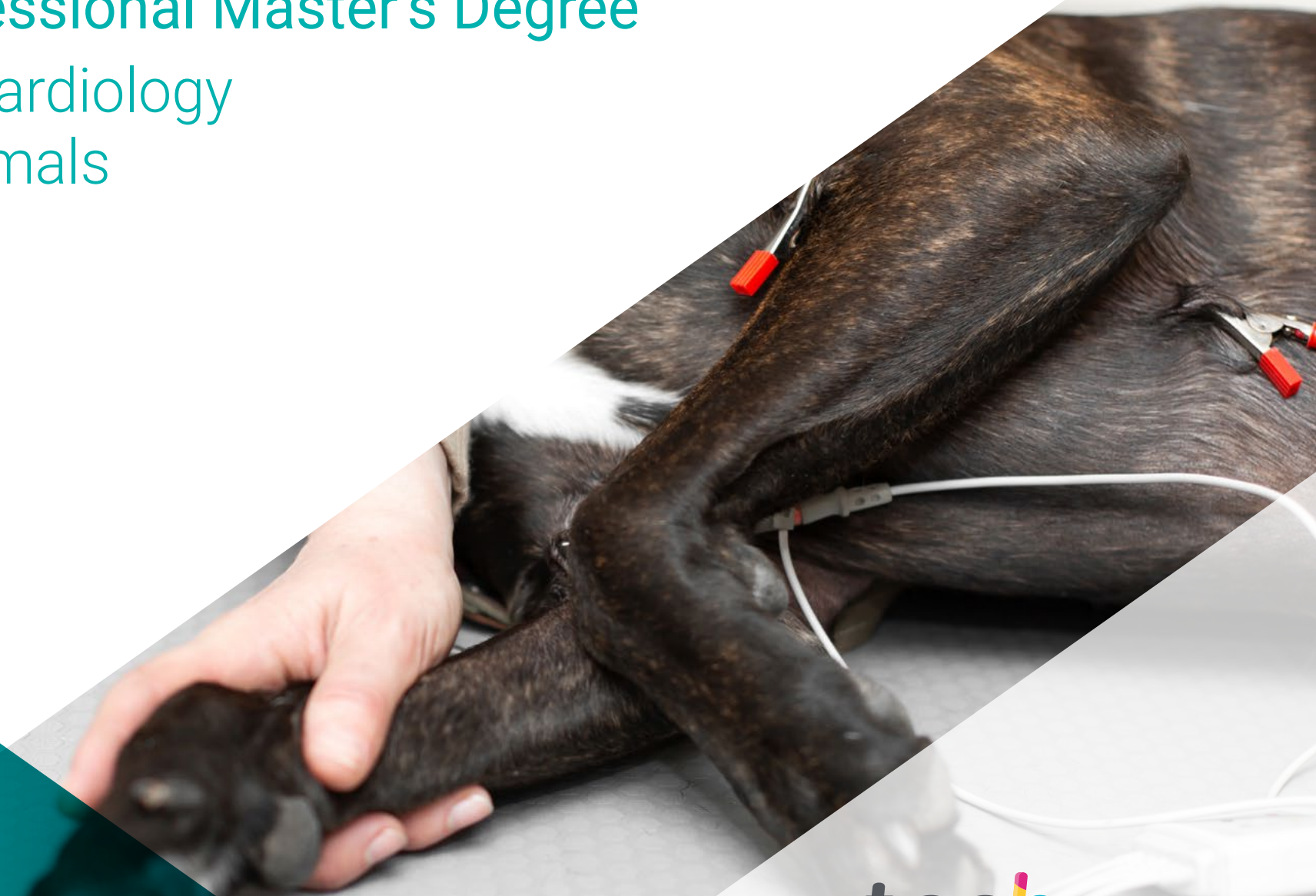


# Hybrid Professional Master's Degree Veterinary Cardiology in Small Animals





## Hybrid Professional Master's Degree Veterinary Cardiology in Small Animals

Course Modality: Hybrid (Online + Clinical Internship)

Duration: 12 months

Certificate: TECH Technological University

Teaching Hours: 1,620 h.

Website: [www.techtute.com/pk/veterinary-medicine/hybrid-professional-master-degree/hybrid-professional-master-degree-veterinary-cardiology-small-animals](http://www.techtute.com/pk/veterinary-medicine/hybrid-professional-master-degree/hybrid-professional-master-degree-veterinary-cardiology-small-animals)

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# 01

# Introduction

Thanks to advances in radiology, electrocardiography and echocardiography, the area of veterinary cardiology has achieved better results in both diagnosis and treatment. At the same time, scientific studies have made it possible to evolve in the field of pharmacology, which significantly favors the recovery and approach to small animals. This progress, in turn, forces specialists to update their knowledge in order to be able to apply it in their daily practice. Faced with this reality, TECH has designed this program, which provides a theoretical framework 100% online, combined with a practical stay in a prestigious center and next to the best specialists. A unique academic experience, which will allow the professionals to update their knowledge in the best clinical environment of the moment.





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*TECH offers you a unique specialty in veterinary internal medicine: small animal cardiology. Update your knowledge with the best professionals"*



Nowadays, first level veterinary centers have powerful echocardiography equipment, which allows three-dimensional models of the cardiac chambers to be made. In this way, more accurate and less invasive diagnoses can be obtained in patients suffering from mitral degenerative disease or myxomatous disease.

These advances, therefore, are only the tip of the iceberg in the field of Veterinary Cardiology, which has evolved in recent years thanks to progress in the field of analysis and pharmacology used in the treatment of small animals. In view of these advances, TECH offers specialists a Hybrid Professional Master's Degree that will provide them with an intensive update of their knowledge in this area.

Thus, the professional will be able to carry out, over 12 months, an update on the approach to the patient with cardiological problems, the most effective techniques and the latest generation equipment used. This will be possible thanks to the advanced 100% online syllabus, which can be accessed whenever and wherever you want. The content is developed by an excellent teaching team specialized and experienced in cardiology.

Once this theoretical phase has been completed, the professionals will undergo a 3-week practical immersion in a first-class clinical center, an environment where they will be able to see, first-hand, what daily work is like in an innovative space, the most effective procedures and methods currently in use. A unique opportunity to update your knowledge in an outstanding clinical facility and always surrounded by the best professionals.

This academic institution thus offers an extraordinary opportunity to keep abreast of advances in this specialty, through a flexible university program that is perfectly adapted to the needs of veterinary professionals.

This **Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ◆ Development of more than 100 clinical cases presented by nursing professionals with expertise in small animal veterinary cardiology
- ◆ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ◆ Assessment and monitoring of patients with cardiac problems
- ◆ Comprehensive systematized action plans for the main pathologies in Veterinary Cardiology
- ◆ An algorithm-based interactive learning system for decision-making in the clinical situations presented throughout the course
- ◆ Practical clinical guides on approaching different pathologies
- ◆ With a special emphasis on evidence-based medicine and research methodologies in Veterinary Cardiology
- ◆ All of this will be complemented by theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ◆ Content that is accessible from any fixed or portable device with an Internet connection
- ◆ In addition, you will be able to carry out a clinical internship in one of the best hospitals in the world

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*This university program will allow you to test the most precise and rigorous diagnostics used in a prestigious clinical center through the most innovative technology”*

In this proposal for a Hybrid Professional Master's Degree, of a professionalizing nature and blended learning modality, the program is aimed at updating veterinary professionals who perform their functions in clinical centers, and who require a high level of qualification. The contents are based on the latest scientific evidence, and oriented in a didactic way to integrate theoretical knowledge in veterinary practice and the theoretical-practical elements will facilitate the updating of knowledge and allow decision making in the management of patients with cardiac problems.

Thanks to its multimedia content elaborated with the latest educational technology, they will allow the veterinary professional to obtain a situated and contextual learning, that is to say, a simulated environment that will provide an immersive learning programmed to train in real situations. This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise throughout the program. For this purpose, the students will be assisted by an innovative interactive video system created by renowned experts.

*This program will allow you to comfortably deepen your knowledge of the electrophysiological mechanisms that cause arrhythmias.*

*You will have access to a library of multimedia resources 24 hours a day, from any electronic device with an Internet connection.*



# 02

## Why Study this Hybrid Professional Master's Degree?

TECH offers in this university program a firm commitment to the combination of a theoretical framework, taught exclusively online, and a practical stay in a prestigious center. In this way, the professionals will be able to obtain a much more complete and current vision of Veterinary Cardiology in Small Animals, throughout the 12 months that make up this academic course. A new way of bringing the specialists closer to the new techniques and methodologies used in this field, always under the guidance of the best professionals, both in the teaching field and in the classroom practice in a first class clinical environment. Thus, the professionals will achieve an effective update in this area, guided throughout the process by real experts.





Why Study this Hybrid Professional | 09 **tech**  
Master's Degree?

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*Step into a world-class clinical environment  
and enhance your diagnostic capabilities  
through the latest technology used in  
Veterinary Cardiology”*

### 1. Updating from the latest technology available

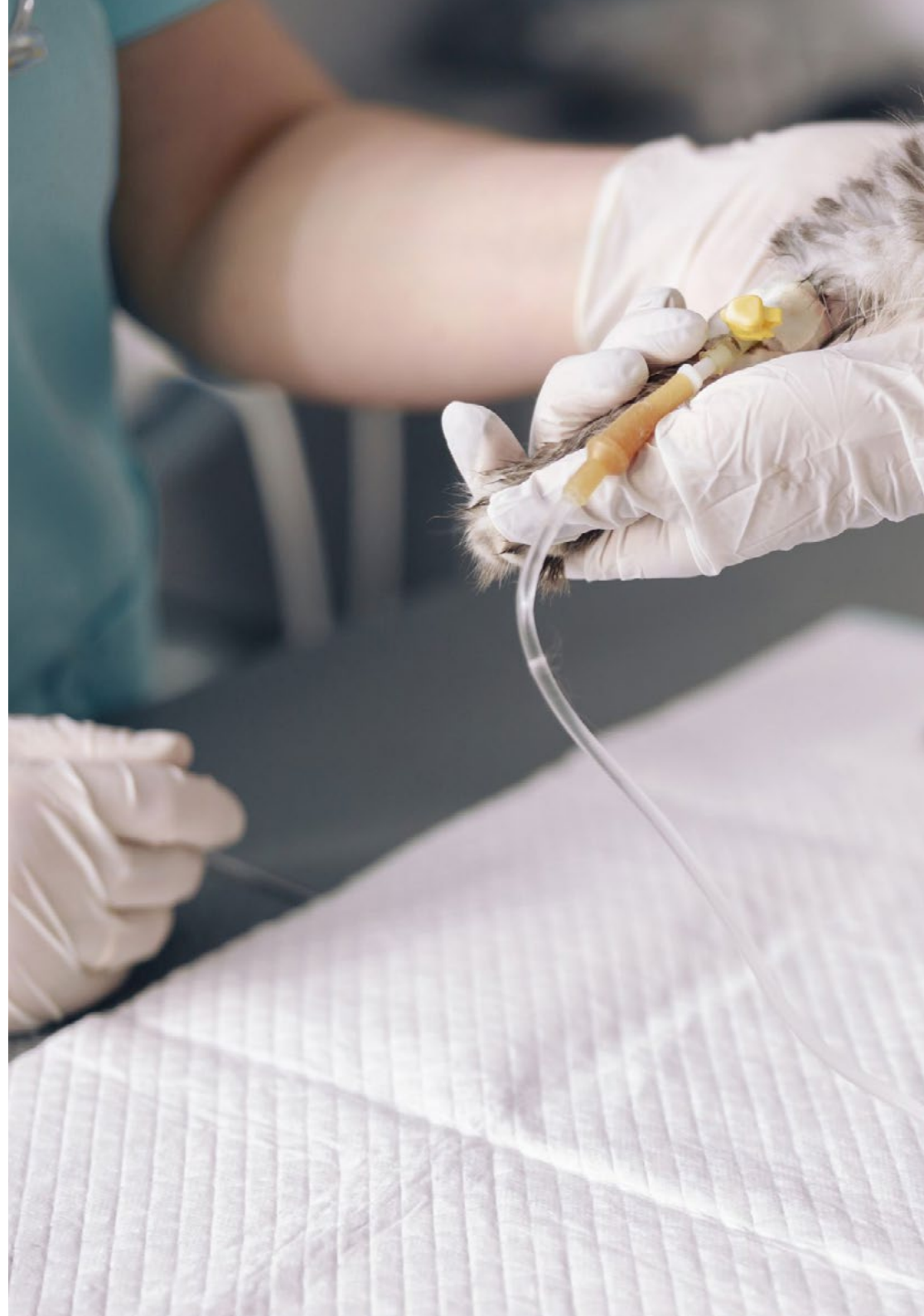
Undoubtedly, the development of veterinary cardiology has gone hand in hand with advances in the equipment used for the diagnosis and intervention of patients. These advances are, therefore, of utmost importance for veterinary professionals. For this reason, and in order to bring the specialist closer to this technology, TECH has created this Hybrid Professional Master's Degree, you will have access to the latest information in this field and will be able to apply it in an innovative clinical environment.

### 2. Gaining In-Depth Knowledge from the Experience of Top Specialists

During this academic process, the veterinary professionals will not be alone, as they will be monitored by a specialized teaching team, and will continue this experience with a practical stay surrounded by the best in the field of Veterinary Cardiology. Undoubtedly, a unique option in the current university panorama, which only TECH offers.

### 3. Entering First-Class Clinical Environments

In order to maintain its philosophy of offering a quality qualification within everyone's reach, TECH carries out a rigorous selection process of the entire teaching team that makes up its qualifications, as well as the centers where the practical stay will take place. In this way, the professionals will have the guarantee of being able to count at all times with specialized veterinarians with extensive experience in the management of patients with cardiac problems.





#### 4. Combining the Best Theory with State-of-the-Art Practice

In today's educational market there are countless programs that focus solely and exclusively on providing theoretical knowledge. However, TECH moves away from this and adapts its programs to the requirements of the professionals who take it. Thus, it provides online content, without classes with fixed schedules, and with a teaching load that can be distributed according to the needs of each specialist. And, in addition to all this, it completes the qualification with a practical stay in a reference clinical center where the veterinarian will be able to carry out an update, together with the best in the field of Veterinary Cardiology in Small Animals.

#### 5. Expanding the Boundaries of Knowledge

TECH offers the possibility of doing this Internship Program, not only in national, but also in international centers. This way, the specialist will be able to expand their frontiers and catch up with the best professionals, who practice in first class centers and in different continents. A unique opportunity that only TECH, the largest online university in the world, could offer.



*You will have full practical immersion  
at the center of your choice"*



# 03

## Objectives

The objectives of the Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals aim to update the knowledge of professionals in the field of cardiology. They will deepen in this area of veterinary medicine, knowing how to analyze the cardiac and vascular anatomy of animals, as well as to determine the different clinical pictures of cardiorespiratory diseases. In short, this program prepares them in depth and trains them through an internship in a veterinary center with real cases, where they will be guided by the best experts, in addition to having the latest advances and most innovative treatments in the sector.







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*The real case studies will lead you to integrate the latest technical advances in diagnostic imaging”*



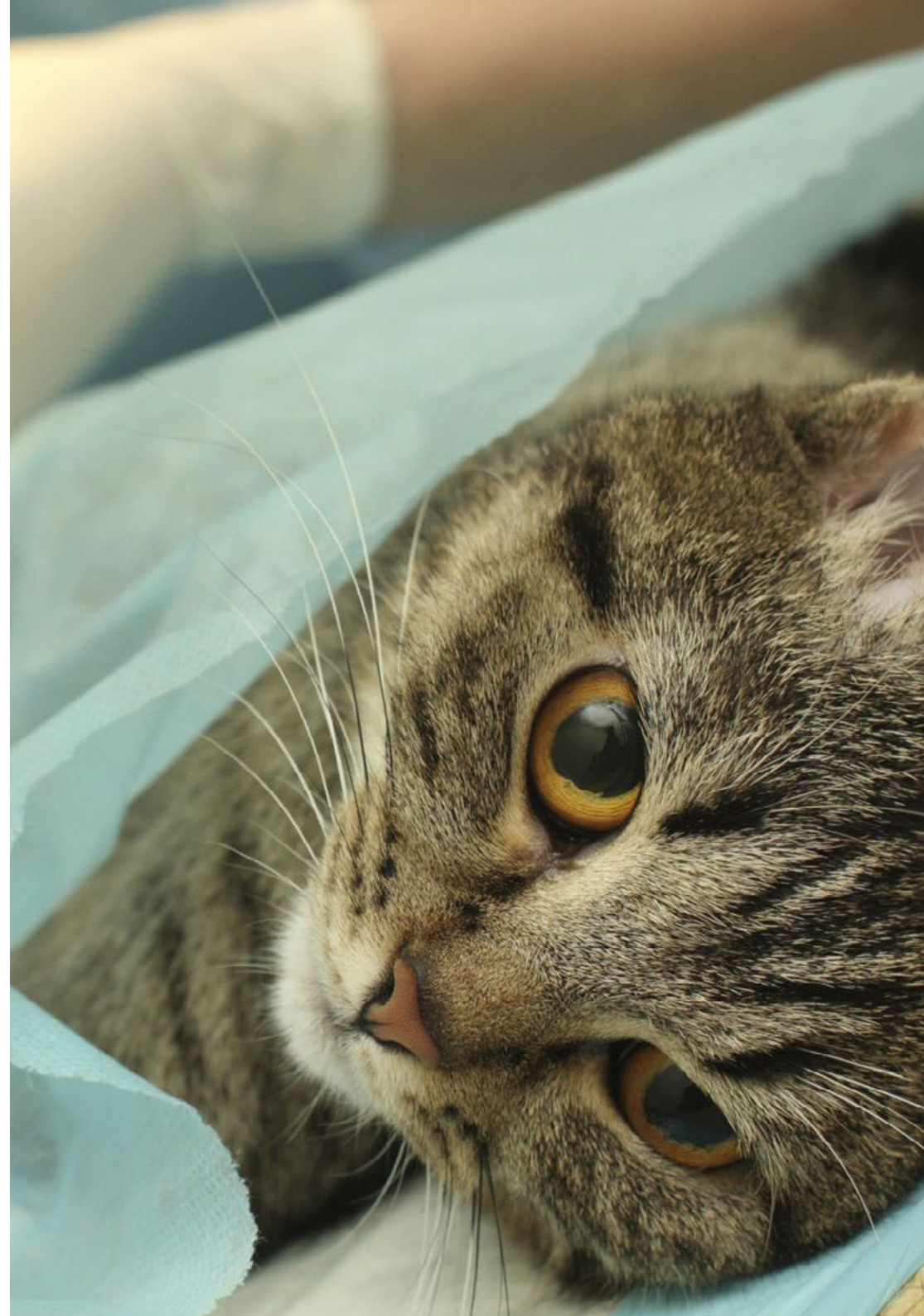
### General Objective

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- The general objective of the Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals is to update the professional in the diagnostic and therapeutic procedures of the specialty. For this purpose, TECH provides innovative multimedia didactic material, which can be accessed at any time from any electronic device with Internet connection. This will allow you to approach the theoretical concepts in a more dynamic way, and then apply them during the 3-week practical stay that the professional will carry out in a leading clinical center



*TECH provides you with the most innovative pedagogical tools, so that you can successfully achieve your objectives"*





## Specific Objectives

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### Module 1. Cardiac Embryology, Anatomy, Physiology and Pathophysiology

- ◆ Compile the chronology of embryonic and fetal development of the cardiovascular system in small animals
- ◆ Examine cardiac macro- and microstructural morphology and vascular macro- and microstructural morphology
- ◆ Develop the fundamental hemodynamic principles underlying cardiac physiology
- ◆ Determine the functions and design of the cardiovascular system
- ◆ Examine the contractile function of the heart
- ◆ Establish the parts of the cardiac cycle
- ◆ Analyze the factors on which cardiac output depends and the main mechanisms of cardiovascular regulation
- ◆ Assess the main pathophysiological mechanisms involved in diseases of the endocardium, myocardium and pericardium
- ◆ Generate specialized knowledge on cardiogenic pulmonary edema

### Module 2. Heart Failure Cardiac Pharmacology

- ◆ Analyze the pathophysiological mechanisms of heart failure and its repercussions on the rest of the systems and apparatuses
- ◆ Compile the existing evidence on the dietary management of cardiovascular disease in small animals
- ◆ Establish guidelines to provide correct information to the owner about the pet's cardiovascular disease
- ◆ Establish the mechanism of action, indications, adverse effects and contraindications of the main medication used in treating heart failure such as ACE inhibitors, diuretics and Pimobendan

- ◆ Examine the mechanism of action, indications, posology, adverse effects and contraindications of the main drugs used in the treatment of arrhythmias
- ◆ Determine the mechanism of action, indications, posology, adverse effects and contraindications of anticoagulant drugs

### Module 3. Anamnesis and Cardiovascular Examination

- ◆ Establish the key questions and their epidemiological and pathophysiological correlates of cardiorespiratory anamnesis in small animals
- ◆ Develop the fundamentals of cardiopulmonary auscultation and its implication in the clinic
- ◆ Examine cardiac and pulmonary auscultation technique
- ◆ Analyze the information that cardiac and pulmonary auscultation can provide in the differential diagnosis
- ◆ Identify the key aspects for the diagnosis of the clinical picture of cough and dyspnea
- ◆ Establish the key aspects for the diagnosis of the clinical picture of cyanosis and the clinical picture of syncope
- ◆ Determine the proper technique for measuring blood pressure and the information it provides in cardiovascular diseases
- ◆ Examine the proper technique for measuring central venous pressure and the information it provides in patients in critical care units
- ◆ Analyze basic blood count and biochemistry parameters that may be altered in cardiovascular disease
- ◆ Compile specialized knowledge to interpret the information provided by the assessment of cardiac markers in cardiorespiratory disease



#### Module 4. Complementary Tests. Diagnostic Imaging

- ◆ Develop the physical fundamentals of Radiology
- ◆ Determine the radiographic technique for the assessment of the thoracic cavity
- ◆ Analyze the normal radiological findings of the thoracic cavity of small animals
- ◆ Establish the main errors in the radiological technique and their implication in the diagnosis
- ◆ Determine the radiological findings in thoracic diseases affecting extrathoracic structures, mediastinum, esophagus and trachea
- ◆ Generate specialized knowledge about normal ultrasound findings and non-cardiac diseases of the thoracic cavity

#### Module 5. Complementary Tests. Electrocardiogram

- ◆ Generate specialized knowledge on tools for the unambiguous identification of P-waves
- ◆ Develop a systematic method for understanding the electrical activity illustrated by the ECG tracing
- ◆ Establish the characteristics that allow discerning the etiology of the arrhythmia
- ◆ Establish criteria to define the anatomical origin of the arrhythmia
- ◆ Specify the criteria defining the malignancy of an arrhythmia
- ◆ Clearly define patients who require a Holter study
- ◆ Develop advanced techniques in the range of therapeutic possibilities







### Module 6. Complementary Tests. Echocardiography

- ◆ Establish the basic principles of image formation in echocardiography
- ◆ Identify the main artifacts that may appear during the echocardiographic technique
- ◆ Determine patient preparation and positioning guidelines for echocardiography
- ◆ Determine the common echocardiographic slices and develop the information that can be obtained from them in the M-mode and two-dimensional modes
- ◆ Review Doppler assessment and evaluation and highlight its importance in hemodynamic assessment
- ◆ Develop in depth hemodynamic assessment in terms of systolic, diastolic, spectral and color Doppler function
- ◆ Determine the use of thoracic ultrasound in other diseases that may be a consequence of cardiac disease
- ◆ Develop expertise in the performance and assessment of echocardiography in small mammals

**Module 7. Acquired Heart Diseases Chronic Mitral and Tricuspid Valve Disease  
Endocarditis Pericardial Alterations Cardiac Masses**

- ♦ Generate specialized knowledge on the epidemiology of chronic degenerative valve disease
- ♦ Determine an assessment protocol in chronic degenerative valve disease
- ♦ Analyze the different tests used in the diagnosis of chronic degenerative valve disease
- ♦ Compile the information available on the therapy of chronic degenerative valve disease
- ♦ Propose a diagnostic and therapeutic algorithm for pericardial effusion
- ♦ Develop the pericardiocentesis technique
- ♦ Examine the etiology of bacterial endocarditis
- ♦ Determine a diagnostic and therapeutic algorithm for bacterial endocarditis

**Module 8. Acquired Heart Diseases Cardiomyopathies**

- ♦ Develop a diagnostic protocol for the phenotype of canine dilated cardiomyopathy and the features that may raise suspicion of secondary cardiomyopathy
- ♦ Systematically assess the possible presence of etiologic causes of canine dilated cardiomyopathy that can be treated
- ♦ Develop an assessment of the risk of negative events in cases of dilated and arrhythmogenic right cardiomyopathy
- ♦ Develop an individualized treatment protocol to maximize the patient's life expectancy, and sometimes reverse the phenotype
- ♦ Specify the echocardiographic criteria for the diagnosis of feline hypertrophic cardiomyopathy
- ♦ Generate advanced knowledge on the latest feline hypertrophic cardiomyopathy staging model for clinical decision making
- ♦ Analyze the differentiating characteristics of other types of feline cardiomyopathies

**Module 9. Congenital Heart Disease**

- ♦ Generate specialized knowledge for a correct understanding of the embryological mechanisms of each of the pathologies that may predispose to the presence of several simultaneous alterations
- ♦ Establish the anatomical characteristics of patent ductus arteriosus that advise surgical or interventional treatment
- ♦ Review the various surgical and interventional techniques available for the treatment of pulmonary stenosis
- ♦ Develop available treatment modalities for aortic stenosis
- ♦ Compile available diagnostic techniques to determine the direction of shunt in intra- and extra-chamber communications
- ♦ Establish anatomical criteria to differentiate between congenital and acquired heart valve processes
- ♦ Predict the hemodynamic consequences of vascular defects or multiple defects



### Module 10. Pulmonary and Systemic Hypertension, Systemic Diseases with Cardiac Repercussions and Anesthesia in the Cardiac Patient

- ◆ Deepen the understanding of the pathophysiological mechanisms that may lead to the development of pulmonary hypertension
- ◆ Identify echocardiographic features that may be helpful in the diagnosis of pulmonary hypertension in the presence and absence of tricuspid regurgitation
- ◆ Quantify the damage generated in target organs by systemic hypertension
- ◆ Familiarity with the most frequently used drugs for the treatment of systemic hypertension and monitoring of therapy
- ◆ Consolidate the treatment protocols most commonly used in filariasis, and identify the differences in the pathophysiology of the disease in dogs and cats
- ◆ Monitor response to etiologic treatment of hyperthyroidism in feline cardiac anatomy
- ◆ Assess the hemodynamic consequences of metabolic diseases that induce hypercoagulable state
- ◆ Assess the need for surgical intervention and its risks in cases of pheochromocytoma
- ◆ Consider the advantages and disadvantages of antiarrhythmic treatments in cases of splenic disease or gastric dilatation/torsion syndrome
- ◆ Identify the hemodynamic consequences of electrolyte disturbances

# 04 Skills

After completing this Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals, the professional will achieve high competencies in a specialty demanded by veterinary clinics and hospitals. To achieve this, it has a management and teaching staff that will guide you at all times to enhance their skills and abilities in this field.







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*This program will provide you with the essential professional competencies to analyze the ultrasound signs in non-cardiac diseases affecting the thoracic cavity"*



## General Skills

- ♦ Examine the main pathophysiological mechanisms of cardiac diseases in small animals
- ♦ Examine the pathophysiology of heart failure as the main paradigm of cardiology
- ♦ Analyze the diagnostic tests involved in the diagnosis and assessment of the cardiovascular system such as laboratory tests, cardiac markers and blood pressure measurement
- ♦ Analyze sonographic signs in non-cardiac diseases affecting the thoracic cavity

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*You will develop an individualized treatment plan that will allow you to maximize the quality of life and life expectancy of affected patients”*





## Specific Skills

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- ♦ Delve into the electrophysiological mechanisms that cause arrhythmias
- ♦ Identify patients requiring therapeutic intervention
- ♦ Examine in depth the information provided by echocardiography in the hemodynamic assessment of patients
- ♦ Assess treatments and new therapies that have been developed in recent years for chronic degenerative valve disease
- ♦ Develop an individualized treatment plan to maximize the quality of life and life expectancy of affected patients
- ♦ Analyze the embryological mechanisms that give rise to the most frequent congenital alterations
- ♦ Simultaneous monitoring of cardiovascular disease and primary disease in order to prioritize etiologic therapies and reduce polypharmacy



05

# Course Management

The teachers of this Hybrid Professional Master's Degree have extensive academic and professional experience, synonymous with the excellence of TECH. They are professionals from different areas and competencies of veterinary medicine, with special expertise in cardiology. These experts have poured their knowledge and professional experience in the elaboration of this program so that the student can develop full faculties of this delicate technique in his professional career. Likewise, the program is completed with a training internship in a veterinary center of reference, which will enable students to achieve their academic and work objectives.



A close-up photograph of a dog's chest with a stethoscope. The dog's fur is a light brown color. The stethoscope is silver and is positioned on the left side of the frame. The background is a dark teal color with a white diagonal line separating it from the white area below.

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*A teaching staff formed by experts in Veterinary Cardiology will give you the keys to achieve a successful recovery of your patients"*

## Management



### Dr. Martínez Delgado, Rubén

- ♦ Head of the Cardiology Service of the Estoril Veterinary Hospital
- ♦ Collaborates with the Veterinary Hospital of the UCM developing the part of minimally invasive interventional cardiology
- ♦ Collaborator of the Veterinary Hospital Alfonso X El Sabio University
- ♦ Internship in Surgery and Cardiology at the UCM
- ♦ Degree in Veterinary Medicine from the Complutense University of Madrid (UCM)
- ♦ Collaboration project in minimally invasive interventional cardiology in the cardiology service of the UCM
- ♦ Intership of the official internship of the European College of Internal Medicine (ECVIM) at the Gran Sasso Veterinary Clinic in Milan (reference center in cardiology and ultrasound diagnosis and specialized center in interventional cardiology)
- ♦ Member of: Association of Spanish Veterinarians Specializing in Small Animals (AVEPA), Specialized Group in Small Animal Respiratory and Cardiology (GECAR)

## Professors

### Dr. Cortés Sánchez, Pablo M

- ♦ Thoracic & Soft Tissue Surgeon at Beltane Veterinary Surgery
- ♦ Veterinary Cardiologist at Ecosun Echography and Veterinary Cardiology
- ♦ Veterinarian at Vetocardia
- ♦ Head of the Cardiology Department and Co-director of the Intensive Care Unit (ICU) of the Estoril Veterinary Hospital
- ♦ Head of the Cardiology service and part of the ICU team at Braid Vets
- ♦ Accreditation in Cardiology and Respiratory System by AVEPA
- ♦ Internship in Internal Medicine and Cardiology at UCM
- ♦ Master in Cardiology for generalists by the International School of Veterinary Postgraduate Studies
- ♦ Internship in Cardiology at the University of Liverpool
- ♦ Certificate in Echocardiography by the Group of Specialists in Cardiology and Respiratory System
- ♦ Degree in Veterinary Medicine from the Complutense University of Madrid
- ♦ Member of: Cardiology and Respiratory Specialist Group, Royal College of Veterinary Surgeons (RCVS). UK



**Dr. Ortiz Díez, Gustavo**

- ♦ Chief of the Small Animal Area at the Complutense Clinical Veterinary Hospital
- ♦ Chief of the Soft Tissue Surgery and Minimally Invasive Procedures Service at the Veterinary Hospital 4 de Octubre
- ♦ Accredited by the Association of Spanish Veterinarians Specializing in Small Animals (AVEPA) in Soft Tissue Surgery
- ♦ Master's Degree in Research Methodology in Health Sciences from the Autonomous University of Barcelona
- ♦ Specialist in Traumatology and Orthopedic Surgery in Companion Animals, Complutense University of Madrid
- ♦ Degree in Small Animal Cardiology from the Complutense University of Madrid
- ♦ PhD and Degree in Veterinary Medicine from the Complutense University of Madrid
- ♦ Courses of laparoscopic and thoracoscopic surgery at the Minimally Invasive Center Jesús Usón. Accredited in functions B, C, D and E of Experimentation Animals by the Community of Madrid
- ♦ ICT Competencies Course for Teachers, UNED
- ♦ Member of: Scientific Committee and current President of the Specialty Group of Soft Tissue Surgery of the Spanish Association of Veterinarians Specializing in Small Animals (AVEPA)

**Dr. Gómez Trujillo, Blanca**

- ♦ Head of Cardiology at the Veterinary Hospital Madrid Este
- ♦ Internal Veterinarian at VESTIA Veterinary Hospital
- ♦ Cardiology and emergencies at VESTIA Veterinary Hospital
- ♦ Adjunct Veterinarian at the Complutense Veterinary Clinical Hospital
- ♦ General Practitioner Certificate in Small Animal Medicine by ISVPS
- ♦ Postgraduate in Small Animal Internal Medicine in Improve International
- ♦ Veterinary Degree at the Complutense University of Madrid
- ♦ Small Animal Cardiology Course at FORVET
- ♦ Echocardiography in Small Animals Course at FORVET

**Dr. Mateos Pañero, María**

- ♦ Veterinary Expert in Small Animal Cardiology
- ♦ Professor of Small Animal Cardiology at the Liverpool University Small Animal Hospital
- ♦ Cardiologist at Northwest Veterinary Specialists
- ♦ Degree in Veterinary Medicine from the University of Extremadura
- ♦ General Practitioner Certificate in Cardiology
- ♦ Cardiology Rotational Internship at the Istituto Veterinario di Novara
- ♦ Specialist Internship in Cardiology at the Istituto Veterinario di Novara

# 06

## Educational Plan

The contents of this program have been developed by the different experts of this Hybrid Professional Master's Degree. Its structure and practice plan make this program the most complete on the market today, as it covers all the relevant knowledge for the veterinarian to develop successfully in a highly sought-after specialty. The structure in ten modules allows a study classified by different knowledge related to animal cardiopathy, cardiovascular exploration or the complete study of the functioning of the electrocardiogram.





“

*You will master cardiovascular examination thanks to the quality content of this TECH program”*



## Module 1. Cardiac Embryology, Anatomy, Physiology and Pathophysiology

- 1.1. Cardiac and Vascular Embryology
  - 1.1.1. Cardiac Embryology
  - 1.1.2. Vascular Embryology
- 1.2. Cardiac and Vascular Anatomy and Histology
  - 1.2.1. Cardiac Anatomy
  - 1.2.2. Vascular Anatomy
  - 1.2.3. Cardiac Histology
  - 1.2.4. Vascular Histology
- 1.3. Normal Cardiovascular Physiology
  - 1.3.1. Functions
  - 1.3.2. Circulation Design
  - 1.3.3. Contractibility
- 1.4. Normal Cardiovascular Physiology
  - 1.4.1. Cardiac Cycle
- 1.5. Normal Cardiovascular Physiology
  - 1.5.1. Blood Vessel Physiology
  - 1.5.2. Systemic and Pulmonary Circulation
- 1.6. Cardiac Physiopathology
  - 1.6.1. Cardiovascular Regulation
- 1.7. Cardiac Physiopathology
  - 1.7.1. Hemodynamic Concepts
  - 1.7.2. Cardiac Output. What Does it Depend On?
- 1.8. Cardiac Physiopathology
  - 1.8.1. Valvulopathies
- 1.9. Cardiac Physiopathology
  - 1.9.1. Pericardium
  - 1.9.2. Cardiomyopathies
  - 1.9.3. Vascular Physiopathology
- 1.10. Cardiac Physiopathology
  - 1.10.1. Pulmonary Edema

## Module 2. Heart Failure Cardiac Pharmacology

- 2.1. Congestive Heart Failure
  - 2.1.1. Definition
  - 2.1.2. Pathophysiological Mechanisms
  - 2.1.3. Pathophysiological Consequences
- 2.2. Dietary Hygiene Management. Communication With the Owner
  - 2.2.1. Communication With the Owner
  - 2.2.2. Feeding in the Cardiac Patient
- 2.3. Angiotensin-Converting Enzyme Inhibitors (ACE Inhibitors)
  - 2.3.1. Mechanism of Action
  - 2.3.2. Types
  - 2.3.3. Indications
  - 2.3.4. Posology
  - 2.3.5. Side Effects
  - 2.3.6. Contraindications
- 2.4. Pimobendan and Other Inotropics
  - 2.4.1. Pimobedan
    - 2.4.1.1. Mechanism of Action
    - 2.4.1.2. Indications
    - 2.4.1.3. Posology
    - 2.4.1.4. Side Effects
    - 2.4.1.5. Contraindications
  - 2.4.2. Sympathomimetics
    - 2.4.2.1. Mechanism of Action
    - 2.4.2.2. Indications
    - 2.4.2.3. Posology
    - 2.4.2.4. Side Effects
    - 2.4.2.5. Contraindications
  - 2.4.3. Others



- 2.5. Diuretics
  - 2.5.1. Mechanism of Action
  - 2.5.2. Types
  - 2.5.3. Indications
  - 2.5.4. Posology
  - 2.5.5. Side Effects
  - 2.5.6. Contraindications
- 2.6. Antiarrhythmics (1)
  - 2.6.1. Preliminary Considerations
  - 2.6.2. Classification of Antiarrhythmics
  - 2.6.3. Class 1 Antiarrhythmics
- 2.7. Antiarrhythmics (2)
  - 2.7.1. Class 2 Antiarrhythmics
  - 2.7.2. Class 3 Antiarrhythmics
  - 2.7.3. Class 4 Antiarrhythmics
- 2.8. Antihypertensive Drugs
  - 2.8.1. Venous
  - 2.8.2. Arterials
  - 2.8.3. Mixed
  - 2.8.4. Pulmonary
- 2.9. Anticoagulants
  - 2.9.1. Heparins
  - 2.9.2. Clopidogre
  - 2.9.3. IAAS
  - 2.9.4. Others
- 2.10. Other Drugs Used in the Treatment of Cardiovascular Disease
  - 2.10.1. Angiotensin Receptor Antagonists II
  - 2.10.2. Spironolactone (Fibrosis and Antiremodeling Study)
  - 2.10.3. Carvedilol
  - 2.10.4. Positive Chronotropics
  - 2.10.5. Atropine (Atropine Test)
  - 2.10.6. Taurine in CMD
  - 2.10.7. Atenolol in Stenosis
  - 2.10.8. Atenolol or Diltiazem in Obstructive HCM

### Module 3. Anamnesis and Cardiovascular Examination

- 3.1. Cardiovascular and Respiratory Anamnesis
  - 3.1.1. Epidemiology of Heart Disease
  - 3.1.2. Medical History
    - 3.1.2.1. General Symptoms
    - 3.1.2.2. Specific Symptoms
- 3.2. Cardiovascular and Respiratory Examination
  - 3.2.1. Respiratory Pattern
  - 3.2.2. Exploration of the Head
  - 3.2.3. Neck Exploration
  - 3.2.4. Examination of the Thorax
  - 3.2.5. Examination of the Abdomen
  - 3.2.6. Other Explorations
- 3.3. Auscultation (I)
  - 3.3.1. Physical Principles
  - 3.3.2. Phonendoscope
  - 3.3.3. Technique
  - 3.3.4. Heart Sounds
- 3.4. Auscultation (II)
  - 3.4.1. Murmurs
  - 3.4.2. Pulmonary auscultation
- 3.5. Cough
  - 3.5.1. Definition and Pathophysiological Mechanisms
  - 3.5.2. Differential Diagnoses and Diagnostic Algorithm for Cough
- 3.6. Dyspnoea
  - 3.6.1. Definition and Pathophysiological Mechanisms
  - 3.6.2. Differential Diagnoses and Diagnostic Algorithm for Dyspnoea
- 3.7. Syncope
  - 3.7.1. Definition and Pathophysiological Mechanisms
  - 3.7.2. Differential Diagnoses and Diagnostic Algorithm for Syncope
- 3.8. Cyanosis
  - 3.8.1. Definition and Pathophysiological Mechanisms
  - 3.8.2. Differential Diagnoses and Diagnostic Algorithm for Syncope

- 3.9. Arterial and Central Pressure Venous Pressure
  - 3.9.1. Arterial Pressure
  - 3.9.2. Central Venous Pressure
- 3.10. Laboratory Tests and Cardiac Markers
  - 3.10.1. Laboratory Tests in Heart Disease
  - 3.10.2. Cardiac Biomarkers
  - 3.10.3. Genetic Tests

### Module 4. Complementary Tests. Diagnostic Imaging

- 4.1. Principles of Radiology
  - 4.1.1. Physical Fundamentals of X-ray Production
  - 4.1.2. X-ray Machine
  - 4.1.3. Selection of MAS and KV
  - 4.1.4. Types of Radiology
- 4.2. Radiographic Technique in Thoracic Radiology
  - 4.2.1. Radiographic Technique
  - 4.2.2. Positioning
- 4.3. Thoracic Radiography (I)
  - 4.3.1. Assessment of a Thoracic Radiography
  - 4.3.2. Diseases of Extrathoracic Structures
- 4.4. Thoracic Radiology (II)
  - 4.4.1. Tracheal Diseases
  - 4.4.2. Mediastinal Diseases
- 4.5. Thoracic Radiology (III)
  - 4.5.1. Diseases of the Pleura
  - 4.5.2. Diseases of the Esophagus
- 4.6. Cardiac Silhouette (I)
  - 4.6.1. Assessment of Normal Cardiac Silhouette
  - 4.6.2. Size
  - 4.6.3. Topography
- 4.7. Cardiac Silhouette (II)
  - 4.7.1. Diseases Affecting the Heart
  - 4.7.2. Diseases



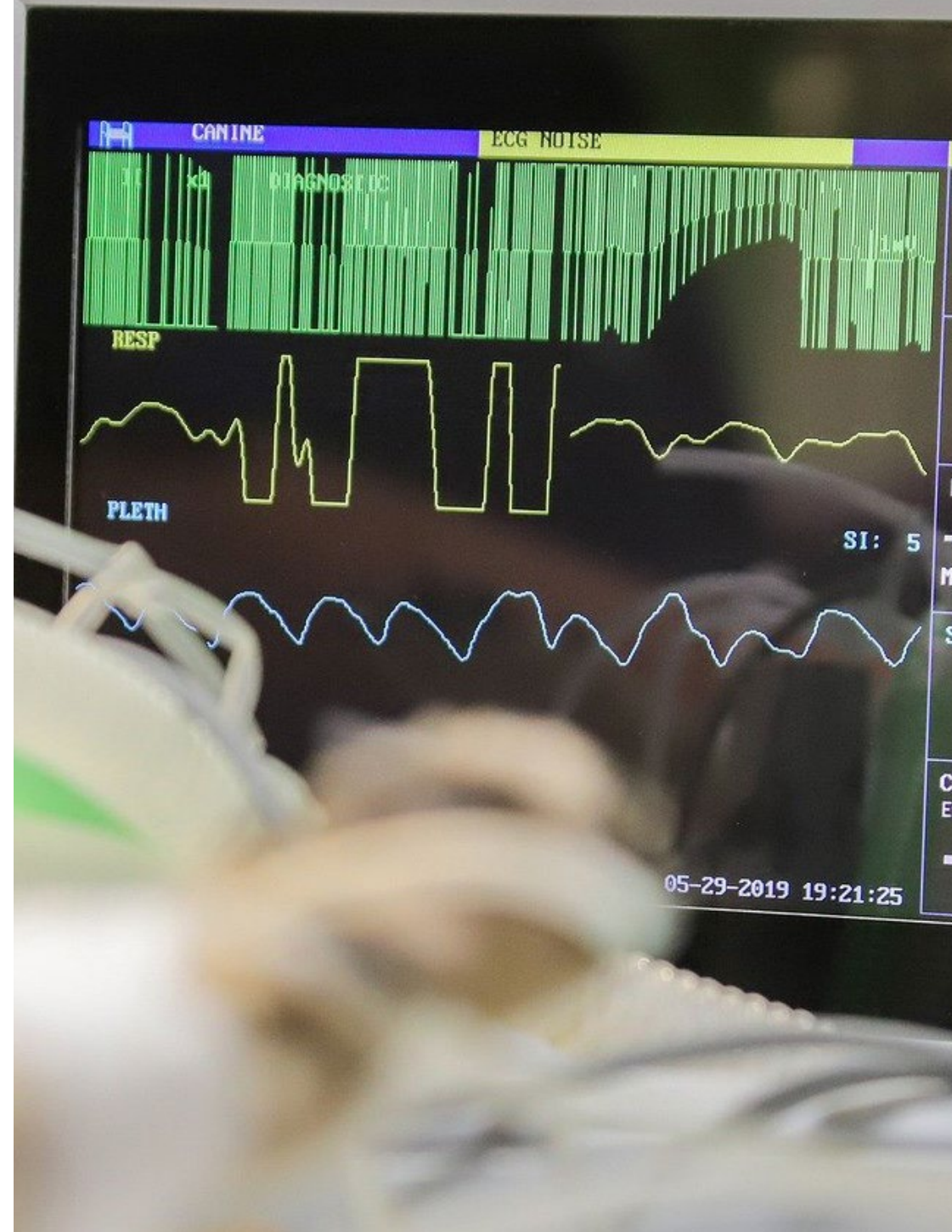
- 4.8. Pulmonary Parenchyma (I)
  - 4.8.1. Assessment of Normal Lung Parenchyma
  - 4.8.2. Pulmonary Patterns (1)
- 4.9. Pulmonary Parenchyma (II)
  - 4.9.1. Pulmonary Patterns (2)
  - 4.9.2. Radiologic Findings in Pulmonary Parenchymal Diseases
- 4.10. Other Tests
  - 4.10.1. Pulmonary Ultrasound Scan
  - 4.10.2. *Bubble Study*

## Module 5. Complementary Tests. Electrocardiogram

- 5.1. Anatomy of the Conduction System and Action Potentials
  - 5.1.1. Sinus Node and Supraventricular Conduction Pathways
  - 5.1.2. Atrioventricular Node and Ventricular Conduction Pathways
  - 5.1.3. Action Potential
    - 5.1.3.1. Pacemaker Cells
    - 5.1.3.2. Contractile Cells
- 5.2. Obtaining a High Quality Electrocardiographic Tracing
  - 5.2.1. Limb Lead System
  - 5.2.2. Precordial Lead System
  - 5.2.3. Artifact Reduction
- 5.3. Sinus Rhythm
  - 5.3.1. Typical Electrocardiographic Characteristics of Sinus Rhythm
  - 5.3.2. Respiratory Sinus Arrhythmia
  - 5.3.3. Non-respiratory Sinus Arrhythmia
  - 5.3.4. Wandering Pacemaker
  - 5.3.5. Sinus Tachycardia
  - 5.3.6. Sinus Bradycardia
  - 5.3.7. Intraventricular Conduction Blocks
- 5.4. Electrophysiological Mechanisms Causing Arrhythmias
  - 5.4.1. Stimulus Formation Disorders
    - 5.4.1.1. Altered Normal Automatism
    - 5.4.1.2. Abnormal Automatism
    - 5.4.1.3. Triggered Activity: Late Postpotentials
    - 5.4.1.4. Triggered Activity: Early Postpotentials
  - 5.4.2. Impulse Conduction Disorders
    - 5.4.2.1. Anatomical Re-entry
    - 5.4.2.2. Functional Re-entry
- 5.5. Supraventricular Arrhythmias (I)
  - 5.5.1. Atrial Premature Complexes
  - 5.5.2. Paroxysmal Supraventricular Tachycardia
  - 5.5.3. Atrioventricular Junctional Tachycardia
  - 5.5.4. Accessory Conduction Routes
- 5.6. Supraventricular Arrhythmias (II): Atrial Fibrillation
  - 5.6.1. Anatomical and Functional Substrate
  - 5.6.2. Hemodynamic Consequences
  - 5.6.3. Treatment for Frequency Control
  - 5.6.4. Treatment for Rythm Control
- 5.7. Ventricular Arrhythmias
  - 5.7.1. Ventricular Premature Complexes
  - 5.7.2. Monomorphic Ventricular Tachycardia
  - 5.7.3. Polymorphic Ventricular Tachycardia
  - 5.7.4. Idioventricular Rhythm
- 5.8. Bradyarrhythmias
  - 5.8.1. Sick Sinus Disease
  - 5.8.2. Atrioventricular Block
  - 5.8.3. Atrial Silence
- 5.9. Holter
  - 5.9.1. Holter Monitoring Indications
  - 5.9.2. Equipment
  - 5.9.3. Interpretation
- 5.10. Advanced Treatment Techniques
  - 5.10.1. Pacemaker Implantation
  - 5.10.2. Radiofrequency Ablation

## Module 6. Complementary Tests. Echocardiography

- 6.1. Introduction. Ultrasound and Equipment
  - 6.1.1. Ultrasound Physics
  - 6.1.2. Equipment and Transducers
  - 6.1.3. Doppler
  - 6.1.4. Artifacts
- 6.2. Echocardiographic Examination
  - 6.2.1. Patient Preparation and Positioning
  - 6.2.2. 2D Two-dimensional Echocardiography
    - 6.2.2.1. Echocardiographic Slicing
    - 6.2.2.2. Two-dimensional Image Controls
  - 6.2.3. M-Mode
  - 6.2.4. Spectral Doppler
  - 6.2.5. Color Doppler
  - 6.2.6. Tissue Doppler
- 6.3. Measurements and Assessment of 2-D and M-mode Images
  - 6.3.1. General Aspects
  - 6.3.2. Left Ventricle and Mitral Valve
  - 6.3.3. Left Atrium
  - 6.3.4. Aorta
  - 6.3.5. Right Ventricle and Tricuspid Valve
  - 6.3.6. Right Atrium and Caval Veins
  - 6.3.7. Pulmonary Trunk and Arteries
  - 6.3.8. Pericardium
- 6.4. Doppler Measurements and Assessment
  - 6.4.1. General Aspects
    - 6.4.1.1. Alignment
    - 6.4.1.2. Laminar and Turbulent Flow
    - 6.4.1.3. Hemodynamic Information
  - 6.4.2. Spectral Doppler: Aortic and Pulmonary Flow
  - 6.4.3. Spectral Doppler: Mitral and Tricuspid Inflow
  - 6.4.4. Spectral Doppler: Flow of the Pulmonary and Left Atrial Veins
  - 6.4.5. Colour Doppler Assessment
  - 6.4.6. Tissue Doppler Measurement and Assessment



- 6.5. Advanced Echocardiography
  - 6.5.1. Tissue Doppler-Derived Techniques
  - 6.5.2. Transesophageal Echocardiogram
  - 6.5.3. 3-D Echocardiography
- 6.6. Hemodynamic Assessment I
  - 6.6.1. Left Ventricular Systolic Function
    - 6.6.1.1. M-Mode Analysis
    - 6.6.1.2. Two-Dimensional Analysis
    - 6.6.1.3. Spectral Doppler Analysis
    - 6.6.1.4. Tissue Doppler Analysis
- 6.7. Hemodynamic Assessment II
  - 6.7.1. Left Ventricular Diastolic Function
    - 6.7.1.1. Types of Diastolic Dysfunction
  - 6.7.2. Left Ventricular Filling Pressures
  - 6.7.3. Right Ventricular Function
    - 6.7.3.1. Radial Systolic Function
    - 6.7.3.2. Longitudinal Systolic Function
    - 6.7.3.3. Tissue Doppler
- 6.8. Hemodynamic Assessment III
  - 6.8.1. Spectral Doppler
    - 6.8.1.1. Pressure Gradients
    - 6.8.1.2. Pressure Half Time
    - 6.8.1.3. Regurgitation Volume and Fraction
    - 6.8.1.4. Shunt Quota
  - 6.8.2. M-Mode
    - 6.9.2.1. Aorta
    - 6.9.2.2. Mitral
    - 6.9.2.3. Septum
    - 6.9.2.4. Left Ventricular Free Wall
- 6.9. Hemodynamic Assessment IV
  - 6.9.1. Color Doppler
    - 6.9.1.1. Jet Size
    - 6.9.1.2. PISA
    - 6.9.1.3. Contracted Vein

- 6.9.2. Assessment of Mitral Regurgitation
- 6.9.3. Assessment of Tricuspid Regurgitation
- 6.9.4. Assessment of Aortic Regurgitation
- 6.9.5. Assessment of Pulmonary Regurgitation
- 6.10. Thoracic Ultrasound Scan
  - 6.10.1. Thoracic Ultrasound Scan
    - 6.10.1.1. Spills
    - 6.10.1.2. Masses
    - 6.10.1.3. Pulmonary Parenchyma
  - 6.10.2. Echocardiography in Exotic Animals
    - 6.10.2.1. Rabbits
    - 6.10.2.2. Ferrets
    - 6.10.2.3. Rodents
  - 6.10.3. Others

### Module 7. Acquired Heart Diseases Chronic Mitral and Tricuspid Valve Disease Endocarditis Pericardial Alterations Cardiac Masses

- 7.1. Chronic Degenerative Valve Disease (I): Etiology
  - 7.1.1. Valvular Anatomy
  - 7.1.2. Etiology
  - 7.1.3. Prevalence
- 7.2. Chronic Degenerative Valve Disease (II): Pathology
  - 7.2.1. Pathophysiology
  - 7.2.2. Staging and Classification
- 7.3. Chronic Degenerative Valve Disease (III): Diagnosis
  - 7.3.1. History and Exploration
  - 7.3.2. Radiology
  - 7.3.3. Electrocardiogram (ECG)
  - 7.3.4. Echocardiography
  - 7.3.5. Biochemical Tests
  - 7.3.6. Differential Diagnoses



- 7.4. Chronic Degenerative Valve Disease (IV): Echocardiographic Assessment
  - 7.4.1. Valvular Anatomy
    - 7.4.1.1. Appearance and Movement
    - 7.4.1.2. Degenerative Lesions
    - 7.4.1.3. Prolapses
    - 7.4.1.4. Ruptured Chordae Tendineae
  - 7.4.2. Dimensions and Functionality of the Left Ventricle
  - 7.4.3. Quantification of Regurgitation
  - 7.4.4. Echocardiographic Staging
    - 7.4.4.1. Cardiac Remodeling
    - 7.4.4.2. Regurgitation Flows and Fraction
    - 7.4.4.3. Left Atrial Pressures
    - 7.4.4.4. Pulmonary Hypertension
- 7.5. Chronic Degenerative Valve Disease (V): Progression and Decompensation Risk Analysis
  - 7.5.1. Risk Factors for Progression
  - 7.5.2. Decompense Prediction
  - 7.5.3. Particularities in the Evolution of Tricuspid Pathology
  - 7.5.4. Owner's Role
  - 7.5.5. Periodicity of Revisions
- 7.6. Chronic Degenerative Valve Disease (VI): Therapy
  - 7.6.1. Medical Treatment
  - 7.6.2. Surgical treatment
- 7.7. Chronic Degenerative Valve Disease (VII): Complicating Factors
  - 7.7.1. Arrhythmias
  - 7.7.2. Pulmonary Hypertension
  - 7.7.3. Systemic Arterial Hypertension
  - 7.7.4. Renal Insufficiency
  - 7.7.5. Atrial Rupture
- 7.8. Infectious Endocarditis
  - 7.8.1. Aetiology and Pathophysiology of Bacterial Endocarditis
  - 7.8.2. Diagnosis of Bacterial Endocarditis
  - 7.8.3. Treatment of Bacterial Endocarditis

- 7.9. Pericardial Alterations
  - 7.9.1. Pericardium Anatomy and Physiology
  - 7.9.2. Pathophysiology of Pericardial Tamponade
  - 7.9.3. Diagnosis of Pericardial Tamponade
  - 7.9.4. Types of Pericardial Alterations
    - 7.9.4.1. Hernias and Defects
    - 7.9.4.2. Spills or Effusions (types and origins)
    - 7.9.4.3. Masses
    - 7.9.4.4. Constrictive Pericarditis
  - 7.9.5. Pericardiocentesis and Action Protocol
- 7.10. Cardiac Masses
  - 7.10.1. Aortic Base Tumors
  - 7.10.2. Hemangiosarcoma
  - 7.10.3. Mesothelioma
  - 7.10.4. Intracavitary Tumors
  - 7.10.5. Clots: Atrial Rupture

## Module 8. Acquired Heart Diseases Cardiomyopathies

- 8.1. Primary Canine Dilated Cardiomyopathy
  - 8.1.1. Definition of Primary Dilated Cardiomyopathy (DCM) and Histological Features
  - 8.1.2. Echocardiographic Diagnosis of DCM
  - 8.1.3. Electrocardiographic Diagnosis of Occult DCM
    - 8.1.3.1. Electrocardiogram (ECG)
    - 8.1.3.2. Holter
  - 8.1.4. RCM Therapy
    - 8.1.4.1. Hidden Phase
    - 8.1.4.2. Symptomatic Phase
- 8.2. Secondary Canine Dilated Cardiomyopathy
  - 8.2.1. Aetiological Diagnosis of Dilated Cardiomyopathy (DCM)
  - 8.2.2. DCM Secondary to Nutritional Deficiencies
  - 8.2.3. DCM Secondary to Other Causes
    - 8.2.3.1. Endocrine Disorders
    - 8.2.3.2. Toxins
    - 8.2.3.3. Others

- 8.3. Tachycardia-Induced Cardiomyopathy (TICM)
  - 8.3.1. Electrocardiographic Diagnosis of TICM
    - 8.3.1.1. Electrocardiogram (ECG)
    - 8.3.1.2. Holter
  - 8.3.2. TICM Therapy
    - 8.3.2.1. Pharmacotherapy
    - 8.3.2.2. Radiofrequency Ablation
- 8.4. Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)
  - 8.4.1. Definition of ARVC and Histological Features
  - 8.4.2. Echocardiographic Diagnosis of ARVC
  - 8.4.3. Electrocardiographic Diagnosis of ARVC
    - 8.4.3.1. ECG
    - 8.4.3.2. Holter
  - 8.4.4. ARVC Therapy
- 8.5. Feline Hypertrophic Cardiomyopathy (HCM) (I)
  - 8.5.1. Definition of HCM and Histological Features
  - 8.5.2. Echocardiographic Diagnosis of HCM Phenotype
  - 8.5.3. Electrocardiographic Findings at HCM
- 8.6. Feline Hypertrophic Cardiomyopathy (HCM) (II)
  - 8.6.1. Aetiological Diagnosis of HCM
  - 8.6.2. Hemodynamic Consequences of HCM
  - 8.6.3. Staging of HCM
  - 8.6.4. Prognostic Factors in HCM
  - 8.6.5. HCM Therapy
    - 8.6.5.1. Asymptomatic Phase
    - 8.6.5.2. Symptomatic Phase
- 8.7. Other Feline Cardiomyopathies (I)
  - 8.7.1. Restrictive Cardiomyopathy (RCM)
    - 8.7.1.1. Histological Characteristics of RCM
    - 8.7.1.2. Echocardiographic Diagnosis of RCM Phenotype
    - 8.7.1.3. Electrocardiographic Findings in RCM
    - 8.7.1.4. RCM Therapy

- 8.7.2. Feline Dilated Cardiomyopathy
  - 8.7.2.1. Histological Features of Feline Dilated Cardiomyopathy (DCM)
  - 8.7.2.2. Echocardiographic Diagnosis of the DCM Phenotype
  - 8.7.2.3. Etiologic Diagnosis of Feline DCM
- 8.8. Other Feline Cardiomyopathies (II)
  - 8.8.1. Feline Dilated Cardiomyopathy (DMC) (cont.)
    - 8.8.1.1. Therapy of Feline DCM
  - 8.8.2. End-stage Cardiomyopathies
    - 8.8.2.1. Echocardiographic Diagnosis
    - 8.8.2.2. Therapy of End-Stage Cardiomyopathy
  - 8.8.3. Hypertrophic Obstructive Cardiomyopathy (HOCM)
- 8.9. Myocarditis
  - 8.9.1. Clinical Diagnosis of Myocarditis
  - 8.9.2. Etiologic Diagnosis of Myocarditis
  - 8.9.3. Non-etiological Therapy of Myocarditis
  - 8.9.4. Chagas Disease
- 8.10. Other Myocardial Alterations
  - 8.10.1. Atrial Standstill
  - 8.10.2. Fibroendoelastosis
  - 8.10.3. Cardiomyopathy Associated with Muscular Dystrophy (Duchenne)
  - 8.10.4. Cardiomyopathy in Exotic Animals

## Module 9. Congenital Heart Disease

- 9.1. Patent Ductus Arteriosus (PDA) (I)
  - 9.1.1. Embryological Mechanisms that Give Rise to PDA
  - 9.1.2. Anatomical Classification of PDA
  - 9.1.3. Echocardiographic Diagnosis
- 9.2. Patent Ductus Arteriosus (II)
  - 9.2.1. Pharmacotherapy
  - 9.2.2. Interventional Therapy
  - 9.2.3. Surgical Therapies
- 9.3. Pulmonary Stenosis (PS) (I)
  - 9.3.1. Anatomical Classification of PS
  - 9.3.2. Echocardiographic Diagnosis of PS
  - 9.3.3. Pharmacotherapy

- 9.4. Pulmonary Stenosis (II)
  - 9.4.1. Interventional Therapy
  - 9.4.2. Surgical Therapies
- 9.5. Aortic Stenosis (AS) (I)
  - 9.5.1. Anatomical Classification of AS
  - 9.5.2. Echocardiographic Diagnosis of AS
  - 9.5.3. Pharmacotherapy
- 9.6. Aortic Stenosis (II)
  - 9.6.1. Interventional Therapy
  - 9.6.2. Screening Program Results
- 9.7. Ventricular Septal Defects (VSD)
  - 9.7.1. Anatomical Classification of VSD
  - 9.7.2. Echocardiographic Diagnosis
  - 9.7.3. Pharmacotherapy
  - 9.7.4. Surgical Therapies
  - 9.7.5. Interventional Therapy
- 9.8. Interatrial Septal Defects (ISD)
  - 9.8.1. Anatomical Classification of ISD
  - 9.8.2. Echocardiographic Diagnosis
  - 9.8.3. Pharmacotherapy
  - 9.8.4. Interventional Therapy
- 9.9. Atrioventricular Valve Dysplasia
  - 9.9.1. Tricuspid Dysplasia
  - 9.9.2. Mitral Dysplasia
- 9.10. Other Congenital Defects
  - 9.10.1. Tetralogy of Fallot
  - 9.10.2. Persistent Left Cranial Cava Vein
  - 9.10.3. Double Chamber Right Ventricle
  - 9.10.4. Aorto-Pulmonary Window
  - 9.10.5. Persistent Right Fourth Aortic Arch
  - 9.10.6. Cortriatrium Dexter and Cortriatrium Sinister
  - 9.10.7. Common Atrioventricular Canal





**Module 10. Pulmonary and Systemic Hypertension, Systemic Diseases with Cardiac Repercussions and Anesthesia in the Cardiac Patient**

- 10.1. Pulmonary Hypertension (PH) (I)
  - 10.1.1. Definition of PH
  - 10.1.2. Echocardiographic Diagnosis of PH
  - 10.1.3. HP Classification
- 10.2. Pulmonary Hypertension (II)
  - 10.2.1. Additional Diagnostic Protocol in Animals Suspected of PH
  - 10.2.2. PH Treatment
- 10.3. Systemic Hypertension (I)
  - 10.3.1. Methods for Blood Pressure Measurement
  - 10.3.2. Diagnosis of Hypertension
  - 10.3.3. Pathophysiology of Systemic Hypertension
  - 10.3.4. Assessment of Target Organ Damage
  - 10.3.5. Hypertensive Cardiomyopathy
- 10.4. Systemic Hypertension (II)
  - 10.4.1. Patient Selection for Hypertension Screening Programs
  - 10.4.2. Treatment of Systemic Hypertension
  - 10.4.3. Monitoring of Treatment and Additional Target Organ Damage
- 10.5. Filariasis
  - 10.5.1. Etiological Agent
  - 10.5.2. Diagnosis of Filarial Infection
    - 10.5.2.1. Physical Methods
    - 10.5.2.2. Serological Methods
  - 10.5.3. Pathophysiology of Filarial Infestations
    - 10.5.3.1. Dogs
    - 10.5.3.2. Cats
  - 10.5.4. Hallazgos ecocardiográficos
  - 10.5.5. Treatment of Filariasis
    - 10.5.5.1. Medical Treatment
    - 10.5.5.2. Interventional Treatment
- 10.6. Endocrine Diseases Affecting the Heart (I)
  - 10.6.1. Hyperthyroidism
  - 10.6.2. Hypothyroidism
  - 10.6.3. Hyperadrenocorticism
  - 10.6.4. Hypoadrenocorticism
- 10.7. Endocrine Diseases Affecting the Heart (II)
  - 10.7.1. Diabetes
  - 10.7.2. Acromegaly
  - 10.7.3. Hyperaldosteronism
  - 10.7.4. Hyperparathyroidism
- 10.8. Other Systemic Alterations Affecting the Cardiovascular System (I)
  - 10.8.1. Pheochromocytoma
  - 10.8.2. Anaemia
  - 10.8.3. Uremia
  - 10.8.4. Toxics and Chemotherapeutics
  - 10.8.5. Shock
- 10.9. Other Systemic Alterations Affecting the Cardiovascular System (II)
  - 10.9.1. Gastric Dilatation/Torsion
  - 10.9.2. Splenic Splenitis/Neoplasia
  - 10.9.3. Hypercoagulable State and Thrombosis
  - 10.9.4. Conditions Causing Hypo- or Hypercalcemia
  - 10.9.5. Conditions Causing Hypo- or Hyperkalemia
  - 10.9.6. Conditions Causing Hypo- or Hypermagnesemia
- 10.10. Anesthesia in Cardiac Patients
  - 10.10.1. Pre-Surgery Evaluation
  - 10.10.2. Hemodynamic and Surgical Factors Involved in the Choice of Hypnotics
  - 10.10.3. Anesthetic Monitoring

07

# Clinical Internship

After passing the online teaching period, the program includes an internship period in a reference veterinary clinic. The students will have at their disposal the support of a tutor who will accompany them throughout the process, both in the preparation and in the development of the clinical practices.





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*Take advantage of the opportunity that TECH gives you to do an internship with expert cardiologists in a veterinary center with state-of-the-art equipment"*

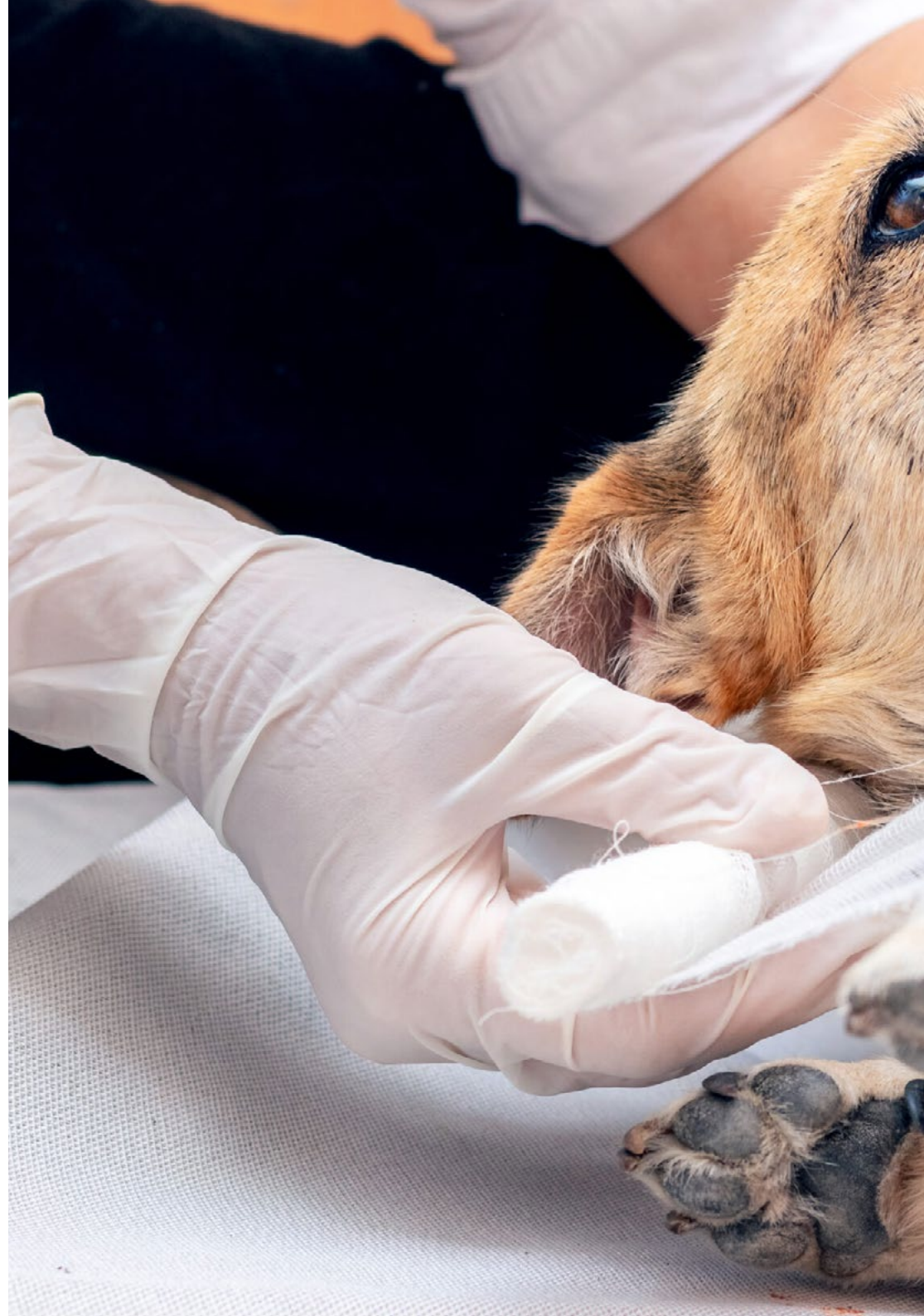


The Internship Program in Veterinary Cardiology in Small Animals consists of a practical stay in a reference veterinary center, lasting 3 weeks, from Monday to Friday with 8 consecutive hours of practical training with an assistant specialist. This stay will allow you to see real cases alongside a professional team of reference in the veterinary area of surgery, applying the most innovative procedures of last generation.

In this training proposal, completely practical in nature, the activities are aimed at developing and perfecting the skills necessary for the provision of veterinary care in areas and conditions that require a high level of qualification, and are oriented to the specific training for the exercise of the activity, in an environment of safety and high professional performance.

In this way, TECH offers professionals an excellent opportunity to update their knowledge, working in a 100% practical scenario and with patients who require the latest advances in cardiology treatments. A unique and effective experience that turns a veterinary clinic into the ideal scenario for professionals to expand and improve their skills.

The practical part will be carried out with the active participation of the student performing the activities and procedures of each area of competence (learning to learn and learning to do), with the accompaniment and guidance of teachers and other fellow trainees that facilitate teamwork and multidisciplinary integration as transversal competencies for veterinary practice (learning to be and learning to relate).







The procedures described below will form the basis of the practical part of the training, and their implementation is subject to both the suitability of the patients and the availability of the center and its workload, with the proposed activities being as follows:

Module	Practical Activity
<b>Cardiac Pharmacology</b>	Perform congestive heart failure testing in small animals
	Perform angiotensin-converting enzyme inhibitor (ACE) testing
	Assist in the evaluation of diuretics
	Apply, if necessary, antihypertensive drugs: venous, arterial, mixed and pulmonary
<b>Anamnesis and Cardiovascular Examination</b>	Perform cardiovascular and respiratory examination in small animals
	Performing auscultation in patients with cardiovascular problems
	Support in the performance of laboratory tests in cardiac diseases in small animals
	Evaluate blood pressure and central venous pressure in small animals
<b>Complementary Tests</b>	Contribute to the evaluation of thoracic radiography in small animals
	Provide support in the performance of pulmonary ultrasound and bubble study
	Evaluate supraventricular arrhythmias using electrocardiograms
	Use spectral doppler and M-Mode for hemodynamic assessment of the patient
<b>Care for the patient with chronic mitral and tricuspid valve disease, endocarditis, pericardial abnormalities or cardiac masses</b>	Collaborate in the evaluation of infective endocarditis
	Analyze pericardial alterations
	Contribute in the diagnosis of chronic degenerative valve disease: arrhythmias, pulmonary hypertension, systemic arterial hypertension, renal failure and atrial rupture
	Perform cardiac masses examination



## Civil Liability Insurance

This institution's main concern is to guarantee the safety of the trainees and other collaborating agents involved in the internship process at the company. Among the measures dedicated to achieve this is the response to any incident that may occur during the entire teaching-learning process.

To this end, this educational entity undertakes to take out civil liability insurance to cover any eventuality that may arise during the internship during the stay at the internship center.

This liability policy for interns will have broad coverage and will be taken out prior to the start of the practical training period. That way professionals will not have to worry in case of having to face an unexpected situation and will be covered until the end of the internship program at the center.





## General Conditions for Practical Training

The general terms and conditions of the internship agreement for the program are as follows:

**1. TUTOR:** During the Hybrid Professional Master's Degree, students will be assigned with two tutors who will accompany them throughout the process, answering any doubts and questions that may arise. On the one hand, there will be a professional tutor belonging to the internship center who will have the purpose of guiding and supporting the student at all times. On the other hand, they will also be assigned with an academic tutor whose mission will be to coordinate and help the students during the whole process, solving doubts and facilitating everything they may need. In this way, the student will be accompanied and will be able to discuss any doubts that may arise, both clinical and academic.

**2. DURATION:** The internship program will have a duration of three continuous weeks, in 8-hour days, 5 days a week. The days of attendance and the schedule will be the responsibility of the center and the professional will be informed well in advance so that they can make the appropriate arrangements.

**3. ABSENCE:** If the students does not show up on the start date of the Hybrid Professional Master's Degree, they will lose the right to it, without the possibility of reimbursement or change of dates. Absence for more than two days from the internship, without justification or a medical reason, will result in the professional's withdrawal from the internship, therefore, automatic termination of the internship. Any problems that may arise during the course of the internship must be urgently reported to the academic tutor.

**4. CERTIFICATION:** Professionals who pass the Hybrid Professional Master's Degree will receive a certificate accrediting their stay at the center.

**5. EMPLOYMENT RELATIONSHIP:** the Hybrid Professional Master's Degree shall not constitute an employment relationship of any kind.

**6. PRIOR EDUCATION:** Some centers may require a certificate of prior education for the Hybrid Professional Master's Degree. In these cases, it will be necessary to submit it to the TECH internship department so that the assignment of the chosen center can be confirmed.

**7. DOES NOT INCLUDE:** The Hybrid Professional Master's Degree will not include any element not described in the present conditions. Therefore, it does not include accommodation, transportation to the city where the internship takes place, visas or any other items not listed.

However, students may consult with their academic tutor for any questions or recommendations in this regard. The academic tutor will provide the student with all the necessary information to facilitate the procedures in any case.

08

# Where Can I Do the Clinical Internship?

In its maxim of offering quality education within your reach, TECH offers you the opportunity to boost your academic career in a prestigious veterinary center, to choose from a variety of clinics to choose the one that best suits your needs. TECH's commitment is that you can opt for a practical training throughout the Spanish geography so that you can live a unique training experience according to your professional expectations. This is an opportunity that allows the professional to specialize alongside the best veterinary cardiologists of today.



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*Carry out your practical training in  
Veterinary Cardiology with the best  
professionals in the sector at a  
national level”*



The student will be able to do this program at the following centers:



Veterinary-medicine

### Centro Veterinario San Antón

Country	City
Spain	Madrid

Address: Avenida de la Libertad,  
93. Local 14-16, 28770 Colmenar Viejo

Veterinary Center offering personalized attention to different animal species.

**Related internship programs:**

- Veterinary Anesthesiology
- Veterinary Cardiology in Small Animals



Veterinary-medicine

### Madrid Este Hospital Veterinario

Country	City
Spain	Madrid

Address: Paseo de la Democracia, 10

Veterinary center offering 24-hour care with surgery, ICU, hospitalization and diagnostic imaging services.

**Related internship programs:**

- Veterinary Anesthesiology
- Veterinary Surgery in Small Animals







Veterinary-medicine

### Centro Veterinario Puebla

Country City  
Mexico Puebla

Address: Calzada zavaleta 115 Local 1  
Santa Cruz Buenavista C.P 72154

General veterinary center  
with 24-hour emergency care

**Related internship programs:**

- Veterinary Anesthesiology
- Veterinary Cardiology in Small Animals



Veterinary-medicine

### Meds for pets

Country City  
Mexico Nuevo León

Address: Av. Venustiano Carranza 429  
Centro C.P 64000

Veterinary Hospital for advanced and  
comprehensive care

**Related internship programs:**

- Veterinary Cardiology in Small Animals
- Small Animal Ultrasound



Veterinary-medicine

### Aztekan Hospital Veterinario - Roma

Country City  
Mexico City Mexico City

Address: San Luis 152 Col Roma C.P CDMX

24 hours Veterinary Hospital

**Related internship programs:**

- Veterinary Emergencies in Small Animals
- Veterinary Cardiology in Small Animals

09

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.







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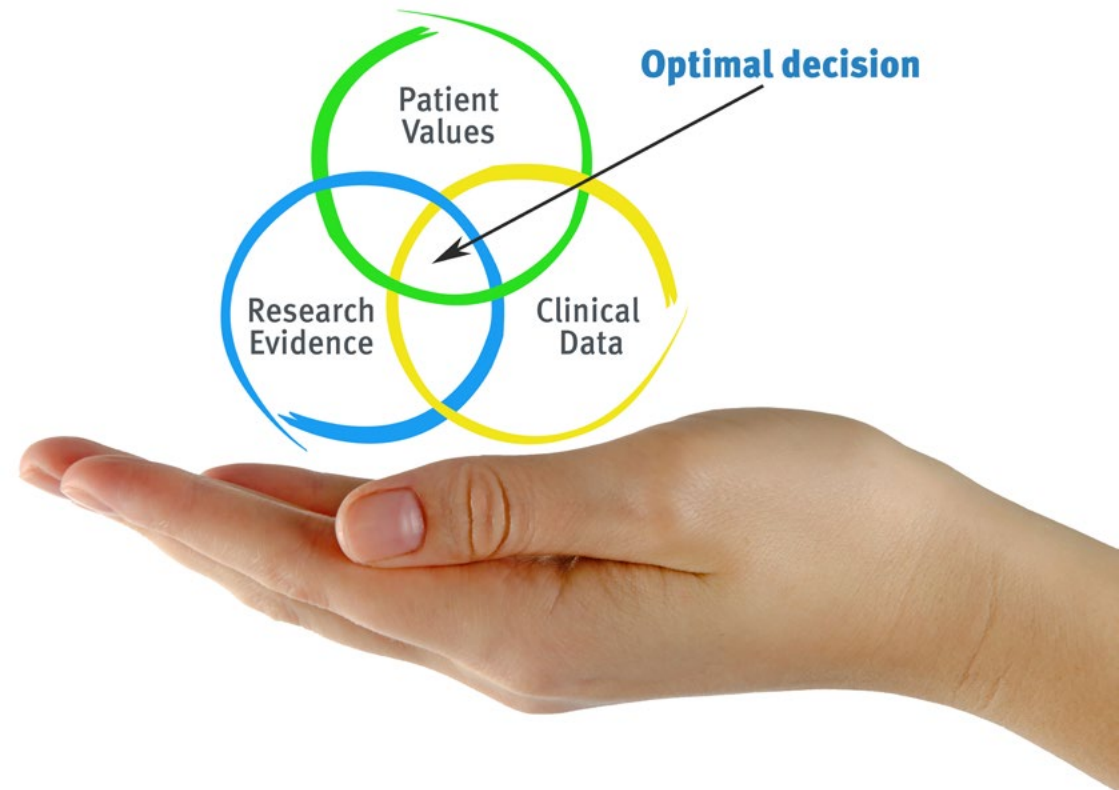
*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*



### At TECH we use the Case Method

What should a professional do in a given situation? Throughout the program you will be presented with multiple simulated clinical cases based on real patients, where you will have to investigate, establish hypotheses and, finally, resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

*With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.*



According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, in an attempt to recreate the actual conditions in a veterinarian's professional practice.

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*Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method”*

The effectiveness of the method is justified by four fundamental achievements:

1. Veterinarians who follow this method not only manage to assimilate concepts, but also develop their mental capacity through exercises to evaluate real situations and knowledge application
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. The feeling that the effort invested is effective becomes a very important motivation for veterinarians, which translates into a greater interest in learning and an increase in the time dedicated to working on the course.



### Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.



*Veterinarians will learn through real cases and by resolving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.*



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology more than 65,000 veterinarians have been trained with unprecedented success in all clinical specialties, regardless of the surgical load. Our teaching method is developed in a highly demanding environment, where the students have a high socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.



This program offers the best educational material, prepared with professionals in mind:



### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



### Latest Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current and procedures of veterinary techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.



### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





#### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



#### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



#### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.





# 10 Certificate

The Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals guarantees, in addition to the most rigorous and updated training, access to a Hybrid Professional Master's Degree issued by TECH Technological University.



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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This **Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals** contains the most complete and up-to-date program on the professional and educational field.

After the student has passed the assessments, they will receive their corresponding Hybrid Professional Master's Degree diploma issued by TECH Technological University via tracked delivery\*.

In addition to the certificate, students will be able to obtain an academic transcript, as well as a certificate outlining the contents of the program. In order to do so, students should contact their academic advisor, who will provide them with all the necessary information.

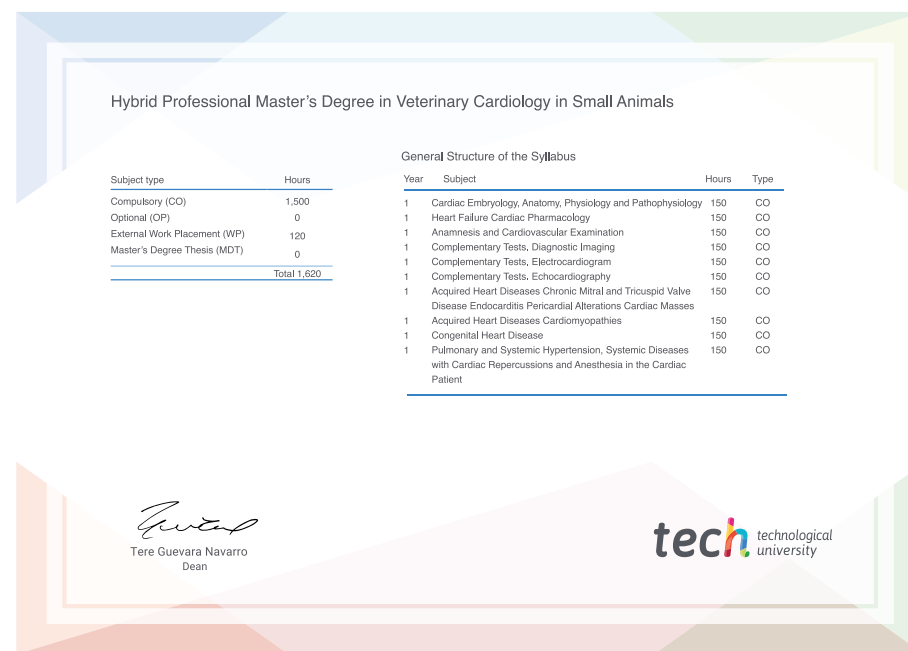
Title: **Hybrid Professional Master's Degree in Veterinary Cardiology in Small Animals**

Course Modality: **Hybrid (Online + Clinical Internship)**

Duration: **12 months**

Certificate: **TECH Technological University**

Teaching Hours: **1,620 h.**



\*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.





## Hybrid Professional Master's Degree

### Veterinary Cardiology in Small Animals

Course Modality: Hybrid (Online + Clinical Internship)

Duration: 12 months

Certificate: TECH Technological University

Teaching Hours: 1,620 h.

# Hybrid Professional Master's Degree Veterinary Cardiology in Small Animals

