

# Postgraduate Certificate Radiophysics in Nuclear Medicine



## Postgraduate Certificate Radiophysics in Nuclear Medicine

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Credits: 6 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/nursing/postgraduate-certificate/radiophysics-nuclea-medicine](http://www.techtute.com/us/nursing/postgraduate-certificate/radiophysics-nuclea-medicine)

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# 01

# Introduction

Quality, safety and precision in the use of ionizing radiation for therapeutic purposes are essential practices. Their role ranges from monitoring equipment performance to optimizing protocols and radiation protection. Therefore, nurses need to gain a thorough understanding of the principles in this area in order to provide effective patient care. Also, should adverse effects or complications occur during treatments, these professionals are prepared to respond appropriately and accurately. To help them with this task, TECH has developed a program that delves into the various clinical applications of disruptive therapies such as radionuclide therapy. It is also taught 100% online, for the convenience of the students.



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*As a nurse, you need to be up to date on Quality Assurance controls in Nuclear Medicine. Achieve it through this comprehensive TECH program"*

Gamma cameras have become one of the most widely used devices for functional and diagnostic imaging of the inside of the human body. Their use is expanding rapidly in healthcare systems around the world. This forces all healthcare personnel to be updated about its main applications and advantages for the successful development of Nuclear Medicine therapies. In this context, nurses must be especially prepared since their responsibilities include the monitoring of patients undergoing these therapies and the application of safety measures in the clinical environment against radiobiological risks.

For this reason, TECH has designed a program that will allow these professionals to update their skills in relation to these hospital services in a holistic way. Throughout the syllabus, students will delve into the most sophisticated assistance techniques and will receive a detailed description of the latest technologies in this field and their advantages. In turn, they will delve into cutting-edge applications such as 3D imaging in this field for radiodiagnosis and the most advanced control measures that promote control and safety in the healthcare environment.

In short, thanks to this program, nurses will be able to update their knowledge in this constantly evolving field, acquiring new skills for their daily practice. In addition, they will do it 100% online since TECH is committed to academic excellence in remote format provided by an innovative Virtual Campus that will avoid uncomfortable displacements for graduates. Also, they will have the opportunity to access the contents according to their schedules or personal work obligations. Although the main option of this program will be to consult the materials from any device with an internet connection, they can be downloaded for online study. This includes materials such as complementary readings, case studies, among others.

This **Postgraduate Certificate in Radiophysics in Nuclear Medicine** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ♦ The development of case studies presented by experts in Radiophysics
- ♦ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ♦ Practical exercises where the self-assessment process can be carried out to improve learning
- ♦ Its special emphasis on innovative methodologies
- ♦ 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



*You will delve into the forms of correction for the reconstruction of diagnostic images obtained with Nuclear Medicine, through this 100% online program"*



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*Looking to become a Nuclear Medicine Nurse Practitioner? Expand your knowledge of the functions of Nuclear Reactors and Accelerators with this pathway”*

The program’s teaching staff includes professionals from the field who contribute their work experience to this educational 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 education programmed to learn 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 during the academic year. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

*You will delve into the application of techniques involved in the emission of accurate radiation doses with radiopharmaceutical therapies.*

*A curriculum tailored to your needs and designed under the most disruptive teaching methodology: Relearning.*

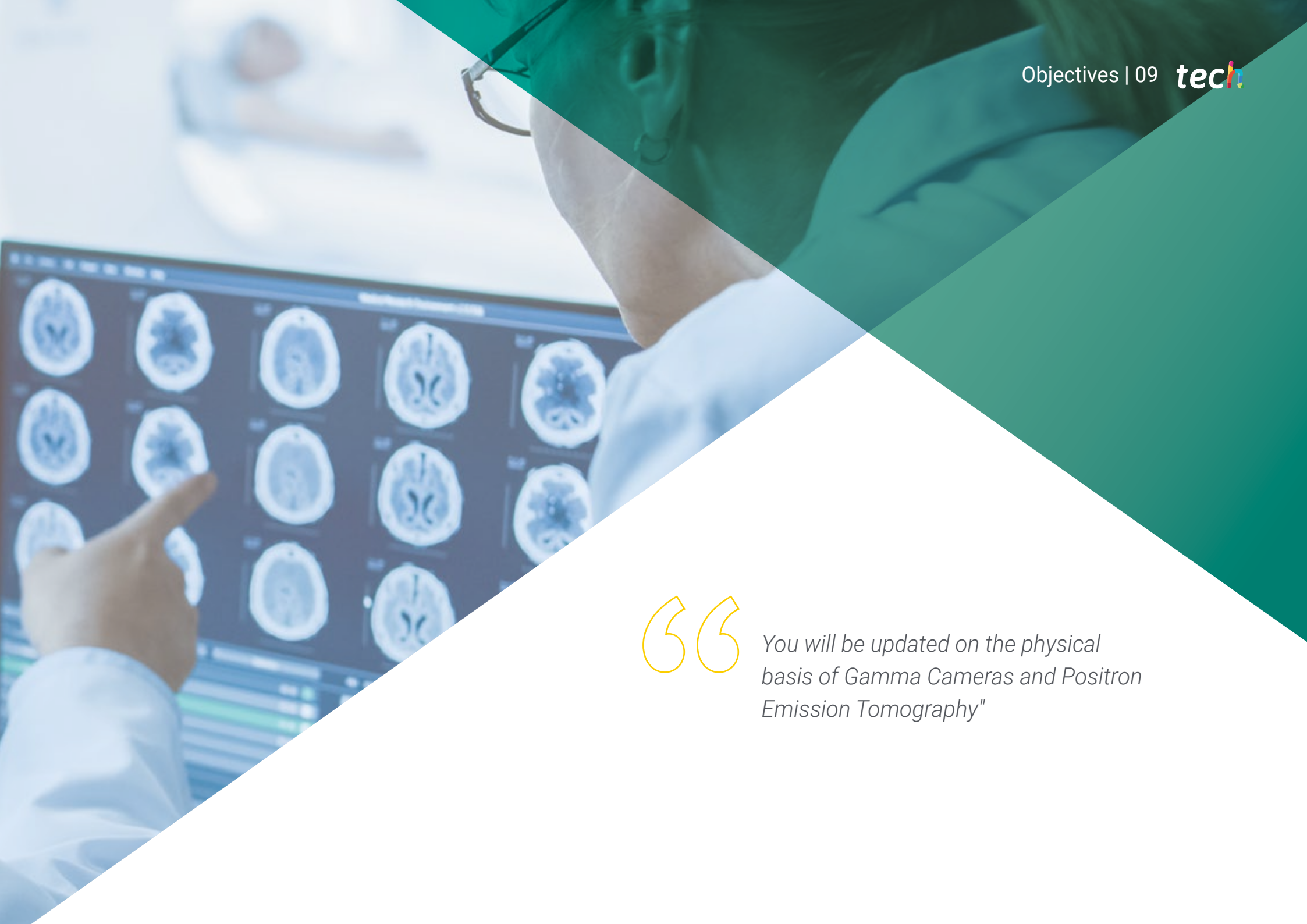


# 02 Objectives

Through this university program, graduates will be able to differentiate the modes of image acquisition from patients with radiopharmaceuticals. In this way, they will broaden their knowledge of the production of high quality photographs and their usefulness for medical diagnoses. At the same time, these professionals will acquire solid knowledge about the lines of health research based on Gammacameras and Positron Emission Tomography. In this way, nurses will be prepared to successfully face the challenges that arise during their clinical procedures.







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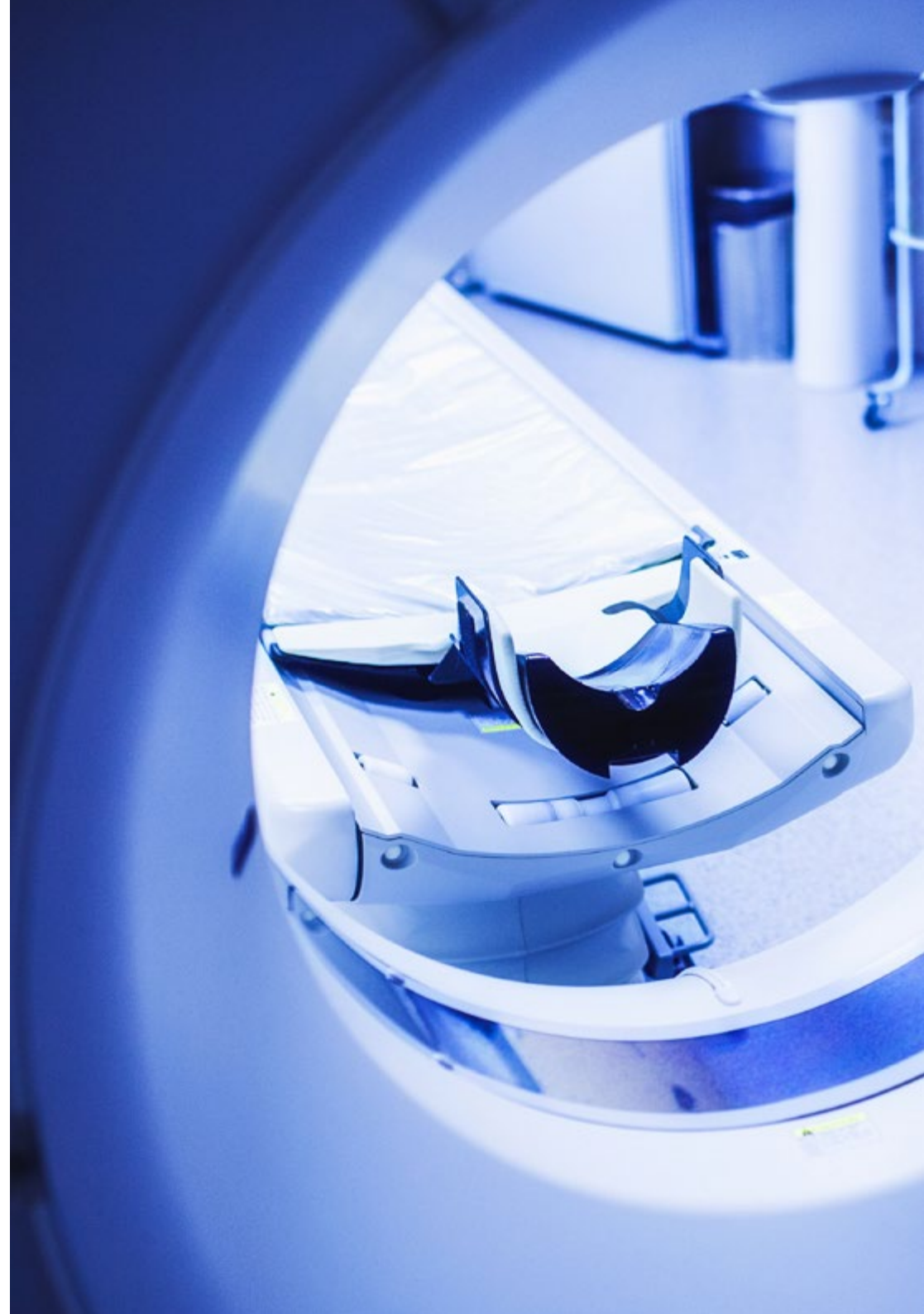
*You will be updated on the physical basis of Gamma Cameras and Positron Emission Tomography”*



## General Objectives

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- ♦ Analyze the basic interactions of ionizing radiation with tissues
- ♦ Establish the effects and risks of ionizing radiation at the cellular level
- ♦ Analyze elements of photon and electron beam measurement in external radiotherapy
- ♦ Examine the quality control program
- ♦ Identify the different treatment planning techniques for external radiotherapy treatment planning techniques
- ♦ Analyze the interactions of protons with matter
- ♦ Examine radiation protection and radiobiology in Proton Therapy
- ♦ Analyze the technology and equipment used in intraoperative radiation therapy
- ♦ Examine the clinical outcomes of Brachytherapy in different oncological contexts
- ♦ Analyze the importance of the Radiological Protection
- ♦ Assimilate the existing risks derived from the use of ionizing radiation
- ♦ Develop the international regulations applicable to radiation protection





## Specific Objectives

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- ◆ Distinguish between modes of image acquisition from a patient with radiopharmaceuticals
- ◆ Develop expertise on MIRDO methodology in patient dosimetry

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*The current importance of Nuclear Medicine makes this Postgraduate Certificate a safe bet, with a market in continuous growth and full of opportunities”*



# 03

# Course Management

In order to offer a first class education to its students, TECH has selected the best professionals in the field of Radiophysics in Nuclear Medicine. These teachers will be responsible for teaching this university program, taking advantage of their years of experience in prestigious hospitals nationwide. It should be noted that, for this reason, the didactic contents offered to the students will be completely applicable to their work environment. In addition to broadening nurses' knowledge, the program will also enable them to acquire new skills aimed at providing high quality medical care.





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*The teaching team of this university program has a long track record of research and professional application”*



## Management



### Dr. De Pérez, Francisco Javier

- ◆ Specialist in Hospital Radiophysics
- ◆ Head of the Radiophysics and Radiological Protection Service at Quirónsalud Hospitals in Alicante, Torrevieja and Murcia
- ◆ Research Group in Personalized Multidisciplinary Oncology, Universidad Católica San Antonio de Murcia
- ◆ PhD in Applied Physics and Renewable Energies, University of Almeria
- ◆ Degree in Physical Sciences, specializing in Theoretical Physics, University of Granada
- ◆ Member of: Spanish Society of Medical Physics (SEFM), Royal Spanish Society of Physics (RSEF), Illustrious Official College of Physicists and Consulting and Contact Committee, Proton Therapy Center (Quirónsalud)

## Professors

### Dr. Rodríguez, Carlos Andrés

- ◆ Specialist in Hospital Radiophysics
- ◆ Physician in Hospital Radiophysics at the University Clinical Hospital of Valladolid, head of the Nuclear Medicine section
- ◆ Principal Tutor of residents of the Department of Radiophysics and Radiological Protection of the Hospital Clínico Universitario de Valladolid
- ◆ Degree in Hospital Radiophysics
- ◆ Degree in Physics at the University of Salamanca



# 04

## Structure and Content

Through 180 hours of learning, this program will focus on the analysis of Radionuclides and their application as radiopharmaceuticals in Nuclear Medicine. For this purpose, the academic itinerary will address in detail the essential instrumentation in this specialty. For example, activimeters, intraoperative probes or tomographs. In this way, students will immediately incorporate the most advanced technology for dosimetry in their professional practice. Likewise, the syllabus will analyze the particularities of tomographic reconstruction and sinograms, thus encouraging students to make corrections to measure doses.



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*From the first day you will be able to access all the syllabus and enjoy the multimedia contents. Forget about fixed schedules with TECH!"*

## Module 1. Nuclear Medicine

- 1.1. Radionuclides used in Nuclear Medicine
  - 1.1.1. Radionuclides
  - 1.1.2. Typical Diagnostic Radionuclides
  - 1.1.3. Typical Therapy Radionuclides
- 1.2. Typical Radionuclides in Therapy
  - 1.2.1. Obtaining Artificial Radionuclides
  - 1.2.2. Cyclotron
  - 1.2.3. Generators
- 1.3. Instrumentation in Nuclear Medicine
  - 1.3.1. Activimeters. Calibration of Activimeters
  - 1.3.2. Intraoperative Probes
  - 1.3.3. Gamma Camera and SPECT
  - 1.3.4. PET:
- 1.4. Quality Assurance Program in Nuclear Medicine
  - 1.4.1. Quality Assurance in Nuclear Medicine
  - 1.4.2. Acceptance, Reference and Constancy Tests
  - 1.4.3. Good Practice Routine
- 1.5. Nuclear Medicine Equipment: Gamma Cameras
  - 1.5.1. Image Formation
  - 1.5.2. Image Acquisition Modes
  - 1.5.3. Standard Patient Protocol
- 1.6. Nuclear Medicine Equipment: SPECT
  - 1.6.1. Tomographic Reconstruction
  - 1.6.2. Synogram
  - 1.6.3. Reconstruction Corrections
- 1.7. Nuclear Medicine Equipment: PET:
  - 1.7.1. Physical Basis
  - 1.7.2. Detector Material
  - 1.7.3. 2D and 3D Acquisition Sensitivity
  - 1.7.4. Time of Flight







- 1.8. Image Reconstruction Corrections in Nuclear Medicine
  - 1.8.1. Attenuation Correction
  - 1.8.2. Dead Time Correction
  - 1.8.3. Random Event Correction
  - 1.8.4. Scattered Photon Correction
  - 1.8.5. Standardization
  - 1.8.6. Image Reconstruction
- 1.9. Quality Control of Nuclear Medicine Equipment
  - 1.9.1. International Guidelines and Protocols
  - 1.9.2. Planar Gamma Cameras
  - 1.9.3. Tomographic Gamma Cameras
  - 1.9.4. PET:
- 1.10. Dosimetry in Nuclear Medicine Patients
  - 1.10.1. MIRD Formalism
  - 1.10.2. Uncertainty Estimation
  - 1.10.3. Erroneous Administration of Radiopharmaceuticals

“*Enroll now and you will study through innovative multimedia didactic formats that will optimize your updating process*”

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 Nursing School we use the Case Method

In a given situation, what should a professional do? 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. Nurses learn better, faster, and more sustainably over time.

*With TECH, nurses can experience a learning methodology 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 real conditions in professional nursing 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. Nurses 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 nursing professional to better integrate knowledge acquisition into the hospital setting or primary care.
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 case studies with a 100% online learning system based on repetition combining a minimum of 8 different elements in each lesson, which is a real revolution compared to the simple study and analysis of cases.



*The nurse 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 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 we have trained more than 175,000 nurses with unprecedented success in all specialities regardless of practical workload. 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 really 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.



### Nursing Techniques and Procedures on Video

We introduce you to the latest techniques, to the latest educational advances, 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 them as many times as you want.



### 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 Radiophysics in Nuclear Medicine guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.





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

This program will allow you to obtain your **Postgraduate Certificate in Radiophysics in Nuclear Medicine** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

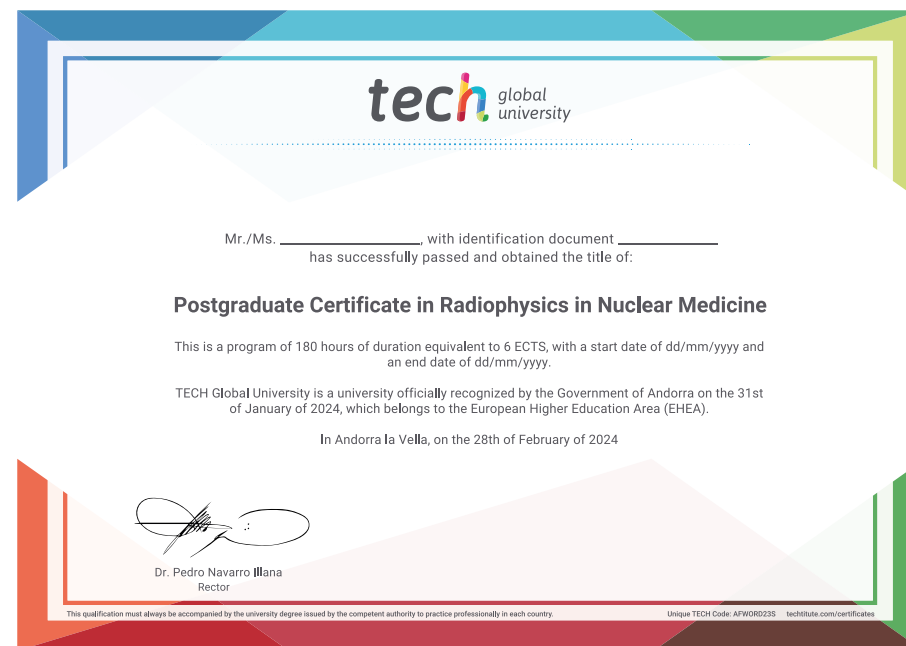
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Radiophysics in Nuclear Medicine**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



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



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