

# Postgraduate Certificate

Thrombosis in the Genomic Age:  
Massive Sequencing Studies





## Postgraduate Certificate

### Thrombosis in the Genomic Age: Massive Sequencing Studies

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

Website: [www.techtitute.com/us/medicine/postgraduate-certificate/thrombosis-genomic-age-massive-sequencing-studies](http://www.techtitute.com/us/medicine/postgraduate-certificate/thrombosis-genomic-age-massive-sequencing-studies)

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# 01

# Introduction

Genetics is one of the main factors causing thrombosis, in addition to other environmental causes, such as diet or smoking. Advances in genomics make it possible to improve treatments for people suffering from these pathologies, so it is essential for professionals to improve their knowledge in this field.







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*Although in the oncologic setting thrombosis is a preventable and treatable disease, it still causes a high number of deaths”*

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 Certificate, students will focus on genomic medicine applied to the treatment of venous thrombosis. The program has been designed by specialists in the field, so students will receive a complete and specific training delivered by experts on the subject.

Thus, this specialization program aims to establish the basis of knowledge in the field, starting from the genetic basis and the molecular study of thrombosis and hemostasis. Students will also study DNA sequencing techniques and bioinformatics analysis of NGS data, in order to learn about the future prospects of NGS technologies.

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

This **Postgraduate Certificate in Thrombosis in the Genomic Age: Massive Sequencing Studies** contains the most complete and up-to-date scientific program on the market. Its most notable features are:

- ♦ Case studies presented by experts in Thrombosis in the Genomic Age
- ♦ 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 news on Thrombosis in the Genomic Age
- ♦ Practical exercises where self-assessment can be used to improve learning
- ♦ Special emphasis on innovative methodologies in Thrombosis in the Genomic Age
- ♦ 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 Certificate in Thrombosis in the Genomic Age with us. It's the perfect opportunity to advance your career"*

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*This Postgraduate Certificate may be the best investment you can make in selecting an up-to-date program for two reasons: in addition to updating your knowledge of Thrombosis in the Genomic Age: Massive Sequencing Studies, you will obtain a qualification endorsed by TECH Technological University”*

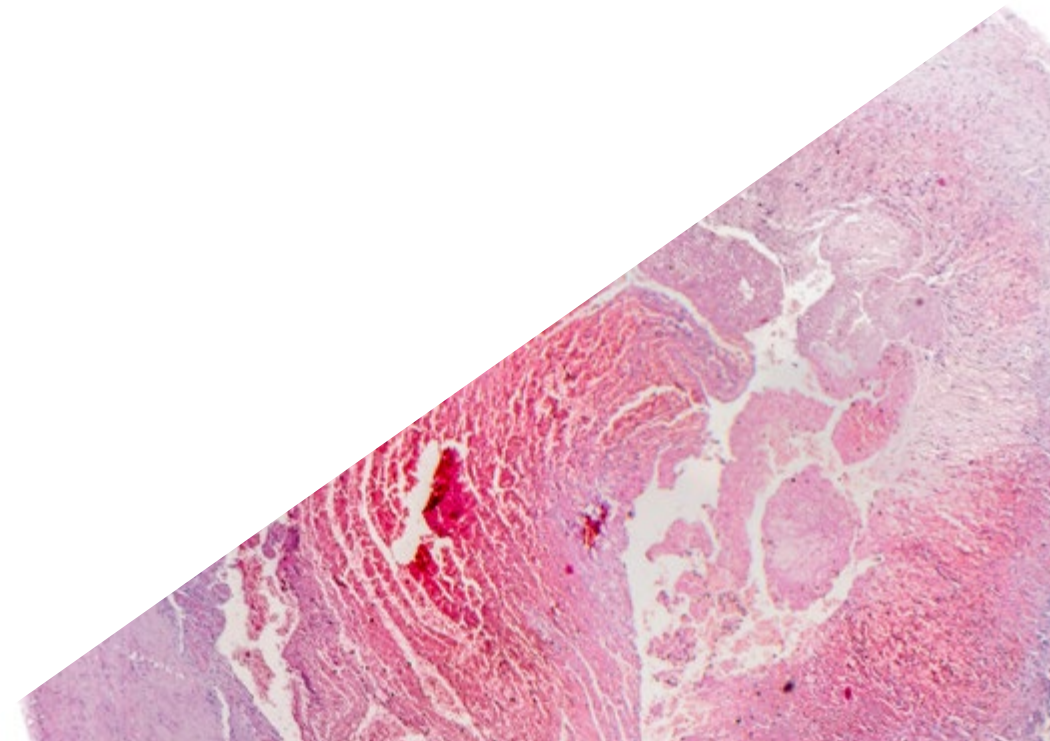
Its teaching staff includes professionals belonging to the field of Thrombosis in the Genomic Age, who bring to this specialization the experience of their work, as well as renowned specialists from leading societies and prestigious universities.

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 learning programmed to study 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. To that end, the professional will have the help of an innovative, interactive video system made by recognized and extensively experienced experts in Thrombosis in the Genomic Age.

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

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



02

# Objectives

This Postgraduate Certificate in Thrombosis in the Genomic Age: Massive Sequencing Studies is aimed at facilitating professional performance in biomedicine with the latest advances and newest treatments in the area.





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*It is the best option to learn about the latest advances in Thrombosis in Genomic Age”*



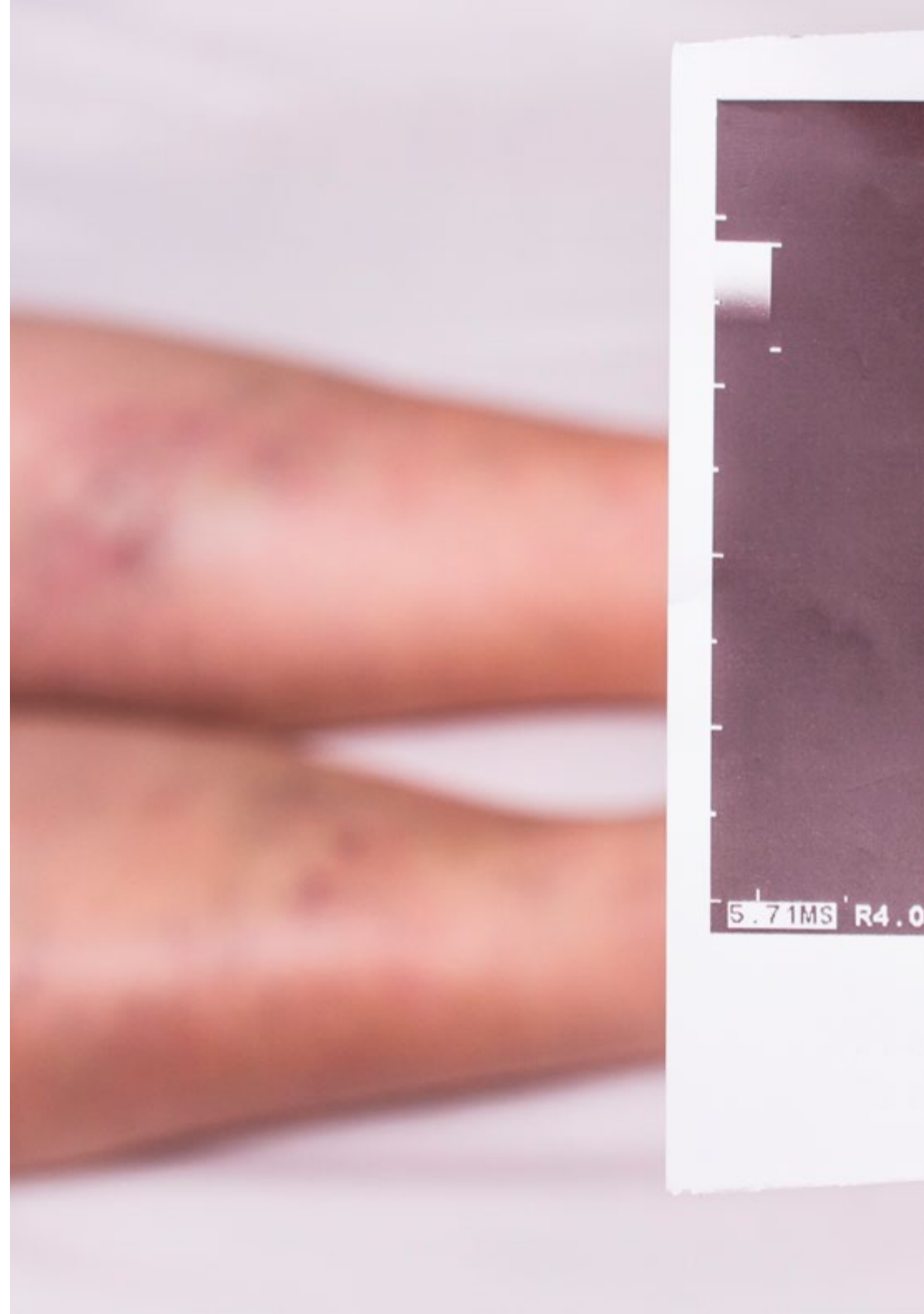
## General Objectives

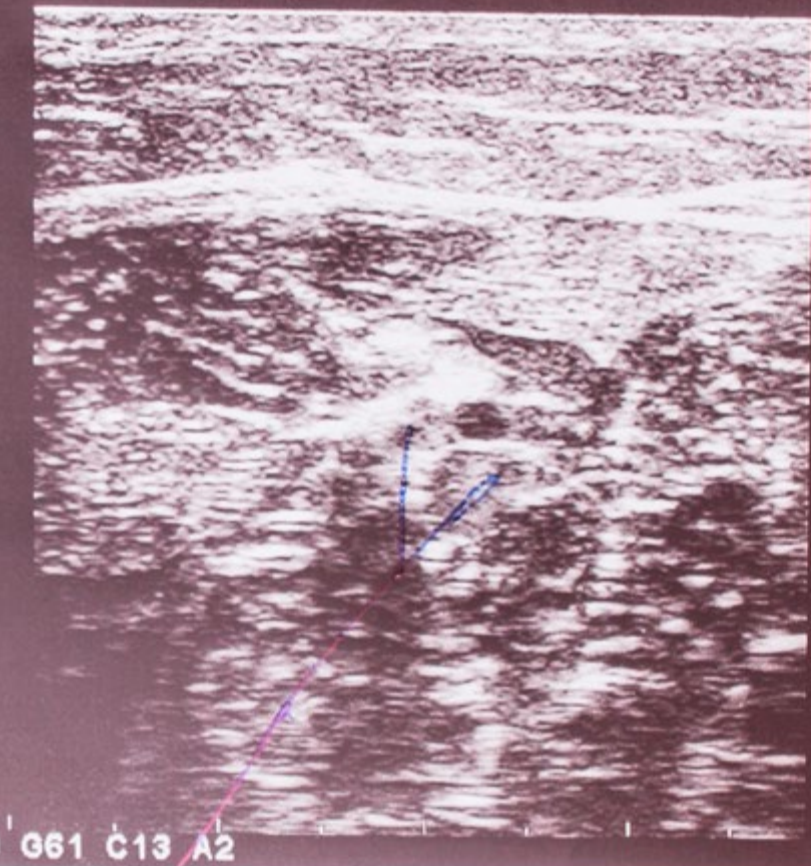
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- Delve into the knowledge of venous thromboembolism as a complex disease
- Train in the field of omics data and bioinformatic methods applied to precision medicine
- Keep up with the latest updates on the disease



*Update your knowledge with the Postgraduate Certificate in Thrombosis in the Genomic Age: Massive Sequencing Studies”*





## Specific Objectives

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- ◆ Know the genetic basis and molecular study of thrombosis and hemostasis
- ◆ Identify DNA sequencing techniques
- ◆ Acquire knowledge of bioinformatic analysis of NGS data
- ◆ Learn how to interpret NGS results in thrombosis and hemostasis
- ◆ Learn about the future perspectives of NGS technologies

03

# Course Management

The program includes in its teaching staff experts in Thrombosis in the Genomic Age, who pour their years of work experience into this training program. Additionally, other recognized experts participate in its design and preparation, completing the program in an interdisciplinary manner.





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*Leading area professional have come together to teach you the latest advances in Thrombosis in the Genomic Age”*

## 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. Marzo, Cristina

- ♦ Degree in Medicine and Surgery, Faculty of Medicine University of Zaragoza
- ♦ Proprietary Master's Degree in Anticoagulant Treatment, obtaining the highest mark San Antonio Catholic University Murcia
- ♦ Master's Degree in Congenital and Acquired Coagulopathies University of Alcalá
- ♦ Assistant Physician in the Hematology and Hemotherapy Service Hemostasia Unit Arnau de Vilanova University Hospital, Lleida



**Dr. Muñoz Martín, Andrés J.**

- ◆ Degree in Medicine and Surgery from the Autonomous University of Madrid
- ◆ PhD in Medicine, Extraordinary Award, Complutense University of Madrid
- ◆ Diploma in Biostatistics in Health Sciences, Autonomous University of Barcelona
- ◆ Attending Physician, Medical Oncology Department Unit of Digestive System Tumors Head of the Hepato-Bilio-Pancreatic Tumors and Cancer and Thrombosis Research Program Gregorio Marañón General University Hospital, Madrid
- ◆ Collaborating Professor in Practical Teaching, Department of Medicine, Faculty of Medicine, Complutense University of Madrid
- ◆ Vice-Chairman of the Ethics and Clinical Research Committee (CEIC), Gregorio Marañón General University Hospital, Madrid
- ◆ Coordinator of the Cancer and Thrombosis Section, Spanish Society of Medical Oncology (SEOM)

**Dr. Llamas, Pilar**

- ◆ PhD in Medicine and Surgery
- ◆ Degree in Medicine and Surgery, University of Córdoba 1989, Extraordinary Award
- ◆ Corporate Head of the Hematology and Hemotherapy Department, Quironsalud Madrid Public Hospitals; Jiménez Díaz Foundation, Rey Juan Carlos, Infanta Elena University Hospitals and Villalba General Hospital

**Dr. Pina Pascual, Elena**

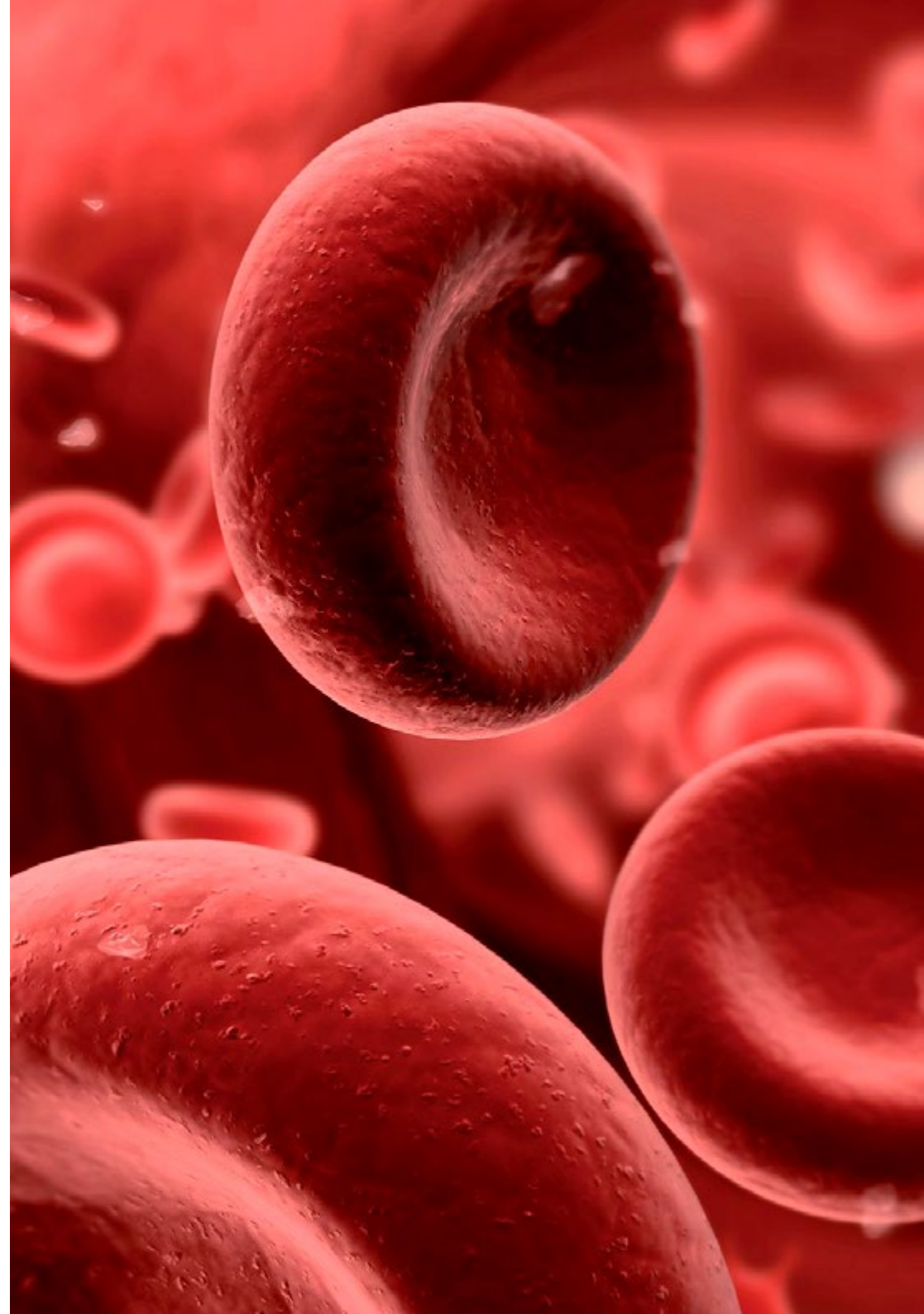
- ◆ Degree in Medicine and Surgery, Autonomous University of Barcelona
- ◆ Specialist in Hematology and Hemotherapy, MIR program, Bellvitge University Hospital
- ◆ Since 2005, Assistant in the Thrombosis and Hemostasis Service, Bellvitge University Hospital
- ◆ Coordinator of the Functional Unit of Venous Thromboembolism, Bellvitge Hospital, since December 2007 Member of the Commission of Cancer-Associated Thrombosis, Institut Català d'Oncologia (ICO)

**Ms. Ruperez Blanco, Ana Belen**

- ◆ Degree in Medicine from the Complutense University of Madrid.
- ◆ Specialist in Medical Oncology, Gregorio Marañón General University Hospital
- ◆ Assistant Physician, Medical Oncology Department Unit of Digestive Tumors, Sarcomas and Cutaneous Tumors Virgen de la Salud Hospital Toledo
- ◆ Specialist in VTE and Cancer, Católica San Antonio University, Murcia
- ◆ Members of the Cancer and Thrombosis Section, Spanish Society of Medical Oncology (SEOM)

**Dr. Sabater Lleal, María**

- ◆ Degree in Biology, University of Barcelona, 2000
- ◆ Specialized in Biomedicine
- ◆ PhD in Genetics, University of Barcelona, 2006
- ◆ Genomics Group of Complex Diseases Sant Pau Hospital Research Institute (IIB Sant Pau) Santa Creu i Sant Pau Hospital Barcelona
- ◆ Cardiovascular Genetics Research Associate, Cardiovascular Medicine Unit (KI)





**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 Idiopathic 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)

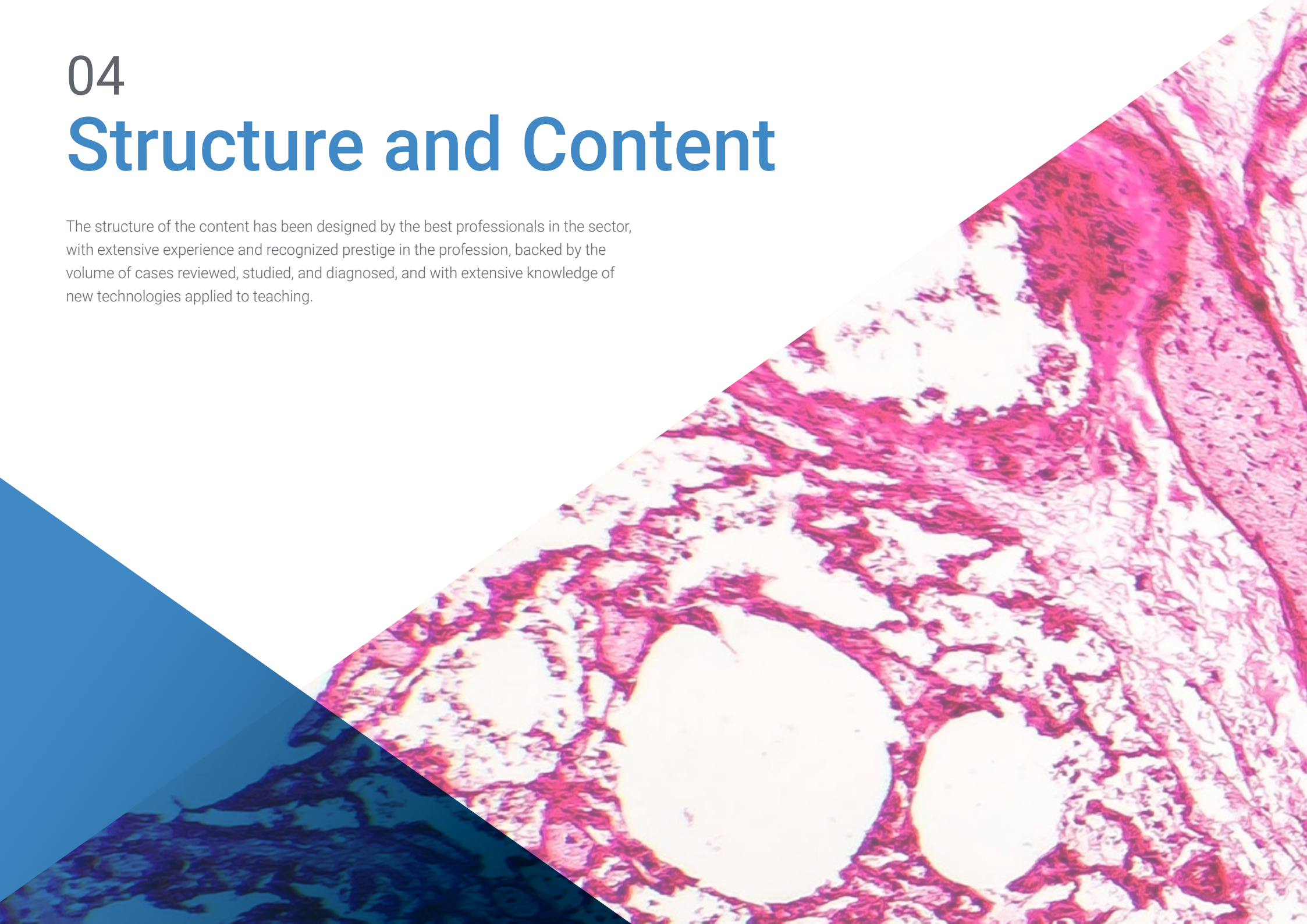
**Dr. Vidal, Francisco**

- ◆ Degree in Biology, Universitat of Barcelona
- ◆ Official Doctoral Program in Biochemistry, Molecular Biology and Genetics University of Barcelona
- ◆ Executive Master's Degree in Healthcare Organization ESADE Business School/ Ramon Llull University
- ◆ Specialist Physician, Blood and Tissue Bank (BST) Barcelona

# 04

# Structure and Content

The structure of the content has been 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.







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*This Postgraduate Certificate in Thrombosis in the Genomic Age contains the most complete and up-to-date scientific program on the market”*

## Module 1. Thrombosis in the Genomic Era II: Massive Sequencing Studies

- 1.1. Genetic Basis and Molecular Study in Thrombosis and Hemostasis
  - 1.1.1. Molecular Epidemiology in Thrombosis and Hemostasis
  - 1.1.2. Genetic Study of Congenital Diseases
  - 1.1.3. Classical Approach to Molecular Diagnostics
  - 1.1.4. Indirect Diagnosis or Genetic Linkage Techniques
  - 1.1.5. Direct Diagnostic Techniques
    - 1.1.5.1. Mutation Screening
    - 1.1.5.2. Direct Mutation Identification
- 1.2. DNA Sequencing Techniques
  - 1.2.1. Sanger's Traditional Sequencing
    - 1.2.1.1. Characteristics of the Technique, Limitations and Application in Thrombosis and Hemostasis
  - 1.2.2. Next-Generation Sequencing (NGS)
    - 1.2.2.1. NGS Platforms in Molecular Diagnostics
    - 1.2.2.2. General Information on the Technology, Possibilities and Limitations of NGS vs. Traditional Sequencing
  - 1.2.3. Third-Generation Sequencing (TGS)
- 1.3. Different Approaches to Genetic Studies Using NGS
  - 1.3.1. Gene Panel Sequencing
  - 1.3.2. Whole Exome Sequencing and Whole Genome Sequencing
  - 1.3.3. Transcriptomics by RNA-Seq
  - 1.3.4. MicroRNA Sequencing
  - 1.3.5. Mapping Protein-DNA Interactions with ChIP-Seq
  - 1.3.6. Epigenomics Analysis and DNA Methylation Using NGS
- 1.4. Bioinformatics Analysis of NGS Data
  - 1.4.1. The Challenge of Bioinformatics Analysis of Massive NGS Generated Data
  - 1.4.2. IT Requirements for NGS Data Management and Analysis
    - 1.4.2.1. NGS Data Storage, Transfer and Sharing
    - 1.4.2.2. Computing Power Required for NGS Data Analysis
    - 1.4.2.3. Software Requirements for NGS Data Analysis
    - 1.4.2.4. Bioinformatics Skills Required for NGS Data Analysis
  - 1.4.3. Base Calling, FASTQ File Format and Base Quality Scoring
  - 1.4.4. NGS Data Quality Control and Preprocessing
  - 1.4.5. Read Mapping
  - 1.4.6. Variant Calls
  - 1.4.7. Tertiary Analysis
  - 1.4.8. Structural Variation Analysis by NGS
  - 1.4.9. Methods to Estimate Copy Number Variation from NGS Data
- 1.5. Concept and Types of Mutation Detectable by NGS
  - 1.5.1. Molecular Etiology of Thrombotic and Hemorrhagic Disorders
  - 1.5.2. Mutation Nomenclature
  - 1.5.3. Functional Implication of Identified Variants/Mutations
  - 1.5.4. Differentiation between Mutation and Polymorphism
- 1.6. Fundamental Molecular Databases in NGS
  - 1.6.1. Locus Specific Databases (LSDB)
  - 1.6.2. Previous Mutation Descriptions in Databases
  - 1.6.3. Databases of Variants Detected in Healthy Population by NGS
  - 1.6.4. Molecular Databases with Clinical Annotations
- 1.7. Analysis and Interpretation of NGS Results on Thrombosis and Hemostasis
  - 1.7.1. Mutation Validation
  - 1.7.2. Concept of Mutation Pathogenicity
  - 1.7.3. Genotype-Phenotype Correlation
    - 1.7.3.1. In Silico Studies
    - 1.7.3.2. Expression Studies
    - 1.7.3.3. In Vitro Functional Studies



- 1.8. Role of NGS in Genetic Counseling and Prenatal Diagnosis
  - 1.8.1. Genetic Counseling in the NGS Era
  - 1.8.2. Ethical Issues Specific to NGS and Whole Genome Sequencing for Genetic Counseling and Clinical Diagnostics
  - 1.8.3. Conventional Prenatal Diagnosis and Methods
  - 1.8.4. Genetic Pre-implant Diagnostic
  - 1.8.5. Non-invasive Prenatal Diagnosis
    - 1.8.5.1. Use of Fetal DNA in Maternal Circulation for Prenatal Diagnosis
    - 1.8.5.2. Sequencing of SNPs from Circulating Fetal DNA
    - 1.8.5.3. Limitations and Challenges of NGS-Based Non-invasive Prenatal Testing
    - 1.8.5.4. Clinical Implementation of Non-Invasive Prenatal Testing for Aneuploidies
- 1.9. Future Perspectives in NGS Technologies and Data Analysis
  - 1.9.1. Technological Development of Sequencing in the Mid-Term
  - 1.9.2. Evolution of Bioinformatics Tools for High-Throughput Sequencing Data Analysis
  - 1.9.3. Standardization and Rationalization of NGS Analytical Processes
  - 1.9.4. Parallel Computation
  - 1.9.5. Cloud Computing



*This specialization will allow you to comfortably advance in your career"*



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, 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.



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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. 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.*



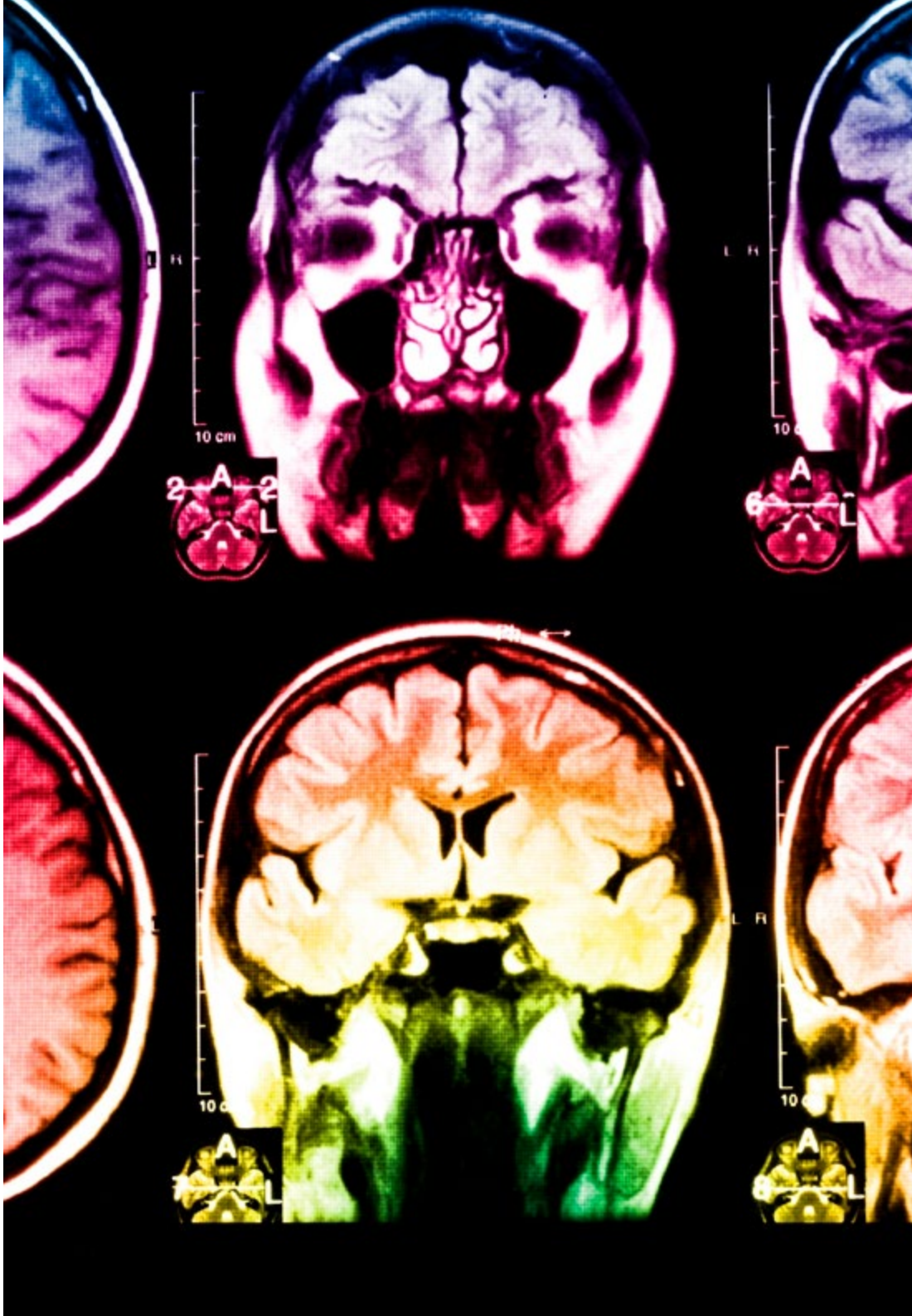
At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

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 adapted in 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

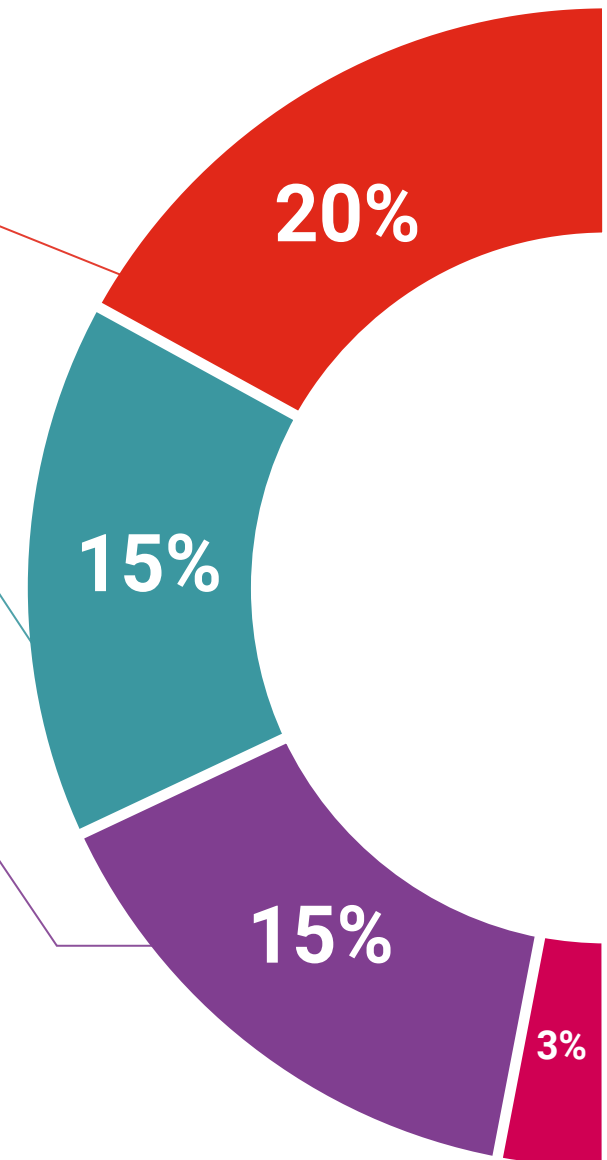
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

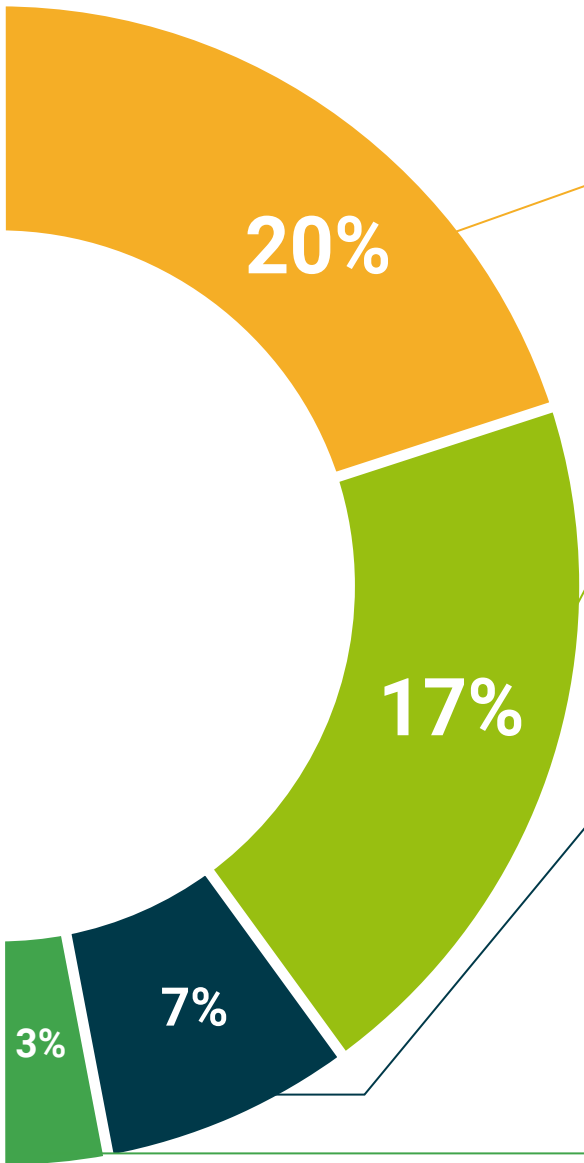


#### Additional Reading

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 Certificate in Thrombosis in the Genomic Age: Massive Sequencing Studies 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 Thrombosis in the Genomic Age: Massive Sequencing Studies** 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 in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations and professional career evaluation committees.

Title: **Postgraduate Certificate in Thrombosis in the Genomic Age: Massive Sequencing Studies**

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.



future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
online training  
development language  
virtual classroom



## Postgraduate Diploma Thrombosis Genomics

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

# Postgraduate Certificate

Thrombosis in the Genomic Age:  
Massive Sequencing Studies

