

**Postgraduate Diploma**  
Clinical Cardiovascular  
Ultrasound  
in Emergencies and  
Intensive Care





**Postgraduate Diploma**  
Clinical Cardiovascular  
Ultrasound in  
Emergencies and  
Intensive Care

Course Modality: **Online**

Duration: **6 months.**

Certificate: **TECH Technological University**

**21 ECTS Credits**

Teaching Hours: **525 hours.**

Website: [www.techtute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-clinical-cardiovascular-ultrasound-emergencies-intensive-care](http://www.techtute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-clinical-cardiovascular-ultrasound-emergencies-intensive-care)

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# 01

# Introduction

Ultrasound has been associated with many medical care advances in the last 40 years and has become an essential tool in dealing with all kinds of patients. Cardiovascular diseases maintain a high prevalence in developed countries, and clinical ultrasound techniques open a door to optimize diagnostic processes as it had not been possible to do before. This program allows the family physician to update their knowledge in a practical way.

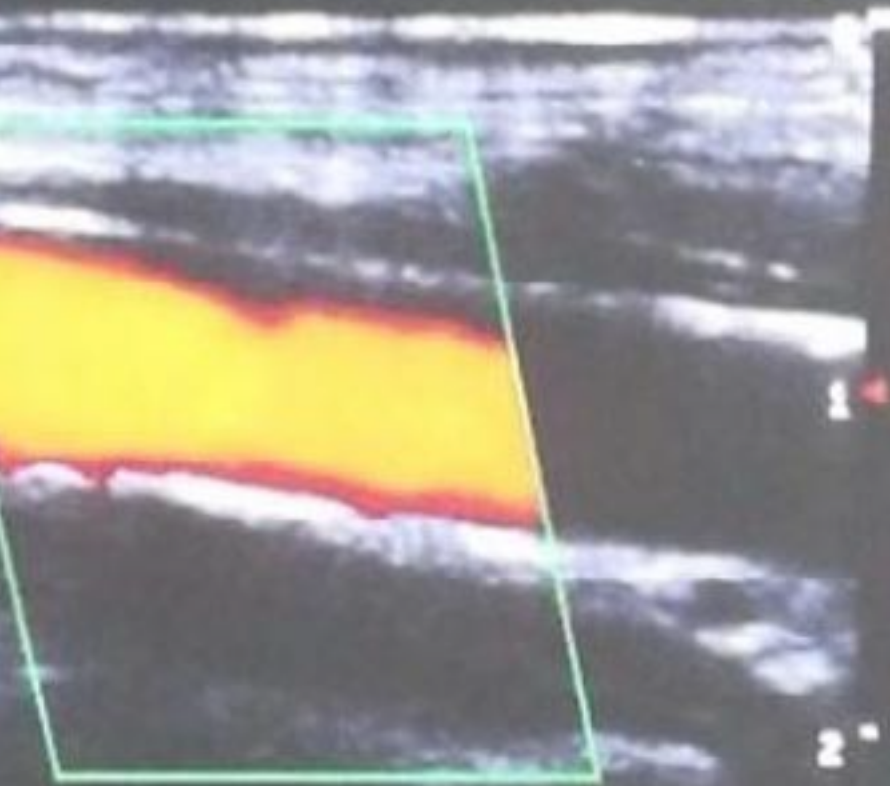
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*Increase your knowledge through this program, where you will find the best didactic material with real clinical cases. Learn here about the latest advances in the specialty to be able to perform quality medical practice"*

Clinical Ultrasonography is the technique of examining the body using ultrasound that is used for medical practice, related to the direct observation of the patient and their treatment. These days it is inconceivable to imagine specialists in obstetrics and gynecology, cardiology or urology attending to their patients without the use of ultrasounds. This idea is also being extended to almost all medical specialities.

Clinical cardiovascular ultrasonography increases the possibility of diagnosing and treating patients in an emergency situation or those who need critical care. In addition, it increases the ability to diagnose potential vascular pathologies, and is becoming an increasingly popular and valuable tool to guide diagnostic and therapeutic interventions.

Its advantages include portability, accuracy, real-time visualization, reproducibility and efficiency. Its usefulness has been demonstrated in various hospital scenarios (emergency, intermediate care, semi-critical or intensive care, operating rooms, resuscitation, hospitalization, consultations, etc.), as well as in out-of hospital situations (home, public roads, health centers, emergencies, ambulances, etc.).

Technological advances have made it possible to reduce the size of the equipment, favoring lower cost and portability, and have increased the capabilities of clinical ultrasound, leading to a notable increase in its applications. Today, more accurate ultrasound cardiovascular diagnosis, safe ultrasound-guided interventions, precise non-invasive hemodynamic evaluations and rapid assessment of traumatic injuries are all possible.

This program is aimed at facilitating the updating of the physician in the procedures for the use of ultrasound devices as diagnostic methods for cardiovascular pathology in the critically ill patient.

This **Postgraduate Diploma in Clinical Cardiovascular Ultrasound in Emergencies and Intensive Care** contains the most complete and up-to-date scientific program on the market. The most important features of the program include:

- Clinical cases presented by experts in the different specialties. The graphic, schematic, and eminently practical contents of which they are composed provide scientific and practical information on the disciplines that are essential for professional practice.
- Advances in cardiovascular ultrasound.
- Algorithm-based interactive learning system for decision-making in the presented clinical situations.
- With special emphasis on evidence-based medicine and research methodologies in cardiovascular ultrasound.
- All 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.



*Expand your knowledge through the Postgraduate Diploma in Clinical Cardiovascular Ultrasound for Emergency and Critical Care, in a practical way and adapted to your needs”*

“

*This postgraduate diploma may be the best investment you can make when choosing a refresher program for two reasons: in addition to updating your knowledge in clinical cardiovascular ultrasound for emergency and critical care, you will obtain a postgraduate diploma from TECH Technological University"*

Its teaching staff includes renowned specialists in nutrition based on clinical practice, who bring the experience of their work to this training.

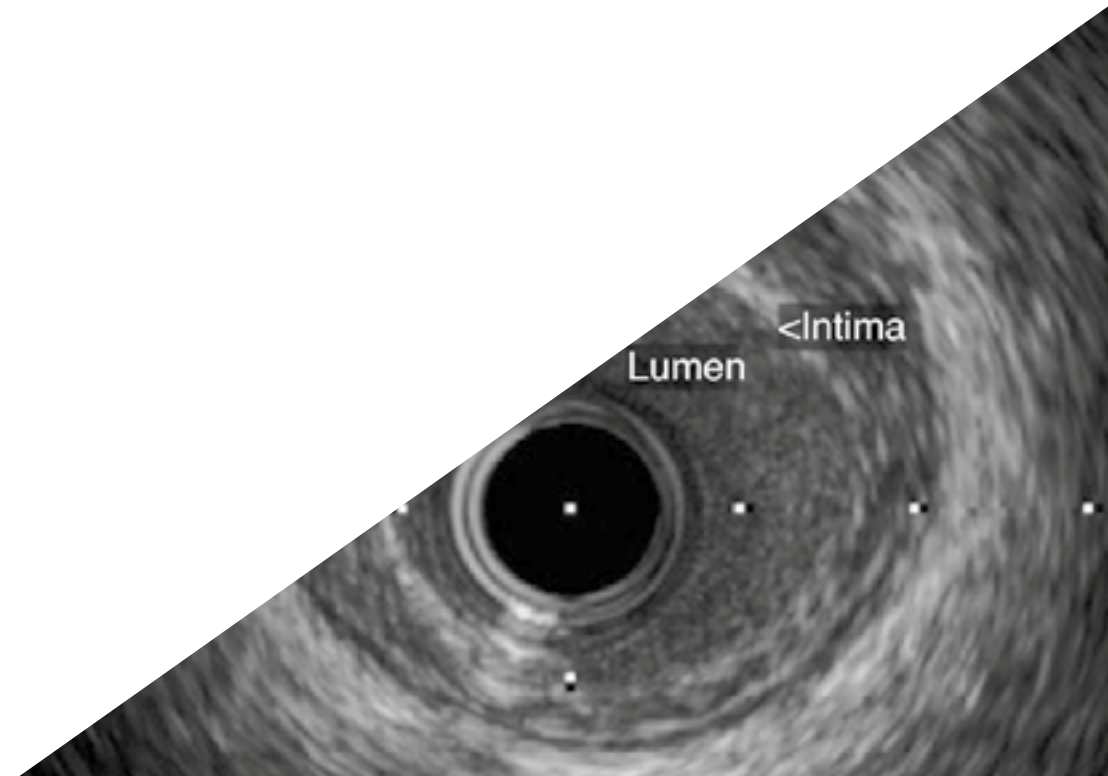
The multimedia content developed with the latest educational technology will provide the physician with situated and contextual learning, i.e., a simulated environment that will provide immersive training programmed to train in real situations.

Problem-Based Learning underpins this program design, and the doctor must use it to try and solve the different professional practice situations that arise throughout the course.

For this reason, you will be assisted by an innovative, interactive video system created by renowned and experienced experts in the field of nutrition with extensive teaching experience.

*This program offers training in simulated environments, which provides an immersive learning experience designed to train for real-life situations.*

*It includes clinical cases to bring the program's degree as close as possible to the reality of care in medicine.*



# 02 Objectives

The program's primary objective is focused on theoretical and practical learning, so that the medical professional is able to master the study of clinical cardiovascular ultrasound in a practical and rigorous way.







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*This refresher program will generate a sense of confidence with medical practise and will help you grow both personally and professionally”*



## General Objectives

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- Update the physician in the use of ultrasound devices for the management of cardiovascular pathologies in the patient, especially in emergency situations and in critical patients, regardless of the environment in which they find themselves.



## Specific Objectives by Modules

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- Define the physical principles which are involved in ultrasound imaging.
- Establish an appropriate ultrasound sequence for each examination of a patient.
- Explain the different ultrasound modes.
- Define the different types of ultrasound and their applications.
- Describe the different ultrasound maps.
- Explain the principles of econavigation.
- Explain the cardiac anatomy.
- Describe the technical requirements of cardiac ultrasound.
- Explain localization and visualization in pericardial windows.
- Describe sonoanatomy and sonophysiology in cardiac ultrasound.
- Explain the different structural alterations to identify in cardiac ultrasound.
- Define the principles of hemodynamic ultrasound.
- Explain the vascular anatomy.



- ♦ Describe the technical requirements of vascular ultrasounds.
- ♦ Explain the examination technique for vascular ultrasounds.
- ♦ Explain the principles of ultrasound for the main thoracoabdominal vessels.
- ♦ Define the principles of ultrasounds of the supra-aortic trunks.
- ♦ Explain the principles of ultrasound of peripheral arterial circulation .

“

*Make the most of the opportunity and take the step to get up-to-date on the latest developments in clinical cardiovascular ultrasound in emergencies and intensive care”*



# 03

# Course Management

This program includes Cardiovascular regarded health professionals in the field of clinical cardiovascular ultrasound in its teaching staff, who bring the experience of their work to this training. In addition, renowned specialists, members of prestigious national and international scientific communities, are involved in designing and preparing the program.





“

*Learn the latest advances in clinical cardiovascular ultrasound for emergency and critical care from leading professionals”*

## Management



### Dr. Álvarez Fernández, Jesús Andrés

- Degree in Medicine and Surgery
- Specialist in Intensive Care Medicine.
- Doctor of Medicine (PhD)
- Attending Physician of Intensive Care Medicine and Major Burns Unit. Getafe University Hospital. Getafe, Madrid
- Collaborating Professor of the Master's Degree in Intensive Care Medicine at the CEU Cardenal Herrera University of Valencia.
- Founding Member of the Ecoclub of SOMIAMA.
- Collaborating Professor of SOCANECO.



04

# Structure and Content

The structure of the contents has been designed by a team of professionals knowledgeable about the implications of training in daily medical practice, aware of the relevance of current training to adequately perform cardiovascular ultrasound procedures and committed to quality teaching through new educational technologies.







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*This Postgraduate Diploma in Clinical Cardiovascular Ultrasound in Emergencies and Intensive Care contains the most complete and up-to-date scientific program on the market”*

## Module 1. Ultrasound imaging

- 1.1. Physical Principles.
  - 1.1.1. Sounds and Ultrasound.
  - 1.1.2. The Nature of Sound.
  - 1.1.3. Interaction of Sound with Matter.
  - 1.1.4. The Concept of Ultrasound.
  - 1.1.5. Ultrasound Safety.
- 1.2. Ultrasound Sequence
  - 1.2.1. Ultrasound Emission.
  - 1.2.2. Tissue Interaction.
  - 1.2.3. Echo Formation.
  - 1.2.4. Echo Reception.
  - 1.2.5. Ultrasound Image Generation.
- 1.3. Ultrasound Modes.
  - 1.3.1. Mode A.
  - 1.3.2. Mode M.
  - 1.3.3. Mode B.
  - 1.3.4. Color Doppler.
  - 1.3.5. Angio-Doppler.
  - 1.3.6. Spectral Doppler.
  - 1.3.7. Combined Modes.
  - 1.3.8. Other Modes and Techniques.
- 1.4. Ultrasound.
  - 1.4.1. Console Ecograph Ultrasound Scanners.
  - 1.4.2. Portable Ecograph Ultrasound scanners
  - 1.4.3. Specialised Ecograph Ultrasound Scanners
  - 1.4.4. Transducers.
- 1.5. Ultrasound Maps and Eco Navigation.
  - 1.5.1. Sagittal Map.
  - 1.5.2. Transverse plane.
  - 1.5.3. Coronal plane
  - 1.5.4. Oblique Maps.
  - 1.5.5. Ultrasound Marking.
  - 1.5.6. Transducer movements



**Module 2. Clinical Cardiac Ultrasound**

- 2.1. Cardiac Anatomy.
  - 2.1.1. Basic Three-Dimensional Anatomy.
  - 2.1.2. Basic Cardiac Physiology.
- 2.2. Technical Requirements to Perform a Cardiac Ultrasound.
  - 2.2.1. Probes.
  - 2.2.2. Characteristics of the Equipment used in a Cardiac Ultrasound.
- 2.3. Perineal Windows and Cardiac Ultrasound.
  - 2.3.1. Windows and Maps Applied in Emergencies and Intensive Care Situations.
  - 2.3.2. Basic Doppler (color, pulsating, continuous and tissue Doppler).
- 2.4. Structural Alterations.
  - 2.4.1. Basic Measures in Cardiac Ultrasound.
  - 2.4.2. Thrombi.
  - 2.4.3. Suspected Endocarditis.
  - 2.4.4. Valvular Heart Disease.
  - 2.4.5. Pericardium.
  - 2.4.6. How is an ultrasound reported in emergency and intensive care?
- 2.5. Hemodynamic Ultrasound.
  - 2.5.1. Left Ventricular Hemodynamics.
  - 2.5.2. Right Ventricular Hemodynamics.
  - 2.5.3. Preload Dynamic Tests.
- 2.6. Transesophageal Echocardiogram.
  - 2.6.1. Techniques
  - 2.6.2. Indications in Emergencies and Intensive Care Cases.
  - 2.6.3. Ultrasound-Guided Study of Cardioembolism.

**Module 3. Clinical Vascular Ultrasound**

- 3.1. Anatomy Recap.
  - 3.1.1. Venous Vascular Anatomy of the Upper Limbs.
  - 3.1.2. Arterial Vascular Anatomy of the Upper Limbs.
  - 3.1.3. Venous Vascular Anatomy of the Lower Limbs.
  - 3.1.4. Arterial Vascular Anatomy of the Lower Limbs.

- 3.2. Technical Requirements.
  - 3.2.1. Ultrasound Scanners and Probes.
  - 3.2.2. Curve Analysis.
  - 3.2.3. Image-Color Media.
  - 3.2.4. Echo Contrasts.
- 3.3. Examination Technique.
  - 3.3.1. Positioning:
  - 3.3.2. Insonation. Examining Technique.
  - 3.3.3. Study of Normal Curves and Speeds.
- 3.4. Large Thoracoabdominal Vessels.
  - 3.4.1. Venous Vascular Anatomy of the Abdomen.
  - 3.4.2. Arterial Vascular Anatomy of the Abdomen.
  - 3.4.3. Abdomino-Pelvic Venous Pathology.
  - 3.4.4. Abdomino-Pelvic Arterial Pathology.
- 3.5. Supra-Aortic Trunks.
  - 3.5.1. Venous Vascular Anatomy of the Supra-Aortic Trunks.
  - 3.5.2. Arterial Vascular Anatomy of the Supra-Aortic Trunks.
  - 3.5.3. Venous Pathology of the Supra-Aortic Trunks.
  - 3.5.4. Arterial Pathology of the Supra-Aortic Trunks.
- 3.6. Peripheral arterial and venous circulation.
  - 3.6.1. Venous Pathology of Lower and Upper Limbs.
  - 3.6.2. Arterial Pathology of Lower and Upper Limbs.



*A unique, key, and decisive training experience to boost your professional development*

05

# Methodology

This training program provides you with a different way of learning. Our methodology uses a cyclical learning approach: ***Re-learning***.

This teaching system is used 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 Re-learning, 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

In a given situation, what would you do? 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 can experience a way of learning that is shaking the foundations of traditional universities around the world.*



According to Dr. Gervas, 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 potential 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 professional medical 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 grasp concepts, but also develop their mental capacity by evaluating real situations and applying their knowledge.
2. The learning process has a clear focus on 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.



## Re-learning Methodology

At TECH we enhance the Harvard case method with the best 100% online teaching methodology available: Re-learning.

Our 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, which represent a real revolution with respect to simply studying and analyzing cases.

*The physician will learn through real cases and by solving 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 Re-learning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best Spanish-speaking online university (Columbia University).

With this methodology we have trained more than 250,000 physicians with unprecedented success, in all clinical specialties regardless of the surgical load. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Re-learning 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 (we learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

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



In this Postgraduate Diploma you will have access to the best educational material, prepared with you in mind:



### Study Material

After a complex production process, we transform the best content into high-quality educational and audiovisual multimedia. We select the best syllabus and make it available to you. Everything you need to acquire in-depth knowledge of a discipline, from A to Z. Lessons written and chosen by specialists in each of the disciplines.



### Surgical techniques and clinical procedures on video

We bring you closer to the newest techniques, to the latest scientific advances, to the forefront of doctor news. All this, in first person, with the maximum rigor, explained and detailed for your assimilation and understanding. And best of all, you can watch them as many times as you want.



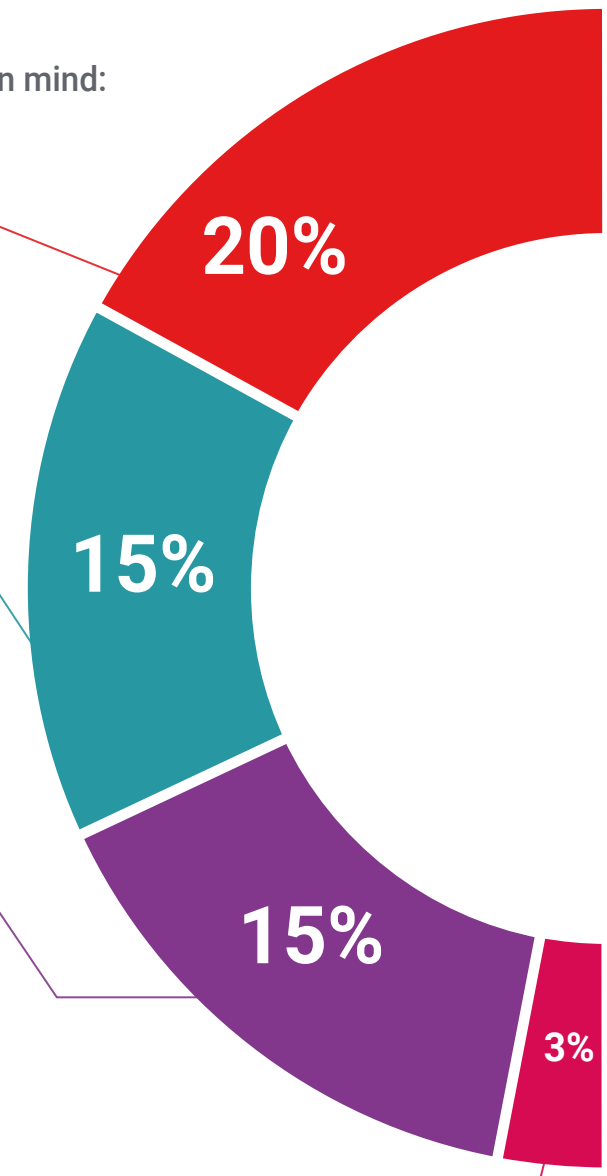
### Interactive Summaries

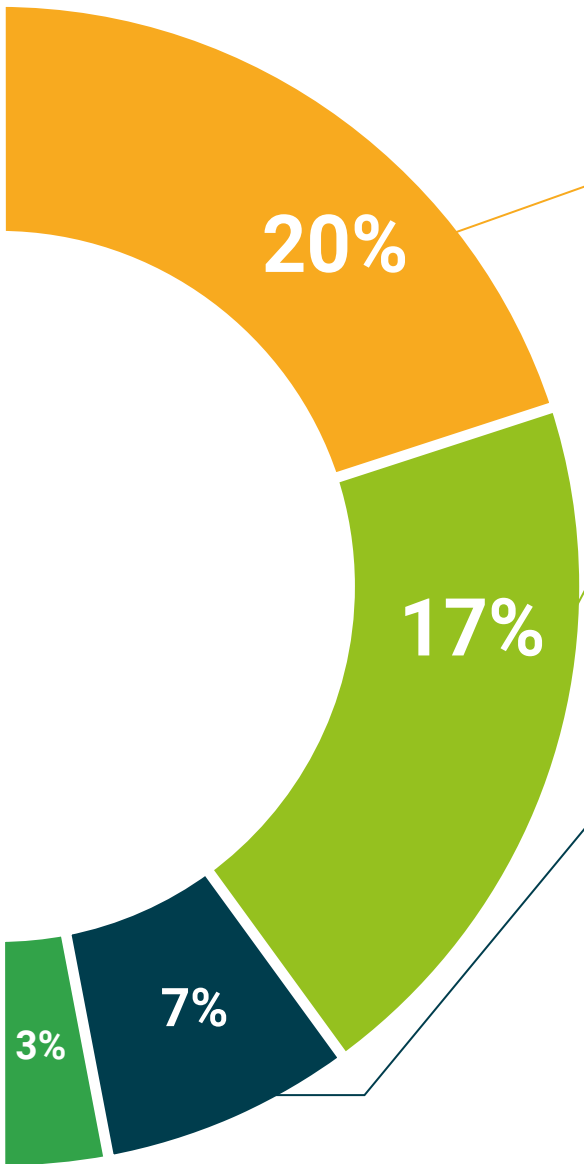
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge. This unique multimedia content presentation training system was awarded by Microsoft as a "European Success Story".



### Additional Reading

Recent articles, consensus documents, international guides. in our virtual library you will have access to everything you need to complete your training.





**Expert-Led Case Studies and Case Analysis**

Through the narratives of expert professionals, it is possible to acquire a high degree of understanding of the most frequent problematic situations. The professional's healthcare practice is not alien to the context in which it takes place. If we want to train to improve our professional practice, this training must be situated within the context in which it takes place.



**Testing & Re-Testing**

We periodically evaluate and re-evaluate your knowledge throughout this program through activities and evaluative exercises.



**Classes**

There is scientific evidence suggesting that observing third-party experts can be useful. Learning from an expert strengthens knowledge and recall, and generates confidence in our future difficult decisions



**Quick Action Guides**

One of the most important functions of our team is to select those contents considered essential and present them in the form of worksheets or quick action guides to facilitate their understanding.



06

# Certificate

The Postgraduate Diploma in Clinical Cardiovascular Ultrasound for Emergency and Critical Care guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Diploma issued by **TECH Technological University**.



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*Successfully complete this training  
and receive your university degree  
without travel or laborious paperwork”*

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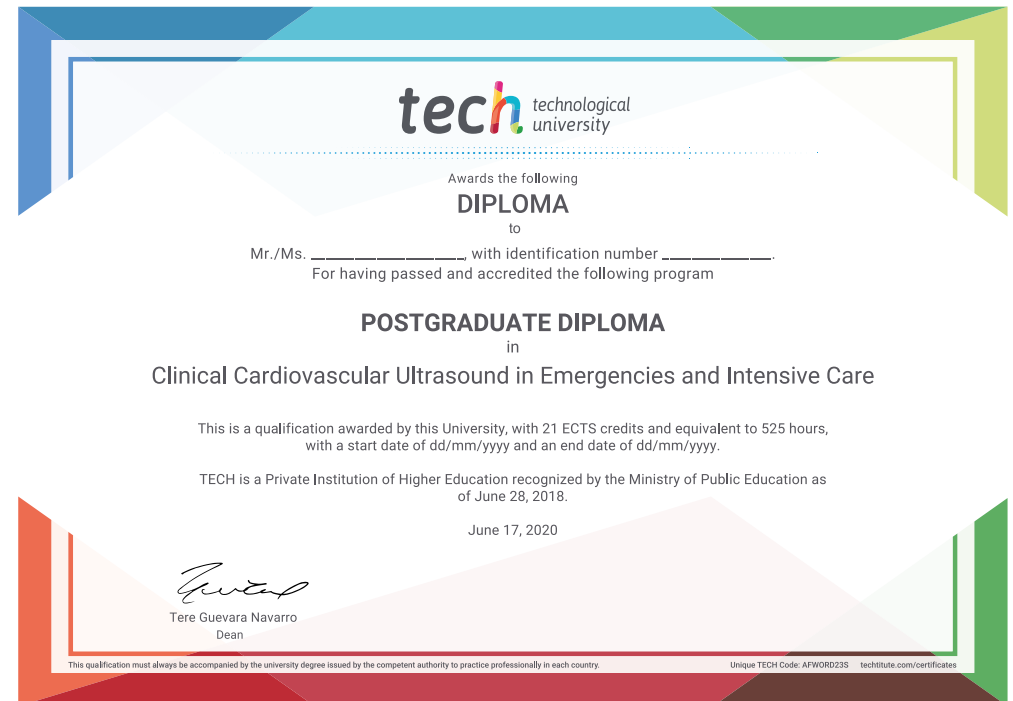
Once the student has passed the evaluation, they will receive by post, with acknowledgement of receipt, their corresponding **Postgraduate Diploma** issued by **TECH Technological University**.

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

Title: Postgraduate Diploma in Clinical Cardiovascular Ultrasound in Emergencies and Intensive Care

ECTS: 21

Official Number of Hours: 525



\*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.

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



**Postgraduate Diploma**  
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Duration: **6 months.**

Certificate: **TECH Technological University**

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Teaching Hours: **525 hours.**

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