Postgraduate Diploma

Bioinformatics Applied to Venous Thromboembolism

tech technological university

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Postgraduate Diploma

Bioinformatics Applied to Venous Thromboembolism

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

Website: www.techtitute.com/pk/medicine/postgraduate-diploma/postgraduate-diploma-bioinformatics-applied-venous-thromboembolism

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01

Introduction

Venous thrombosis, produced by blood clots in the veins, can result in pulmonary embolisms when one of the clots travels to the lungs, causing venous thromboembolism. This pathology can become very serious for people's health if they do not receive proper treatment. Currently, bioinformatics has made great strides to achieve better results in the field.

This program is the best option you can find to specialize in Bioinformatics Applied to Venous Thromboembolism and to establish more accurate diagnoses"

Thrombosis is an often undiagnosed pathology that can affect anyone, regardless of age, and that can become a serious disease. Early detection of venous thrombosis is essential to treat the disease and reduce sequelae in patients. There are also preventive measures, such as physical or pharmacological ones.

Throughout this Postgraduate Diploma, students will focus on Bioinformatics applied to Venous Thromboembolism, with a program designed by specialists in the field, so students will receive a complete and specific training from area experts.

The training program aims to establish the basis of knowledge in the field, starting with studies of the pathophysiology and epidemiology of venous thromboembolic disease. Omics data will also be studied, which will enable specialists to learn the programming language R and predictive models.

Therefore, after completing and passing the Postgraduate Diploma, students will have acquired the theoretical knowledge necessary to carry out effective treatment of venous thrombosis in the main areas of professional practice.

This **Postgraduate Diploma in Bioinformatics Applied to Venous Thromboembolism** contains the most complete and up-to-date scientific program on the market. Its most notable features are:

- Case studies presented by experts in Bioinformatics Applied to Venous Thromboembolism
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional development
- The latest developments in Bioinformatics Applied to Venous Thromboembolism
- Practical exercises where self-assessment can be used to improve learning
- Special emphasis is placed on innovative methodologies in Bioinformatics Applied to Venous Thromboembolism
- 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

Don't miss the opportunity to study this Postgraduate Diploma in Bioinformatics Applied to Venous Thromboembolism with us. It's the perfect opportunity to advance your career"

This Postgraduate Diploma is the best investment you can make when selecting a refresher program, for two reasons: in addition to updating your knowledge of Bioinformatics Applied to Venous Thromboembolism, you will obtain a qualification endorsed by TECH Technological University"

This training program comes with the best didactic material, providing you with a contextual approach that will facilitate your learning.

This 100% online Postgraduate Diploma will allow you to combine your studies with your professional work while expanding your knowledge in this field.

The teaching staff includes professionals in the field of Bioinformatics Applied to Venous Thromboembolism, who bring their experience to this specialization program, as well as renowned specialists from leading societies and prestigious universities.

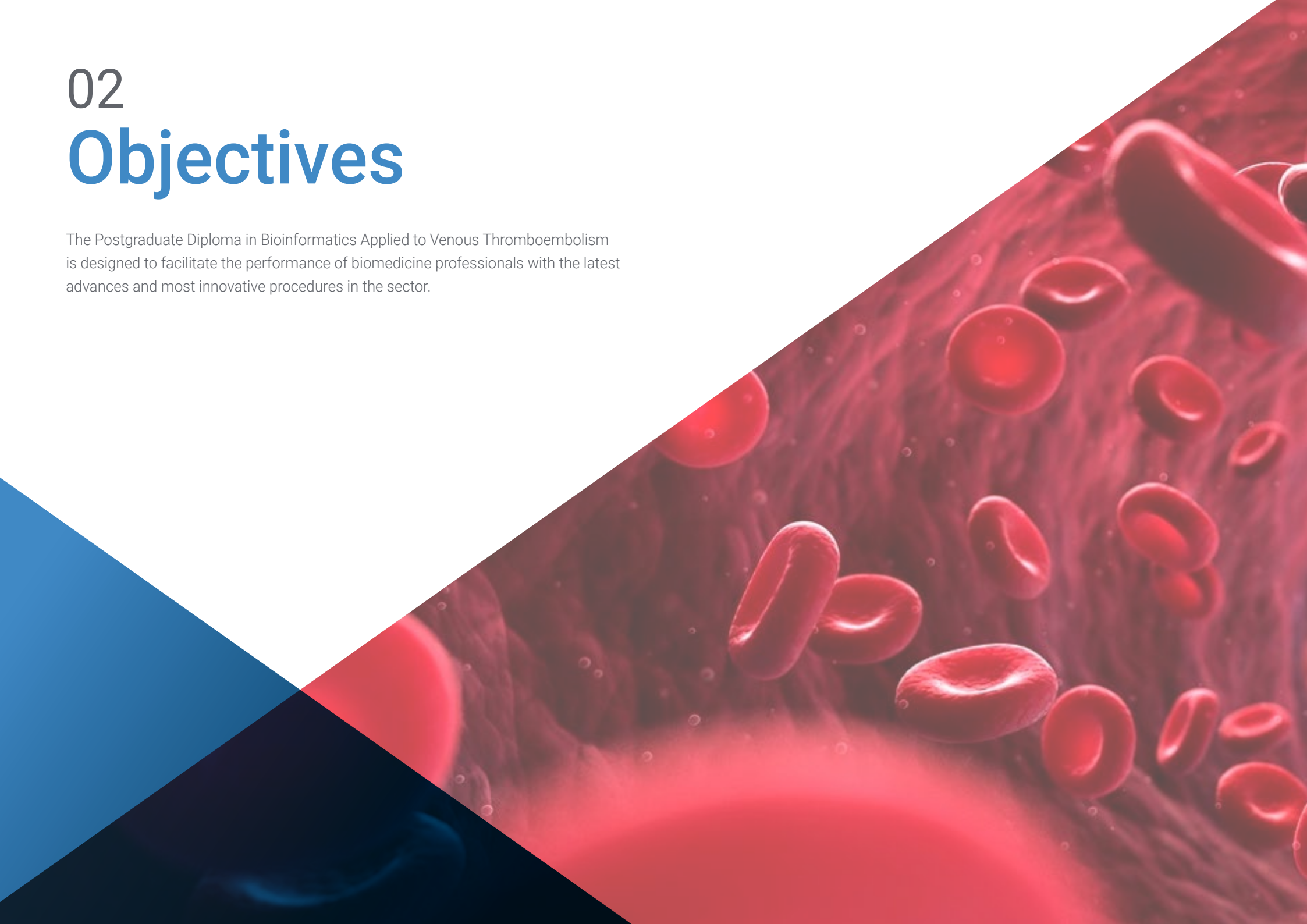
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive specialization programmed to learn in real situations.

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. To that end, the professional will have the help of an innovative, interactive video system made by recognized and extensively experienced experts in Bioinformatics Applied to Venous Thromboembolism.

02

Objectives

The Postgraduate Diploma in Bioinformatics Applied to Venous Thromboembolism is designed to facilitate the performance of biomedicine professionals with the latest advances and most innovative procedures in the sector.



This is the best option to learn about the latest advances in Bioinformatics Applied to Venous Thromboembolism"

General Objectives

- Delve into the knowledge of venous thromboembolism as a complex disease
- Train in the field of omics data and bioinformatic methods applied to precision medicine
- Keep up with the latest updates on the disease

Take advantage of the opportunity and take the step to get up to date on the latest developments in Diabetes”

Specific Objectives

Module 1. Pathophysiology and Epidemiology in Venous Thromboembolism

- Demonstrate the enormous biological and clinical complexity underlying venous thromboembolism
- Explain the pathological mechanisms by which a thrombus develops in the veins and the short- and long-term consequences it may have
- Analyze the relations of thrombus and recurrence with determinant variables such as age, sex or race
- Highlight the importance of the circumstances associated with thromboembolic events and how these circumstances largely determine the risk of recurrence
- Describe the environmental risk factors that are associated with the disease and the genetic basis known today
- Review the global impact on the worldwide burden of disease and the economic impact of thrombosis, its sequelae and the complications in treatment
- Delve into the concept of biomarkers or intermediate phenotypes with the risk of the disease, which can be studied in diagnosing the cause and estimating risk of recurrence, and that can be used as a starting point to discover the genes involved in phenotype variability and, therefore, in venous thromboembolisms
- Understand the concept of individual risk profile

Module 2. Omic Data: Introduction to the Programming Language R

- Learn about the Unix/Linux operating system and its importance
- Obtain notions of basic Unix/Linux administration
- Learn how to manage files and directories using the Unix/Linux command interpreter
- Learn the programming language R and how to manage its packages
- Recognize the different types of data in R and know which to use in each context
- Learn how to correctly manipulate each data type in R
- Know what control functions and loops are and how they are implemented in R
- Perform graphical representations of data and results in R
- Apply basic statistics in R depending on the characteristics of the data
- Learn how to implement proprietary functions in R to perform specific tasks

Module 3. Predictive Models

- Identify the different types of statistical learning problems
- Understand and implement the steps involved in preprocessing a new dataset
- Understand the fundamentals of linear regression models and their scope of application
- Optimize linear regression models with the lowest possible number of variables
- List the different types of classification models and know when to use each of them
- Learn different ways to validate the performance of a predictive model
- Become familiar with decision trees and their extensions
- Adjust support vector machines to clinical data and assess their performance
- Learn different unsupervised learning methods for exploratory data analysis

03

Course Management

The program includes in its teaching staff experts in Bioinformatics Applied to Venus Thromboembolism, who have contributed their years of work experience to this training program. Additionally, other recognized experts participate in its design and preparation, completing the program in an interdisciplinary manner.

Leading professionals in the field have come together to teach you the latest advances in Bioinformatics Applied to Venus Thromboembolism"

Management

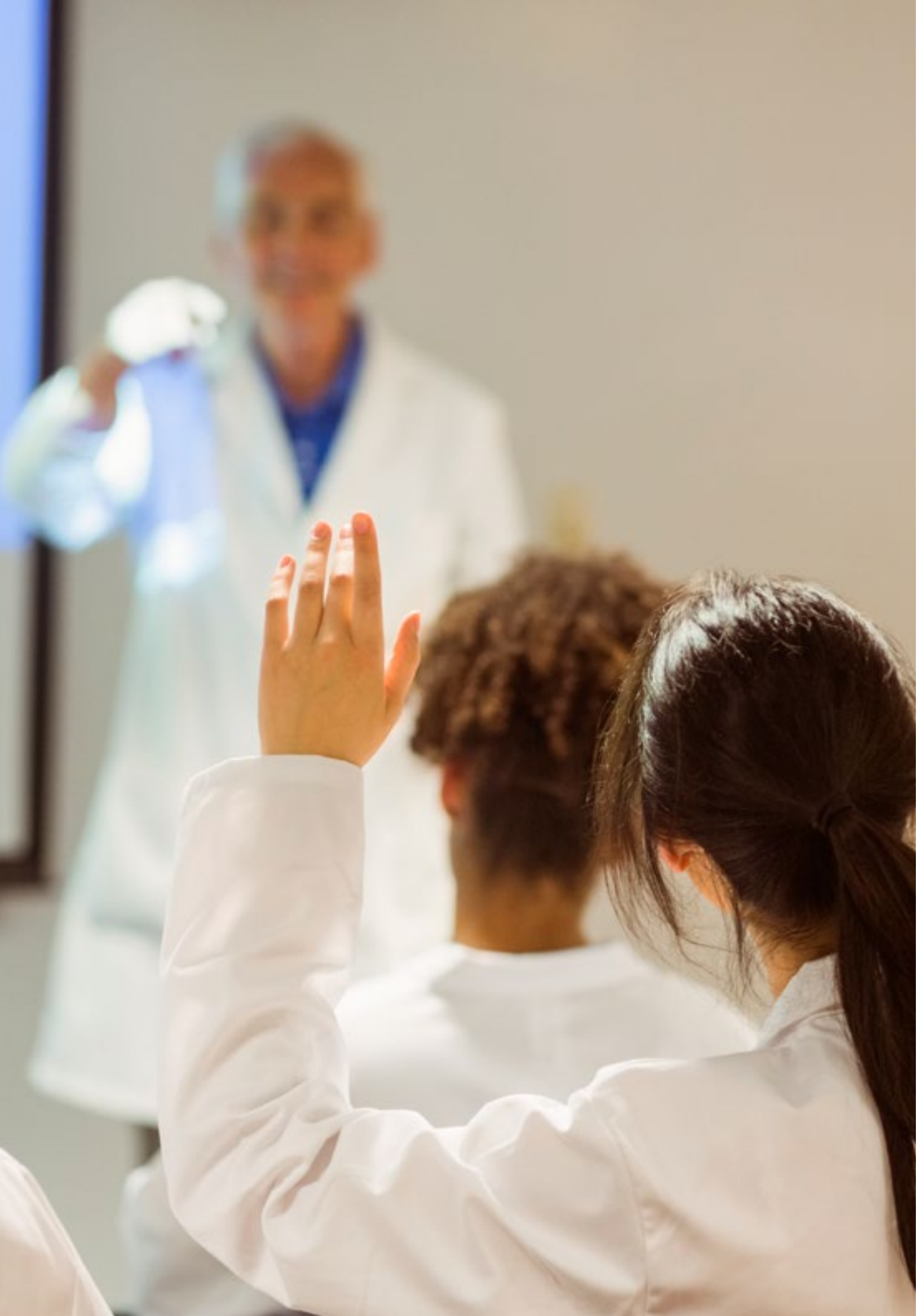
Dr. Soria, José Manuel

- Genomics Group of Complex Diseases
- Sant Pau Hospital Research Institute (IIB Sant Pau)
- Santa Creu i Sant Pau Hospital Barcelona

Professors

Dr. López del Río, Ángela

- Bioinformatics and Biomedical Signals Laboratory (B2SLab) Polytechnic University of Catalonia Barcelona
- Biomedical Engineer, Polytechnical University of Madrid
- Master's Degree, Barcelona University and Polytechnic University of Catalonia
- Training at the European Bioinformatics Institute (EBI-EMBL), Cambridge, United Kingdom
- Center for Biomedical Research, Polytechnic University of Catalonia



Dr. Souto, Juan Carlos

- Degree in Medicine and Surgery, University Extension, UCB, Lleida 1987
- Specialist in Hematology and Hemotherapy
- PhD in Medicine and Surgery, UAB
- Member of the Hematology staff to date The current head of the Section of Diagnostic and Translational Research of Hemostasis Diseases
- Consultation work in antithrombotic treatment and thromboembolic and hemorrhagic diseases Elected member in 2017 of the Consell Directiu del Cos Facultatiu of the Hospital
- Author of 160 scientific articles in indexed journals, in 35 as primary author
- Author of 290 scientific talks at national and international congresses
- Member of the Research Team in 21 competitive Research Projects, in 7 of which as Lead Researcher
- Responsible for the scientific projects GAIT 1 and 2 (Genetic Analysis of Idiophatic Thrombophilia), 1995-present; ACOA (Alternative Control of Oral Anticoagulation), 2000-2005; RETROVE (Risk of Venous Thromboembolic Disease), since 2012; MIRTO (Modelling the Individual Risk of Thrombosis in Oncology), since 2015
- Senior Data Analyst (CNAG-CRG)

04

Structure and Content

The contents have been structured and designed by the best professionals in the sector, with extensive experience and recognized prestige in the profession, backed by the volume of cases reviewed, studied, and diagnosed, and with extensive knowledge of new technologies applied to teaching.

This Postgraduate Diploma in Bioinformatics Applied to Venous Thromboembolism contains the most complete and up-to-date scientific program on the market"

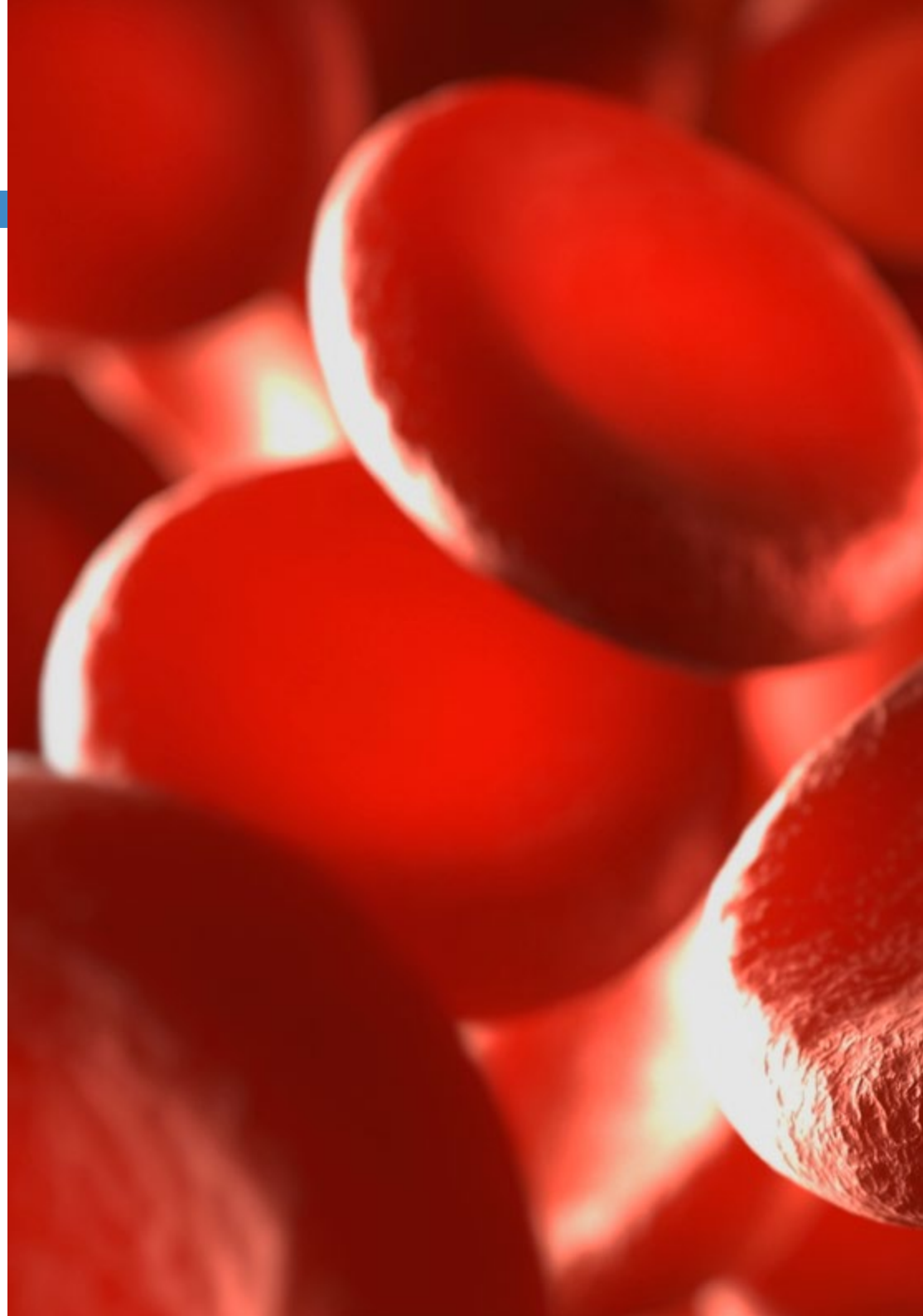
Module 1. Pathophysiology and Epidemiology in Venous Thromboembolism

1.1. General Introduction to the Complexity and Clinical Impact of VTE
- 1.1.1. General Introduction to Complexity
- 1.1.2. Clinical Impact of VTE

1.2. Generation of a Pathological Thrombus
- 1.2.1. Hemostasis Balance
- 1.2.2. Break in Balance (Classic Virchow's Triad) and Consequences
- 1.2.3. Normal and Pathological Venous Function
- 1.2.4. The Role of Venous Valve in Pathological Thrombi
- 1.2.5. The Role of the Vascular Endothelium
- 1.2.6. The Role of Platelets and Polyphosphates
- 1.2.7. The Role of Neutrophil Extracellular Traps (NETs)
- 1.2.8. The Role of Circulating Microparticles
- 1.2.9. Local inflammatory processes
- 1.2.10. Paraneoplastic Thrombosis (see Module 4)
- 1.2.11. Mechanism and Site in Thrombus Formation

1.3. Classification and Characteristics of VTE according to Anatomical Site
- 1.3.1. Lower Limbs
- 1.3.2. Upper Limbs
- 1.3.3. Pulmonary Thromboembolism
- 1.3.4. Atypical Sites
  - 1.3.4.1. Visceral
  - 1.3.4.2. Intracranial

1.4. Classification of Thrombosis according to Associated Circumstances
- 1.4.1. Spontaneous VTE vs. Secondary
- 1.4.2. Environmental Risk Factors (Table a)
- 1.4.3. The Role of Race, Age, and Sex
- 1.4.4. The Role of Intravascular Devices (Intravenous Catheters)



1.5. VTE Sequalae
- 1.5.1. Post-Thrombotic Syndrome and Residual Thrombosis: Relation to Recurrence
- 1.5.2. Chronic Pulmonary Hypertension
- 1.5.3. Short- and Long-Term Mortality
- 1.5.4. On Quality of Life

1.6. Impact of VTE on the Global Burden of Disease
- 1.6.1. Contribution to the Global Burden of Disease
- 1.6.2. Impact on the Economy

1.7. VTE Epidemiology
- 1.7.1. Influencing Variables (Age, Race, Comorbidities, Medication, Seasonal Factors, etc.)

1.8. Risk and Epidemiology of Thrombotic Recurrence
- 1.8.1. Differences between the Sexes
- 1.8.2. Differences according to the Circumstances associated with the First Episode

1.9. Thrombophilia
- 1.9.1. Classical Conception
- 1.9.2. Biological Biomarkers of Thrombophilia
  - 1.9.2.1. Genetic Biomarkers
  - 1.9.2.2. Plasmatic Biomarkers
  - 1.9.2.3. Cell Biomarkers
- 1.9.3. Thrombophilia Laboratory Study
  - 1.9.3.1. Debate on its Utility
  - 1.9.3.2. Classical Abnormalities
  - 1.9.3.3. Other Biomarkers or Intermediary Phenotypes (Table b)

1.10. Thrombophilia as a Complex and Chronic Pathology Concept
- 1.10.1. High Complexity (see 2.1)
- 1.10.2. Importance of the Genetic basis: Concept of Heritability
- 1.10.3. Known Genetic Risk Factors (Table c): Connection to Modules 7 and 8
- 1.10.4. Heritability to Be Discovered

1.11. Individual Risk Profile
- 1.11.1. Concept
- 1.11.2. Permanent Components (Genetic)
- 1.11.3. Changing Circumstances
- 1.11.4. New and Powerful Mathematical Models to Jointly Assess All Risk Variables (see Module 9)

Module 2. Omics Data: Introduction to the Programming Language R

2.1. Basic Introduction to the UNIX/ Linux Operating System
- 2.1.1. History and Philosophy
- 2.1.2. Command Interpreter (Shell)
- 2.1.3. Basic Linux Commands
- 2.1.4. Word Processors

2.2. File Management in UNIX/Linux
- 2.2.1. File System
- 2.2.2. Users and Groups
- 2.2.3. Licences

2.3. System Management in UNIX/Linux
- 2.3.1. Tasks (*Jobs*)
- 2.3.2. Register (*Logs*)
- 2.3.3. Monitoring Tools
- 2.3.4. Networks

2.4. Introduction and Basic Features of R
- 2.4.1. What is R?
- 2.4.2. First Steps
  - 2.4.2.1. Installation and Graphic Interface
  - 2.4.2.2. *Workspace*
- 2.4.3. Extension in R
  - 2.4.3.1. Standard Packages
  - 2.4.3.2. Contributed Packages, CRAN and Bioconductor

2.5. Types of Data in R
- 2.5.1. Vectors
- 2.5.2. Lists
- 2.5.3. Arrays and Matrices
- 2.5.4. Factors
- 2.5.5. Data Frames
- 2.5.6. Text Strings
- 2.5.7. Other Types of Data

2.6. Data Management in R
- 2.6.1. Import and Export Data
- 2.6.2. Data Manipulation
  - 2.6.2.1. Vectors
  - 2.6.2.2. Matrices
  - 2.6.2.3. Text Strings
  - 2.6.2.4. Data Sheets

2.7. Control Functions and Loops in R
- 2.7.1. Conditional Execution: if
- 2.7.2. Cycles: For, Repeat, While
- 2.7.3. Apply Functions

2.8. Statistical Models in R
- 2.8.1. Univariate Data
- 2.8.2. Multivariate Data
- 2.8.3. Hypothesis Test

2.9. Graphic Representation in R
- 2.9.1. Basic Representations
- 2.9.2. Graphical Parameters and Elements
- 2.9.3. The ggplot2 Package

2.10. Defining Functions in R
- 2.10.1. Simple Examples
- 2.10.2. Default Arguments and Values
- 2.10.3. Assignments within Functions

Module 3. Predictive Models

3.1. Statistical Learning
- 3.1.1. Estimating F
- 3.1.2. Supervised and Unsupervised Learning
- 3.1.3. Regression and Classification Problems
- 3.1.4. Linear and Non-Linear Models

3.2. Data Pre-Processing
- 3.2.1. Standardization
- 3.2.2. Imputability
- 3.2.3. Atypical Values (Outliers)

3.3. Linear Regression
- 3.3.1. Linear Models
- 3.3.2. Variance Analysis (ANOVA)
- 3.3.3. Mixed Effects Models

3.4. Classification
- 3.4.1. Logistic Regression
- 3.4.2. Linear Discriminant Analysis
- 3.4.3. K Nearest Neighbors (KNN)

3.5. Resampling Methods
- 3.5.1. Cross Validation
  - 3.5.1.1. Validation Set or Test
  - 3.5.1.2. Leave One Out Cross Validation
  - 3.5.1.3. Cross Validation of k Iterations (k-Fold)
- 3.5.2. Bootstrap

3.6. Linear Model Selection
- 3.6.1. Nested Model Comparison
- 3.6.2. Stepwise Algorithms
- 3.6.3. Linear Model Diagnosis

3.7. Regularization
- 3.7.1. The Curse of Dimensions
- 3.7.2. Principal Component Regression
- 3.7.3. Partial Least Squares Regression
- 3.7.4. Shrinkage Methods
  - 3.7.4.1. Ridge Regression
  - 3.7.4.2. Lasso

3.8. Methods Based on Decision Trees
- 3.8.1. Introduction to Decision Trees
- 3.8.2. Types of Decision Trees
  - 3.8.2.1. Bagging
  - 3.8.2.2. Random Forests
  - 3.8.2.3. Boosting

3.9. Support Vector Machines
- 3.9.1. Maximum Margin Classifiers
- 3.9.2. Support Vector Machines
- 3.9.3. Hyperparameter Tuning

3.10. Unsupervised Learning
- 3.10.1. Main Component Analysis
- 3.10.2. *Clustering* Methods
  - 3.10.2.1. *K-Means* Clustering
  - 3.10.2.2. Hierarchical Clustering

This program will allow you to advance in your career comfortably"

05

Methodology

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

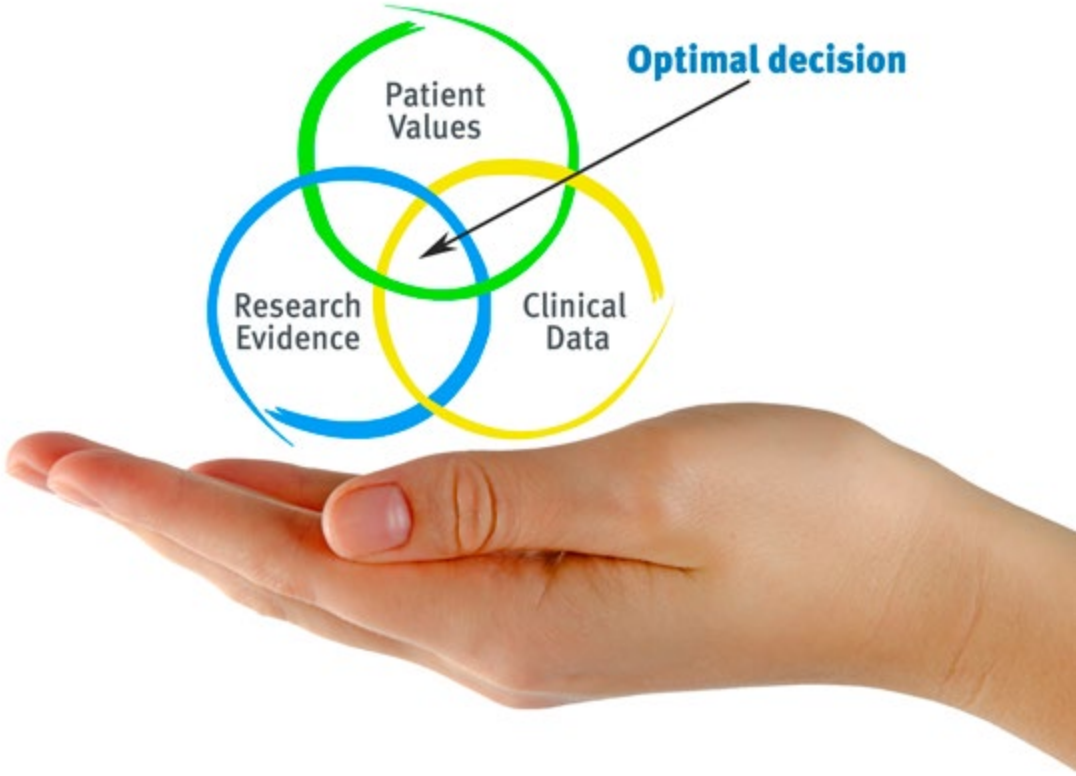
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

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, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately 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, trying to recreate the real conditions in the physician's professional practice.

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:

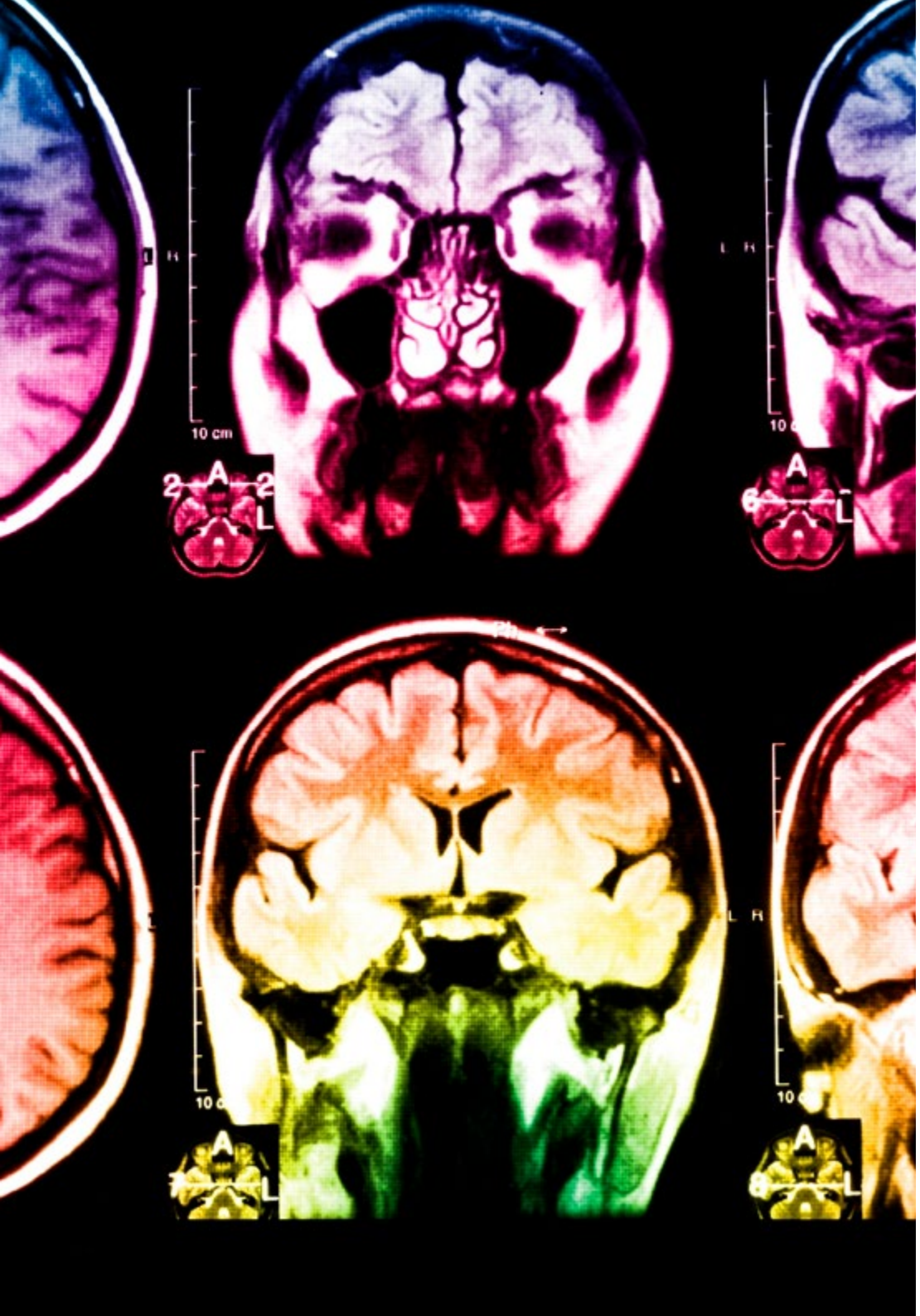
1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more 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.

Professionals 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 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

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

Surgical Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current medical 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.

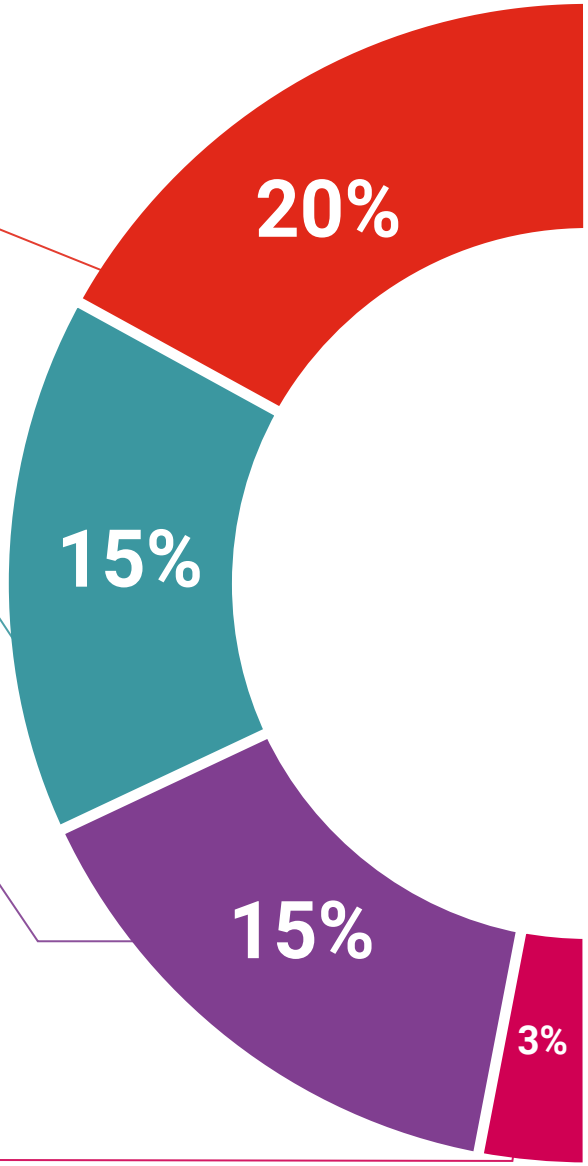
Interactive Summaries

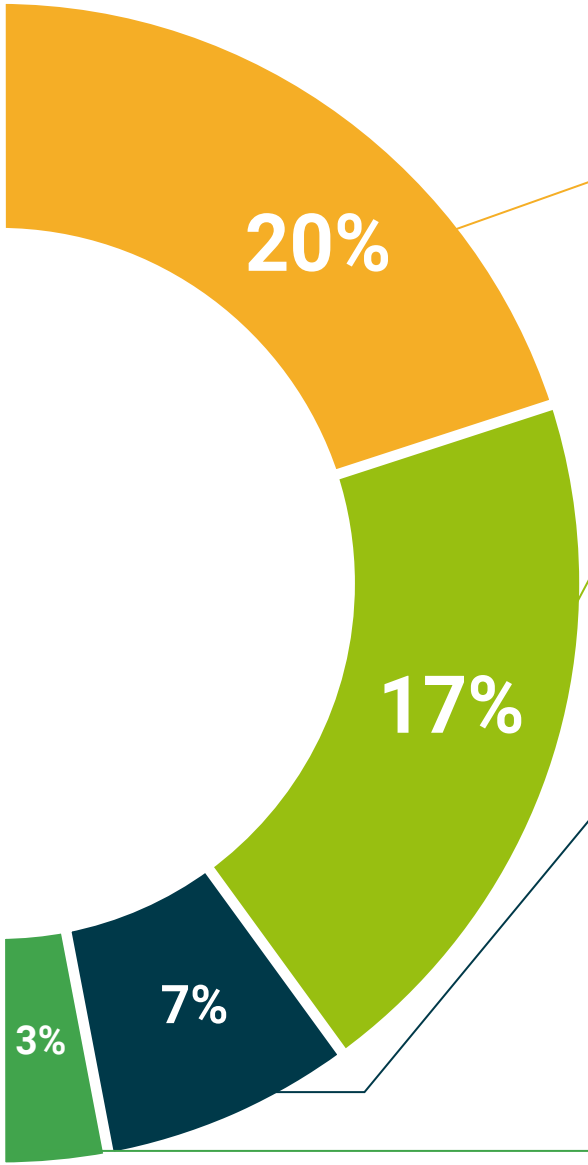
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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 on the usefulness of learning by observing experts. The system known as 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 Diploma in Bioinformatics Applied to Venous Thromboembolism guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.

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

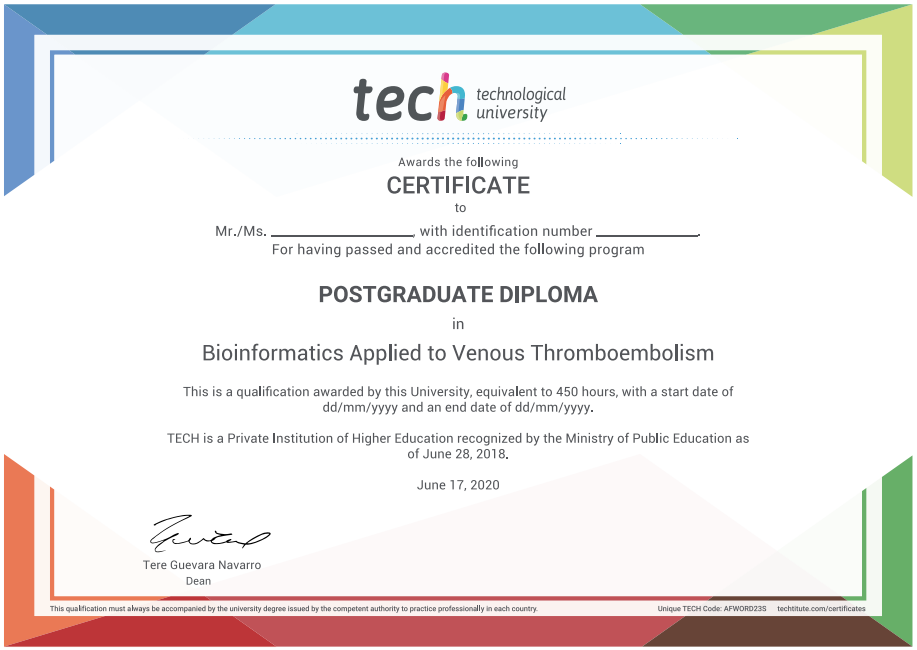
This **Postgraduate Diploma in Bioinformatics Applied to Venous Thromboembolism** contains the most complete and up-to-date scientific program on the market.

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

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

Title: **Postgraduate Diploma in Bioinformatics Applied to Venous Thromboembolism**

Official Nº of hours: **450 h.**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Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Bioinformatics Applied to Venous Thromboembolism

This is a qualification awarded by this University, equivalent to 450 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro
Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

*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.

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