

# Postgraduate Certificate

Update on Veterinary  
Pharmacokinetics and  
Pharmacodynamics





## Postgraduate Certificate

### Update on Veterinary Pharmacokinetics and Pharmacodynamics

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/veterinary-medicine/postgraduate-certificate/update-veterinary-pharmacokinetics-pharmacodynamics](http://www.techtute.com/us/veterinary-medicine/postgraduate-certificate/update-veterinary-pharmacokinetics-pharmacodynamics)

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# 01

# Introduction

This program addresses the concept and evolution of pharmacology and the objectives of Veterinary Pharmacology, to give way to the concepts of Pharmacokinetics and Pharmacodynamics. A high-quality program that offers the most advanced resources in online education, to guarantee the student an effective, real and practical learning that boosts their competencies to the highest level in this area of work.







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*Specialize in Veterinary Pharmacokinetics and Pharmacodynamics with the advantages of a revolutionary syllabus for its teaching and content quality”*

The program offers specialized knowledge on Veterinary Pharmacology of each animal species system how drugs act in different animal species covering Pharmacokinetics, Pharmacodynamics, adverse reactions and interactions.

Pharmacokinetics will cover topics of drug transport across membranes, as well as the concepts of drug release, absorption, distribution, metabolism and excretion, addressing the variability of response in different species.

Develops Applied Pharmacokinetics pharmacokinetic models, obtaining and assessing pharmacokinetic parameters through applied problem practice and dosing to determine the calculation of prescribed dosing guidelines for each animal patient.

In Pharmacodynamics the students will become familiar with the mechanisms of action and the molecular aspects of the different pathways, as well as with the quantitative aspects in terms of Dose-Response curves, which will allow them to calculate the therapeutic index and the toxic index of the drugs.

This **Postgraduate Certificate in Update on Veterinary Pharmacokinetics and Pharmacodynamics** contains the most complete and up-to-date scientific program on the market. The most important features include:

- » Innovative and up-to-date diagnostic techniques in infectious diseases and their application in daily clinical practice, including the use of cytology as a diagnostic tool in these diseases
- » The most frequent and not so frequent pathologies of infectious origin in dogs from a practical and completely up-to-date point of view
- » Infectious Pathologies oriented to the Feline Species, dealing extensively with all those of this species
- » "One Health" vision, in which Zoonoses and their implications for public health will be reviewed
- » At present, there are no more exotic diseases, and they should be included by the clinician in the differential diagnosis when the epidemiology allows to suspect them
- » Prevention and management of all infectious diseases, including clinical, home and community settings



*A complete learning on the new developments in Pharmacokinetics and Pharmacodynamics, of enormous importance for the prevention and treatment of diseases affecting animal health"*

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*A revolutionary program for its ability to reconcile the highest quality of learning with the most comprehensive online education"*

Its teaching staff includes professionals belonging to the field of Veterinary Medicine, who bring to this program the experience of their work, as well as renowned specialists from reference societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e. a simulated environment that will provide an immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the specialist must try to solve the different professional practice situations that arise throughout the program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced psychology experts.

*A great opportunity for the veterinary medicine professionals to expand their competencies and catch up on all the latest developments in pharmacological approaches.*

*Learn in an efficient way, with a real qualification objective with this unique Postgraduate Certificate for its quality and price, in the online teaching market.*

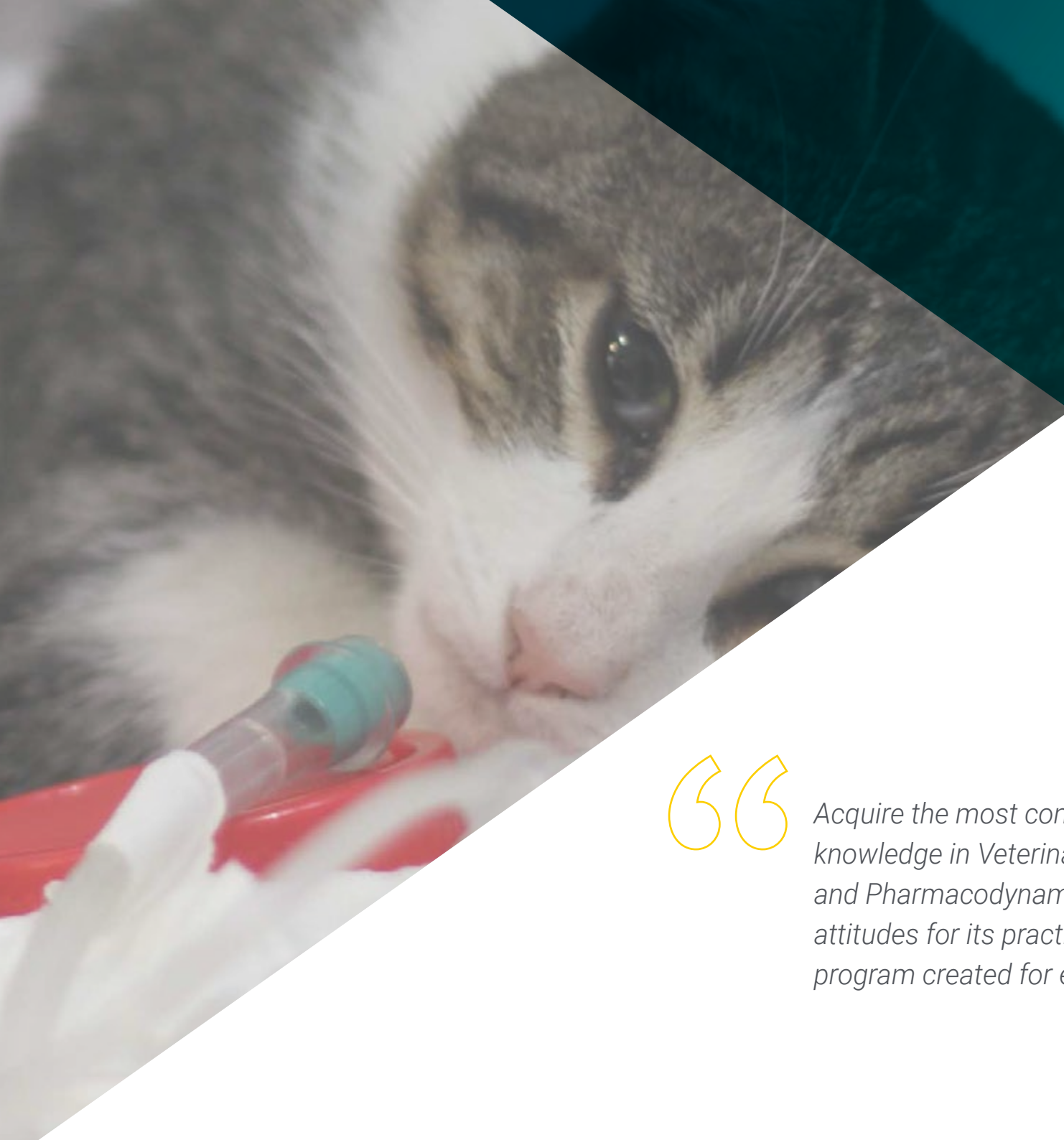


# 02 Objectives

The objective of the Postgraduate Certificate is to provide the students with the required competencies in relation to preclinical or clinical research of drugs used in veterinary medicine, and their application in the therapeutic use of drugs so that they can be integrated into the professional field.







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*Acquire the most comprehensive knowledge in Veterinary Pharmacokinetics and Pharmacodynamics and the skills and attitudes for its practical application in a program created for excellence"*



## General Objectives

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- » Examine the general concepts of pharmacology at the veterinary level
- » Determine the mechanisms of action of drugs
- » Analyze Pharmacokinetics and Pharmacodynamics

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*A path to achieve training and professional growth that will propel you towards a greater level of competitiveness in the labor market”*







## Specific Objectives

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- » Develop all those processes that affect a drug molecule when administered to an animal species
- » Establish the different biological barriers and their significance in therapeutic effectiveness
- » Examine the factors that will influence drug absorption, distribution and elimination processes
- » Analyze how to manipulate the renal excretion process and its importance in the treatment of intoxications
- » Establish based on the pharmacodynamics and pharmacokinetics of a drug, its possible pharmacological interactions
- » Identify and characterize at the molecular level the different types of pharmacological receptors
- » Determine which second messengers and biochemical pathways are coupled to each of the pharmacological receptor types
- » Present the relationship between the molecular phenomenon and the pharmacological effect
- » Analyze all the phenomena involved in drug-receptor interaction
- » Examine the different types of pharmacological agonism and antagonism
- » Correctly establish the differences between the different species that are important for the administration of drugs or their therapeutic efficacy
- » Develop the concepts of side, adverse and toxic effects



03

# Course Management

The teaching team of this Postgraduate Certificate is made up of professionals specialized in the study of Pharmacology, both human and veterinary, with clinical experience in small and large animals. They have extensive and recognized teaching and research experience, with officially recognized six-year research periods, participation in numerous research projects and dissemination of their research both nationally and internationally in high impact journals, books and conferences.







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*A unique opportunity to learn from internationally renowned professors, with teaching, clinical and research experience"*

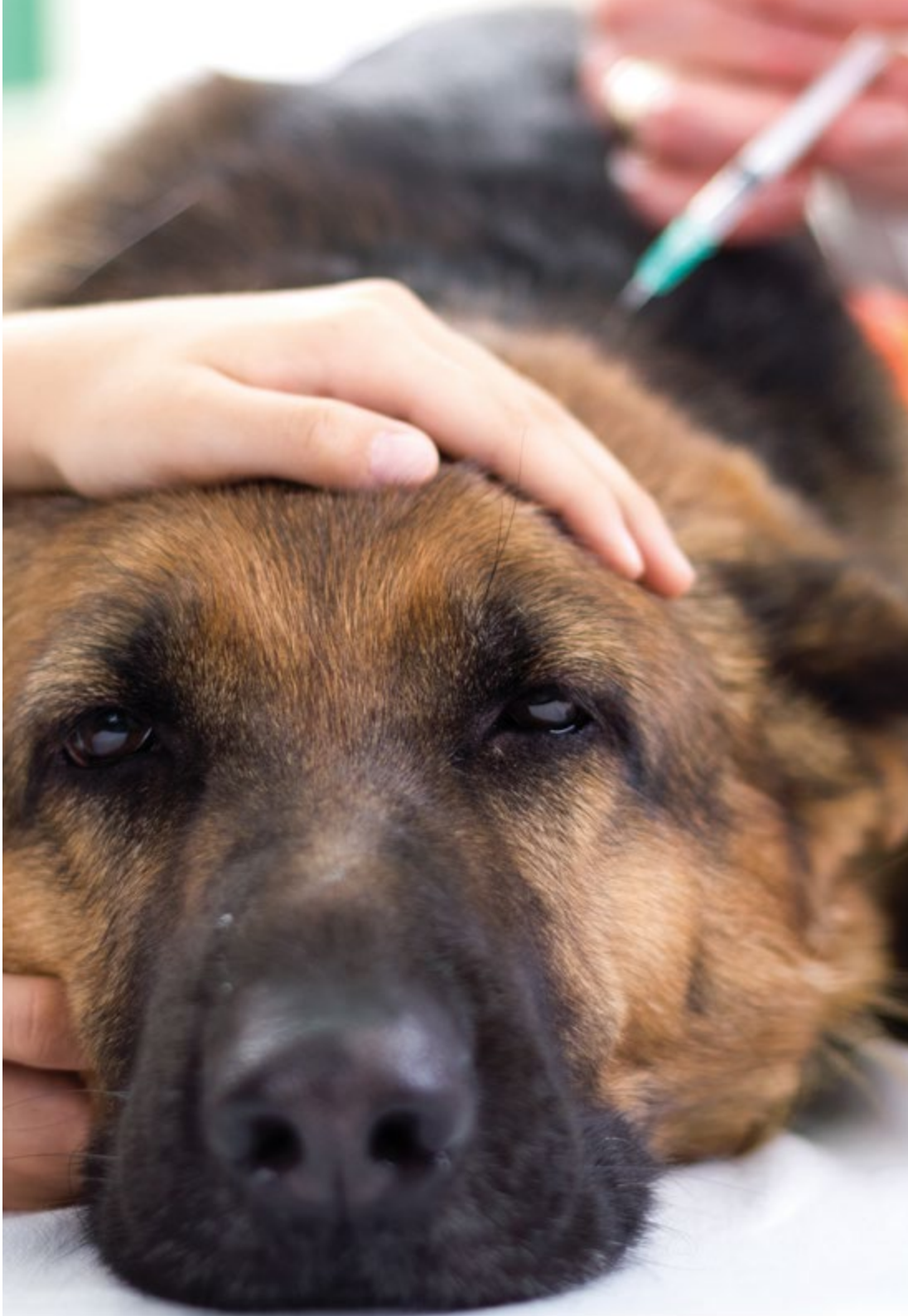


## Management



### **Dr. Santander Ballestín, Sonia**

- ♦ Teaching Coordinator, Department of Pharmacology, University of Zaragoza, Spain
- ♦ Lecturer in the university course: "Introduction to Pharmacology: Principles for the Rational Use of Drugs" Basic Program of the University of Zaragoza
- ♦ Evaluation professor in: objective-structured clinical evaluation of the Degree in Medicine
- ♦ Degree in Biology and Biochemistry, specializing in the area of Pharmacology
- ♦ PhD with the European Degree from the University of Zaragoza
- ♦ Master's Degree in Environment and Water Management. Andalusia Business School
- ♦ Title of the doctoral program: Biochemistry and Molecular and Cellular Biology



## Professors

### **Ms. Luesma Bartolomé, María José**

- » Veterinarian. Study Group on Prion Diseases, Vectorial Diseases and Emerging Zoonoses at the University of Zaragoza.
- » Study group of the University Research Institute
- » Professor of Film and Anatomy. University Degree: Complementary Academic Activities
- » Professor of Anatomy and Histology University degree: Graduate in Optics and Optometry. University of Zaragoza
- » Professor of Final Degree Project University Degree, Bachelor's Degree in Medicine
- » Professor of Morphology. Development Biology University Degree: Professional Master's Degree in Initiation to Research in Medicine. University of Zaragoza
- » Doctor of Veterinary Medicine. Official Doctorate Program in Veterinary Sciences. University of Zaragoza
- » Degree in Veterinary Medicine. University of Zaragoza

# 04

## Structure and Content

This Postgraduate Certificate provides all the necessary knowledge to be able to perform Pharmacology in Veterinary Medicine in the best possible way. It is important to take into account that the contents allow the student to obtain specialized knowledge of pharmacology, as well as the ability to deal with different solutions for veterinary pathologies. A complete and accessible journey that will make a difference in your career progression.







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*A complete educational program that will lead you to the exhaustive training necessary to intervene as a specialist in the theoretical and practical aspects of Veterinary Pharmacokinetics and Pharmacodynamics”*

## Module 1. General Pharmacology

- 1.1. Concept and Evolution of Pharmacology. Objectives of Veterinary Pharmacology
  - 1.1.1. Origin
  - 1.1.2. Evolution of Pharmacology as a Science
  - 1.1.3. Veterinary Pharmacology: Objectives
  - 1.1.4. General Concepts
    - 1.1.4.1. Pharmaceuticals
    - 1.1.4.2. Medication
    - 1.1.4.3. Pharmaceutical Forms
    - 1.1.4.4. Others
- 1.2. Pharmacokinetics I: Drug Transport Systems across Biological Membranes.
  - 1.2.1. General Principles
  - 1.2.2. General Transportation Mechanisms
    - 1.2.2.1. Transport Across Cell Membranes
    - 1.2.2.2. Transport Through Intercellular Clefts
- 1.3. Pharmacokinetics II: Routes of Drug Administration. Concept of Absorption
  - 1.3.1. General Principles
  - 1.3.2. Routes of Adminstrating Medication
    - 1.3.2.1. Enteral Routes
      - 1.3.2.1.1. Oral
      - 1.3.2.1.2. Rectal
      - 1.3.2.1.3. Sublingual
      - 1.3.2.1.4. Others: Inhalation, Otic, Conjunctival, Dermal or Topical
    - 1.3.2.2. Parenteral Routes
      - 1.3.2.2.1. Intravenous
      - 1.3.2.2.2. Intramuscular
      - 1.3.2.2.3. Subcutaneous
      - 1.3.2.2.4. Intrathecal
      - 1.3.2.2.5. Epidural
  - 1.3.3. Absorption Mechanisms
  - 1.3.4. Concept of Bioavailability
  - 1.3.5. Factors that Modify Absorption





- 1.4. Pharmacokinetics III: Drug Distribution I
  - 1.4.1. Distribution Mechanisms
    - 1.4.1.1. Binding to Plasma Proteins
    - 1.4.1.2. Blood-Brain Barrier
    - 1.4.1.3. Placental Barrier
  - 1.4.2. Factors that Modify the Distribution
  - 1.4.3. Distribution Volume
- 1.5. Pharmacokinetics IV: Drug Distribution II. Pharmacokinetic Compartments
  - 1.5.1. Pharmacokinetic Models
  - 1.5.2. Concepts of the Most Characteristic Parameters
    - 1.5.2.1. Apparent Volume of Distribution
    - 1.5.2.2. Aqueous Compartments
  - 1.5.3. Variability of the Response
- 1.6. Pharmacokinetics V: Drug Elimination: Metabolism
  - 1.6.1. Concept of Metabolism
  - 1.6.2. Phase I and II Metabolic Reactions
  - 1.6.3. Hepatic Microsomal System: Cytochromes. Polymorphisms
  - 1.6.4. Factors Influencing Biotransformation Processes
    - 1.6.4.1. Physiological Factors
    - 1.6.4.2. Pathological Factors
    - 1.6.4.3. Pharmacological Factors (Induction/Inhibition)
- 1.7. Pharmacokinetics VI: Drug Elimination: Excretion
  - 1.7.1. General Mechanisms
  - 1.7.2. Renal Excretion
  - 1.7.3. Biliary Excretion
  - 1.7.4. Other Excretion Routes
    - 1.7.4.1. Saliva
    - 1.7.4.2. Milk
    - 1.7.4.3. Sweat
  - 1.7.5. Elimination Kinetics
    - 1.7.5.1. Elimination Constant and Half-Life
    - 1.7.5.2. Metabolic and Excretion Clearance
  - 1.7.6. Factors that Modify Excretion
- 1.8. Pharmacodynamics: Drug Action Mechanisms Molecular Aspects
  - 1.8.1. General Concepts Receptor
  - 1.8.2. Types of Receptors
    - 1.8.2.1. Ion Channel Associated Receptors
    - 1.8.2.2. Enzyme Receptors
    - 1.8.2.3. Receptors Associated with Proteins
    - 1.8.2.4. Intracellular Receptors
  - 1.8.3. Drug- Receptor Interactions
- 1.9. Adverse Reactions to Medications. Toxicity
  - 1.9.1. Classification of Adverse Reactions According to their Origin
  - 1.9.2. Mechanisms of Production of Adverse Reactions
  - 1.9.3. General Aspects of Drug Toxicity
- 1.10. Pharmacological Interactions
  - 1.10.1. Concept of Pharmacological Interaction
  - 1.10.2. Modifications Induced by Pharmacological Interactions
    - 1.10.2.1. Synergy
    - 1.10.2.2. Agony
    - 1.10.2.3. Antagonism
  - 1.10.3. Pharmacokinetic and Pharmacodynamic Interactions
    - 1.10.3.1. Variability in Response Due to Pharmacokinetic Causes
    - 1.10.3.2. Variability in Response due to Pharmacodynamic Causes



*It advances towards excellence with the help of the best professionals and teaching resources of the moment"*

# 05 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.

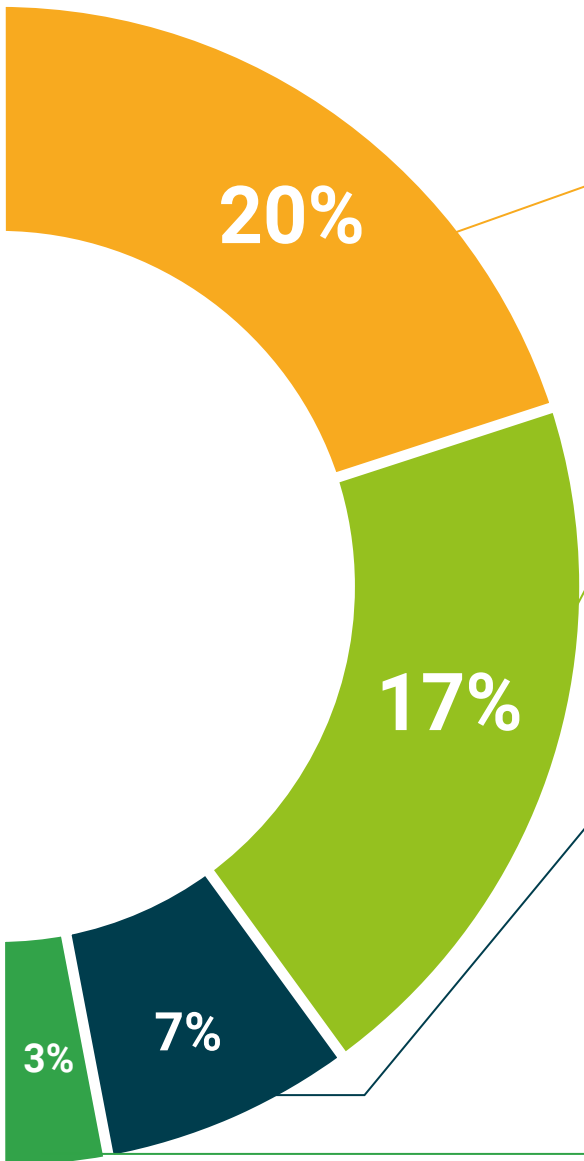
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



#### 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.





# 06 Certificate

The Postgraduate Certificate in Update on Veterinary Pharmacokinetics and Pharmacodynamics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate 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 **Postgraduate Certificate in Update on Veterinary Pharmacokinetics and Pharmacodynamics** contains the most complete and up-to-date scientific program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery\*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained through the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations and professional career evaluation committees.

Title: **Postgraduate Certificate in Update on Veterinary Pharmacokinetics and Pharmacodynamics**

Official N° of Hours: **150 h.**



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



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