraemia of carp and infectious pancreatic necrosis.

Unit 8: Alfavirosis of salmonids, lymphocytic disease and nodaviriosis.

Unit 9: Classic salmonid furunculosis. Other aeromoniasis.

Unit 10: Streptococcosis and renal bacterial disease.

Unit 11: Myxobacteriosis and red mouth disease.

Unit 12: Vibriosis and pasteurellosis.

Unit 13: Mycobacteriosis.

Unit 14: Saprolegniosis. Other mycoses of importance in ichthyopathology.

Ectoparasitosis:

Unit 15: Ectoprotezoosis in fish.

Unit 16: Ectohelminthosis in fish.

Unit 17: Arthropods, hirudiniosis and glochidiosis.

Endoparasitosis:

Unit 18: Endoprotezoosis (Flagellates and coccidiosis).

Unit 19: Microsporidiosis.

Unit 20: Mixosporidiosis.

Unit 21: Internal Helminths of fish.

Unit 22: Zoonotic Helminths transmitted by fish.

IV. Biotic factors of disease affecting molluscs.

Unit 23: Protozoosis of molluscs I: Bonamiosis and Mikrocytosis.

Unit 24: Protozoosis of molluscs II: Marteiliosis and Perkinsiosis.



## 28432 - Integration: Aquatic and Exotic Animals

V. Biotic factors of disease affecting crustaceans.

Unit 25: Taura syndrome, white spot disease and yellow head. Afanomicosis of crab.

Practical sessions (12 h)

Practice IAAEx-4. Problem solving and cases I (2 h).

Practice IAAEx-5. Problem solving and cases II (2 h).

Practice IAAEx-6. Ichthyopathological study I (4 h).

Practice IAAEx-7. Ichthyopathological Study II (2 h).

Practice IAAEx-8. Interpretation of results of the ictiopathological diagnosis (2 h).

### 5.4. Course planning and calendar

The dates and key landmarks of the subject are described in detail, along with those of the other subjects of the fourth year in the Degree of Veterinary, in the Web page of the Faculty of Veterinary Medicine (<https://veterinaria.unizar.es/academico/Veterinary-grade-study-plan>). This link will be updated at the beginning of each academic year.

### 5.5. Bibliography and recommended resources

The bibliography associated to this discipline is kept up-to-date on the library's website:

<http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=7514>

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Acuicultura / Gilbert Barnabé, coordinador ; Prefacio, Maurice Fontaine ; traducido por M<sup>a</sup> Pilar Alvarez Pellitero ... [et al.] . [1a. ed. española], traducción de la 2a. ed. francesa Barcelona : Omega, D.L. 1991  
Acuicultura para veterinarios : producción y clínica de peces / editado por Lydia Brown ; traducido por Ignacio de Blas Giral [ et al.] . Zaragoza : Acribia, 2000  
Bruno, David W. A colour atlas of salmonid diseases / David W. Bruno and Trygve T. Poppe. 2nd Dordrecht: Springer,2013  
BSAVA Manual of exotic pets / editors Anna Meredith and Cathy Johnson-Delaney. 5th ed. Quedgeley, Gloucester, UK : British Small Animal Veterinary Association, cop. 2010  
BSAVA manual of psittacine birds / editors Nigel Harcourt -Brown and John Chitty. 2nd ed. Cheltenham : British Small Animal Veterinary Association, cop. 2005  
BSAVA manual of raptors, pigeons and passerine birds / editors, John Chitty and Michael Lierz. Quedgeley : British Small Animal Veterinary Association, cop. 2008

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## 28432 - Integration: Aquatic and Exotic Animals

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- BB** BSAVA manual of rodents and ferrets / edited by Emma Keeble and Anna Meredith. 1st. ed., 1st repr. Quedgeley : British Small Animal Veterinary Association, cop. 2011
- BB** Código sanitario para los animales acuáticos / OIE. Paris : Oficina Internacional de Epizootias, 2013 [Para acceder al texto completo mirar URL]
- BB** Doneley, Bob. Avian medicine and surgery in practice : companion and aviary birds / Bob Doneley . 2nd imp. London : Manson/Veterinary Press, 2011
- BB** Eiras, Jorge da Costa. Métodos de estudio y técnicas laboratoriales en parasitología de peces/ Jorge da Costa Eiras, Ricardo Massato Takemoto, Gilberto Cezar Pavanelli . Zaragoza : Acribia, 2002
- BB** Fish reproduction / editors, Maria Joo Rocha, Augustine Arukwe, B.G. Kapoor . Enfield, N.H. : Science Publishers, cop. 2008
- BB** Kinkelin, Pierre de. Tratado de las enfermedades de los peces / por Pierre de Kinkelin, Christian Michel y Pietro Ghittino . [1ªed.] Zaragoza : Acribia, D.L. 1990
- BB** La Reproducción de los peces [recurso electrónico] : aspectos básicos y sus aplicaciones en acuicultura / Manuel Adrián Carrillo Estévez (coordinador) . Madrid : Consejo Superior de Investigaciones Científicas : Fundación Observatorio Español de Acuicultura, D.L. 2009
- BB** Manual de pruebas de diagnóstico para los animales acuáticos /Oficina Internacional de Epizootias . 5ª ed. Paris : OIE, 2012 [Para acceder al texto completo mirar URL]
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- BB** Peces continentales españoles : inventario y clasificación de zonas fluviales / edición preparada por Ignacio Doadrio, Benigno Elvira, Yasmina Bernat . Madrid Instituto Nacional para la Conservación de la Naturaleza, 1991



## 28432 - Integration: Aquatic and Exotic Animals

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- BB**      Reptile medicine and surgery / [edited by] Douglas R. Mader . 2nd ed. St. Louis (Missouri) : Saunders Elsevier, cop. 2006
- BB**      Roberts, Ronald J. Fish Pathology / Ronald J. Roberts. 4th ed. Hoboken, N.J. : Wiley-Blackwell , 2012
- BB**      Stickney, Robert R.. Acuicultura : texto introductorio / Robert R. Stickney ; traducido por Tania Pérez Sánchez en colaboración con Byron Flores Somarriba, supervisado por José Luis Múzquiz Moracho . Zaragoza : Acribia, D. L. 2016
- BC**      Alabaster, J. S.. Water quality criteria for freshwater fish /J. S. Alabaster, R. Lloyd. Cambridge University Press, 1984
- BC**      Ferguson, H. W.. Systematic pathology of fish / H. W. Ferguson London : Scotlan Press, 2010
- BC**      Infectious diseases and pathology of reptiles : color atlas and text / [edited by] Elliott R. Jacobson . Boca Raton, Florida : CRC Press/Taylor & Francis, cop. 2007
- BC**      Lom, J.. Protozoan parasites of fishes : developments in aquaculture and fisheries science / J. Lom, I. Kyková Amsterdam : Elsevier, 1994

### LISTADO DE URLs:

Código sanitario para los animales acuáticos -  
[<http://www.oie.int/es/normas-internacionales/codigo-acuatico/acceso-en-linea/>]  
Fishbase - [<http://www.fishbase.org>]  
Fundación OESA, Observatorio Español de Acuicultura -  
[<http://www.fundacionoesa.es> ]  
Manual de pruebas de diagnóstico para los animales acuáticos -  
[<http://www.oie.int/es/normas-internacionales/manual-acuatico/acceso-en-linea/>]  
Organización Mundial de Sanidad Animal -  
[<http://www.oie.int/es>]  
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