Postgraduate Certificate

Radiophysics in Nuclear Medicine

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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.techtitute.com/us/engineering/postgraduate-certificate/radiophysics-nuclear-medicine**

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01

Introduction

In a medical scenario increasingly oriented towards the precision and personalization of treatments, Nuclear Medicine has become indispensable for accurate diagnoses. The complexity of equipment such as PET, SPECT and Gammacámaras requires specialized engineers, creating a growing demand in the labor market. For medical engineering professionals, immersion in this discipline is not only an opportunity to advance their careers, but also a prevailing need in a constantly evolving medical environment. This context highlights the importance of programs that provide students with the necessary skills to face the technological challenges of Nuclear Medicine and, therefore, meet the specialized labor demand in this field. And all in a 100% online mode.

Thanks to this pioneering TECH program, you will develop skills to evaluate and guarantee radiation safety in the practice of nuclear medicine"

Today, Nuclear Medicine has established itself as an essential field in medical diagnosis and treatment, marking a significant change in clinical practices. The exponential growth in the use of technologies linked to this pioneering technique has created a critical demand for professionals with specific skills in Engineering and Nuclear Medicine.

This is how this university program was born, responding directly to the growing need for engineers who can navigate and apply advanced knowledge in an area where technology and healthcare converge. In this context, the syllabus will focus on essential aspects throughout the development of this Postgraduate Certificate in Radiophysics in Nuclear Medicine, from the imaging and dosimetry of patients, to rigorous quality control of equipment and radiation protection.

Furthermore, not only will it delve into specific technologies, but it will also promote a holistic understanding of the intersection between Engineering and Medicine. This approach will be crucial for graduates not only to acquire technical skills, but also a comprehensive vision necessary to apply this knowledge in a constantly evolving clinical environment.

In this way, the flexibility of the online modality of the university itinerary will give professionals the opportunity to access this specialized program from anywhere in the world. This, combined with the *Relearning*methodology, focused on the repetition of key concepts, will ensure effective and lasting learning, adapting to the pace and unique needs of the engineers in practice.

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

- The development of case studies presented by experts in Radiophysics in Nuclear Medicine
- The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics and practical information on those 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 quality control of advanced diagnostic systems, improving the precision in images and clinical diagnostics"

You will delve into efficient resource management and process optimization in the daily practice of Nuclear Medicine. And in as little as 6 weeks!"

Relearning will allow you to learn with less effort and higher performance, involving you more in your professional specialization.

You will develop competencies to evaluate and guarantee radiological safety in the practice of Nuclear Medicine.

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.

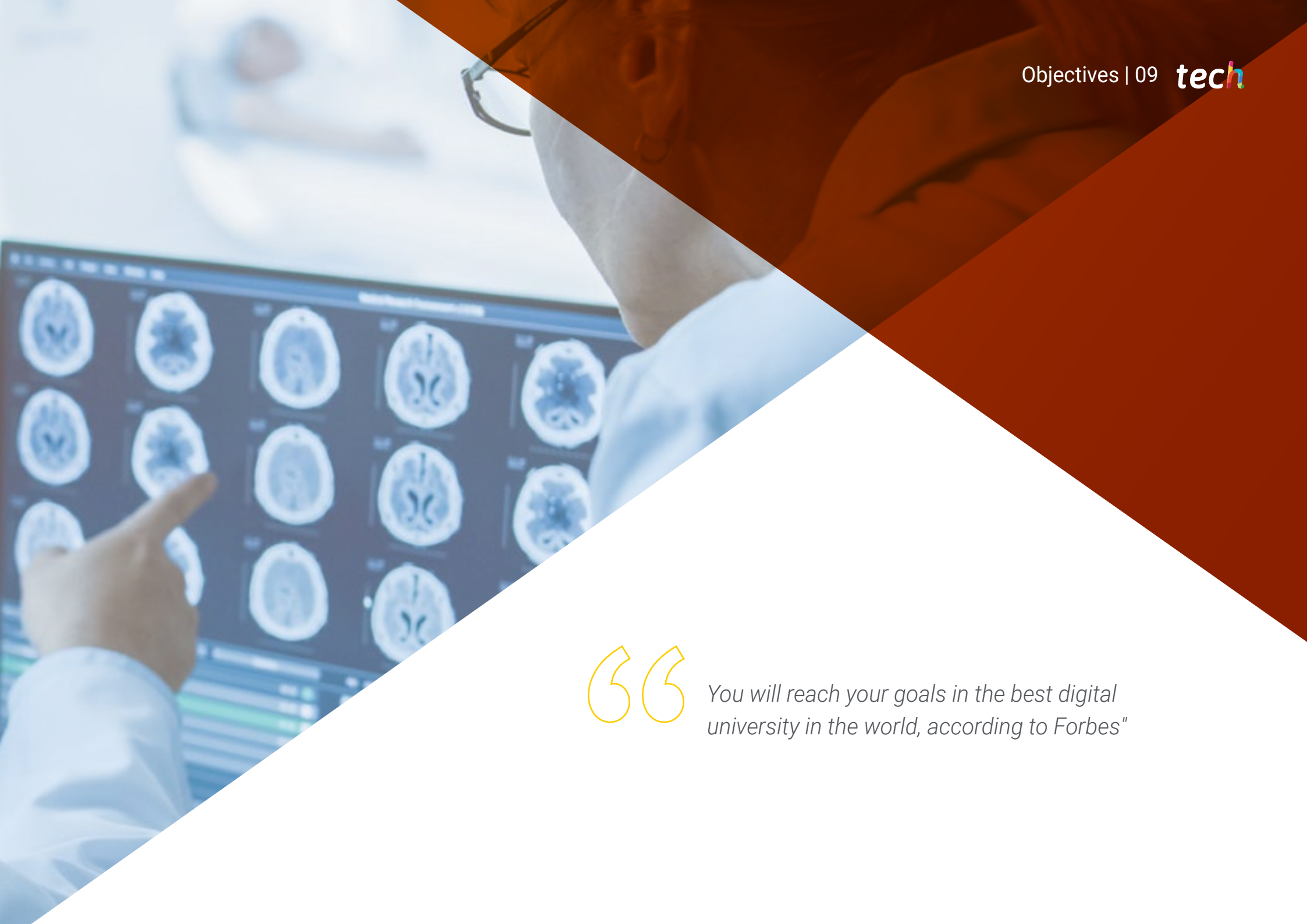
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

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.

02

Objectives

The main objective of this syllabus will be for graduates to delve into the development and quality control of Nuclear Medicine equipment, covering advanced technologies such as PET, SPECT and gamma cameras. Focused on the academic development of engineering professionals, this program will focus on providing students with specialized skills to efficiently implement, operate and maintain the equipment used in Nuclear Medicine. With a practical approach and oriented to current challenges, the academic itinerary will provide essential knowledge to excel in the field of Medical Engineering.

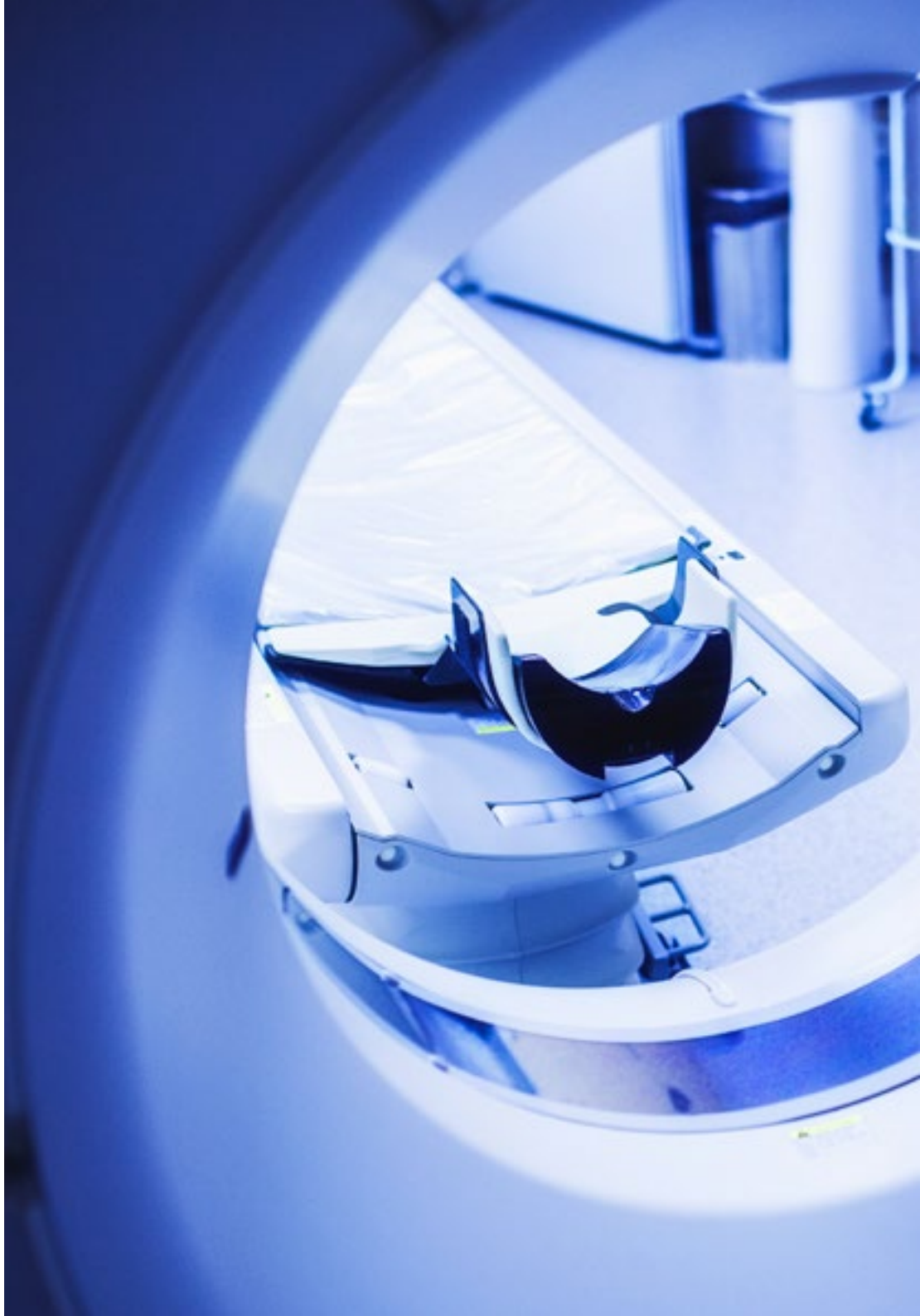


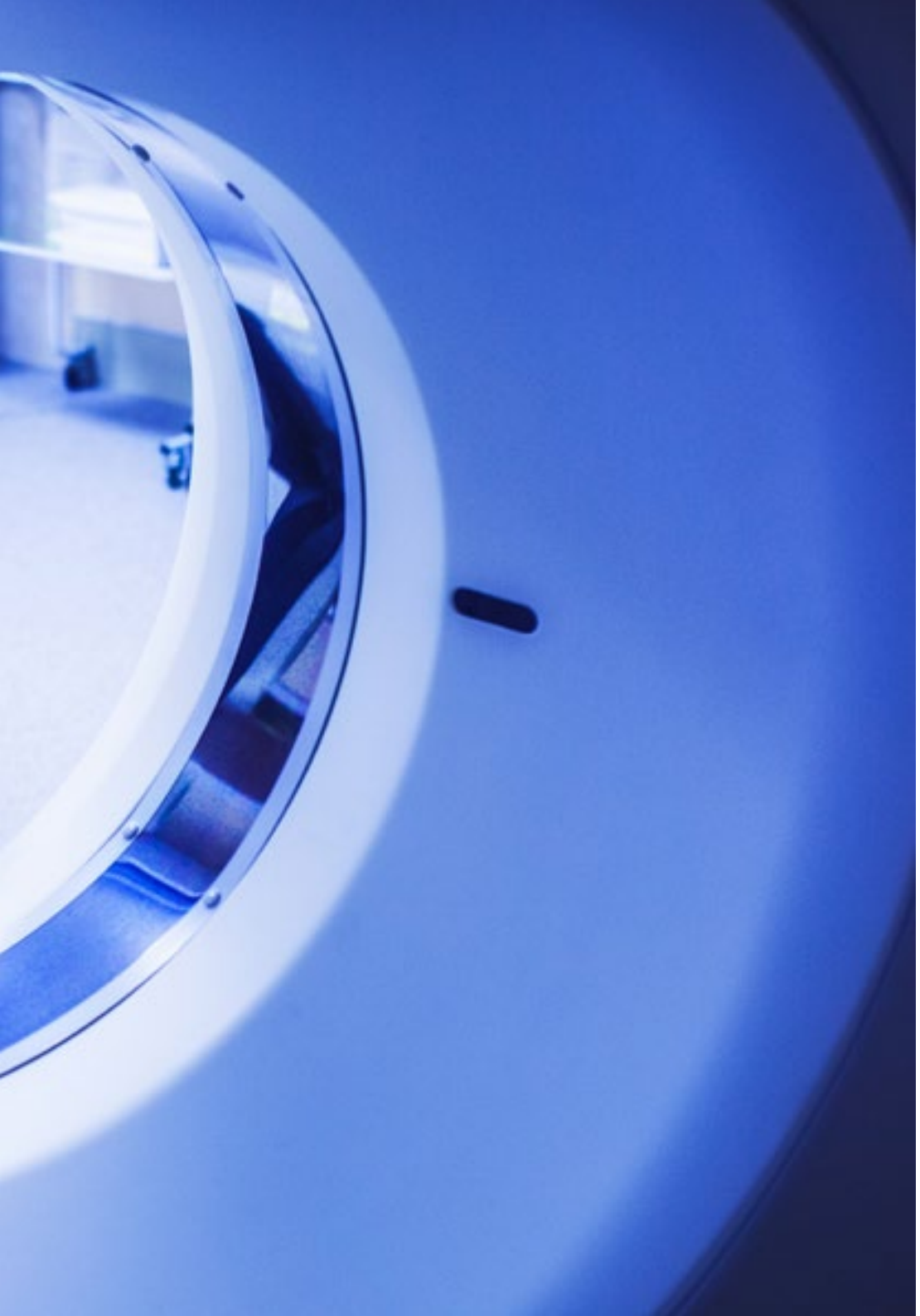
You will reach your goals in the best digital university in the world, according to Forbes"

General Objectives

- Compile the instrumentation of a Nuclear Medicine Service
- Develop in depth knowledge of gamma cameras and PET
- Analyze the operation of both tomographs from quality control
- Develop more advanced concepts of dosimetry in patients

Take advantage of this unique opportunity and take the plunge! You will catch up on the latest technological advances in the field of Nuclear Medicine"





Specific Objectives

- Distinguish between modes of image acquisition from a patient with a radiopharmaceutical
- Fundamentals of the physical basis of gamma camera and PET performance
- Determine the quality controls between gamma cameras and PET
- Develop specialized knowledge on the MIRD methodology in patient dosimetry

03

Course Management

The faculty of the Postgraduate Certificate in Radiophysics in Nuclear Medicine consists of distinguished specialists, carefully selected by TECH due to their extensive and recognized professional background in the field of Medical Engineering. These experts bring a unique combination of theoretical knowledge and practical experience in the field of Nuclear Medicine, providing graduates with a valuable and up-to-date perspective. In addition, this faculty will guarantee high quality instruction, preparing students to face the specific challenges and demands of the application of nuclear technologies in medical environments.

The faculty of this program has a long history of research and professional application"

Management

Dr. De Luis 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, Catholic University San Antonio of Murcia
- Ph.D. 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

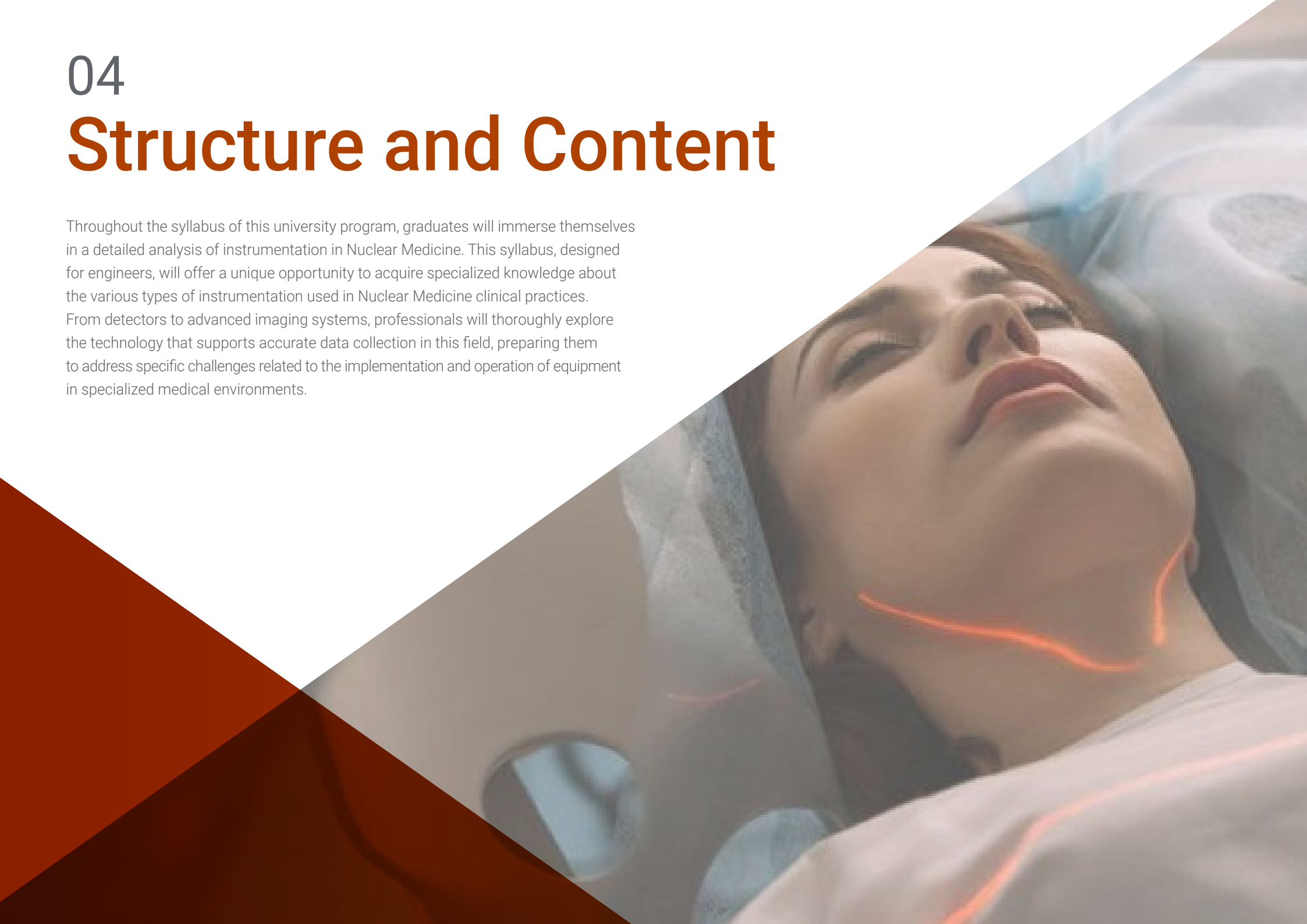
Dr. Rodríguez, Carlos Andrés

- Specialist in Hospital Radiophysics
- Physician in Hospital Radiophysics at the University Clinical Hospital of Valladolid, responsible for the Nuclear Medicine section
- Principal Tutor of residents of the Department of Radiophysics and Radiological Protection of the University Clinical Hospital of Valladolid
- Degree in Hospital Radiophysics
- Degree in Physics at the University of Salamanca

04

Structure and Content

Throughout the syllabus of this university program, graduates will immerse themselves in a detailed analysis of instrumentation in Nuclear Medicine. This syllabus, designed for engineers, will offer a unique opportunity to acquire specialized knowledge about the various types of instrumentation used in Nuclear Medicine clinical practices. From detectors to advanced imaging systems, professionals will thoroughly explore the technology that supports accurate data collection in this field, preparing them to address specific challenges related to the implementation and operation of equipment in specialized medical environments.



Bet on TECH! You will apply the most advanced Nuclear Medicine techniques and delve into the development of this clinical technology"

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 Radionuclides in Therapy

1.2. Obtaining Artificial Radionuclides
- 1.2.1. Nuclear Reactor
- 1.2.2. Cyclotron
- 1.2.3. Generators

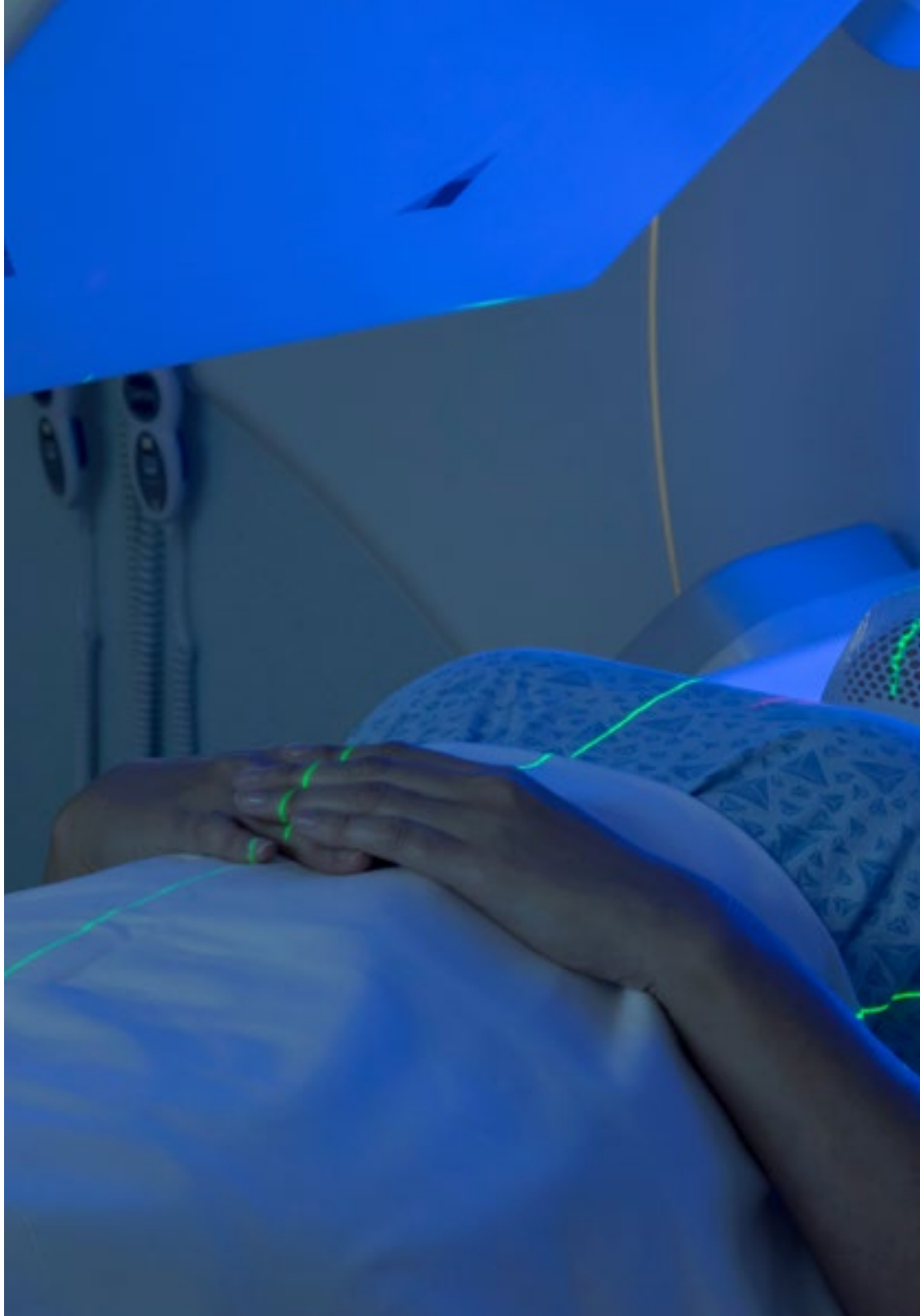
1.3. Instrumentation in Nuclear Medicine
- 1.3.1. Activimeters. Calibration of Activimeters
- 1.3.2. Intraoperative Probes
- 1.3.3. Gammacameras and SPECT
- 1.3.4. PET

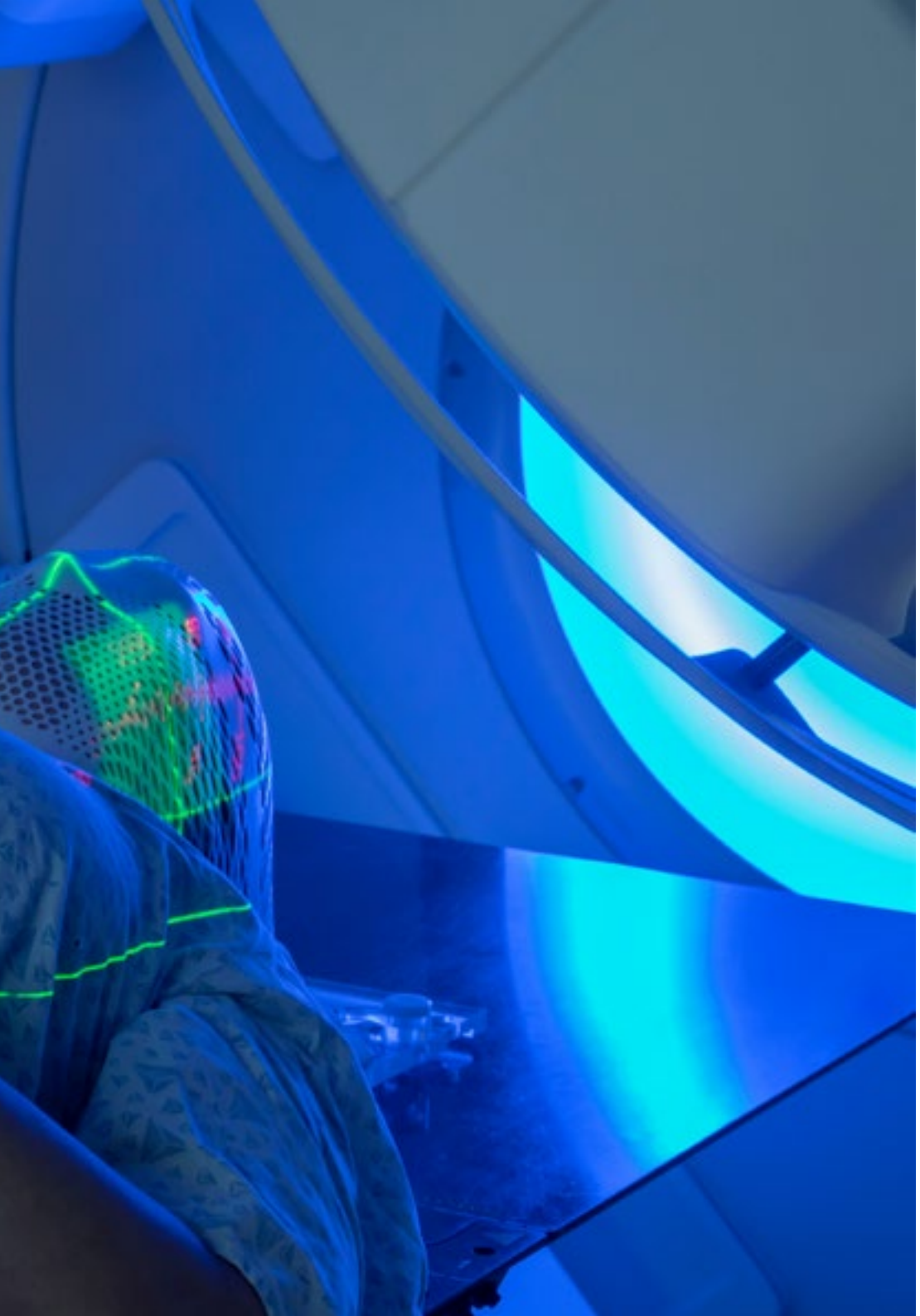
1.4. Quality Assurance Program in Nuclear Medicine
- 1.4.1. Quality Assurance in Nuclear Medicine
- 1.4.2. Acceptance, Reference and Consistency Tests
- 1.4.3. Good Practice Routine

1.5. Nuclear Medicine Equipment: Gamma Cameras
- 1.5.1. Image Formation
- 1.5.2. Image Acquisition Modes
- 1.5.3. Standard Protocol for a Patient

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. Estimation of Uncertainties
- 1.10.3. Erroneous Administration of Radiopharmaceuticals

Register and you will access the Virtual Campus at any time, being able to download the contents to consult them whenever you want"

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"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

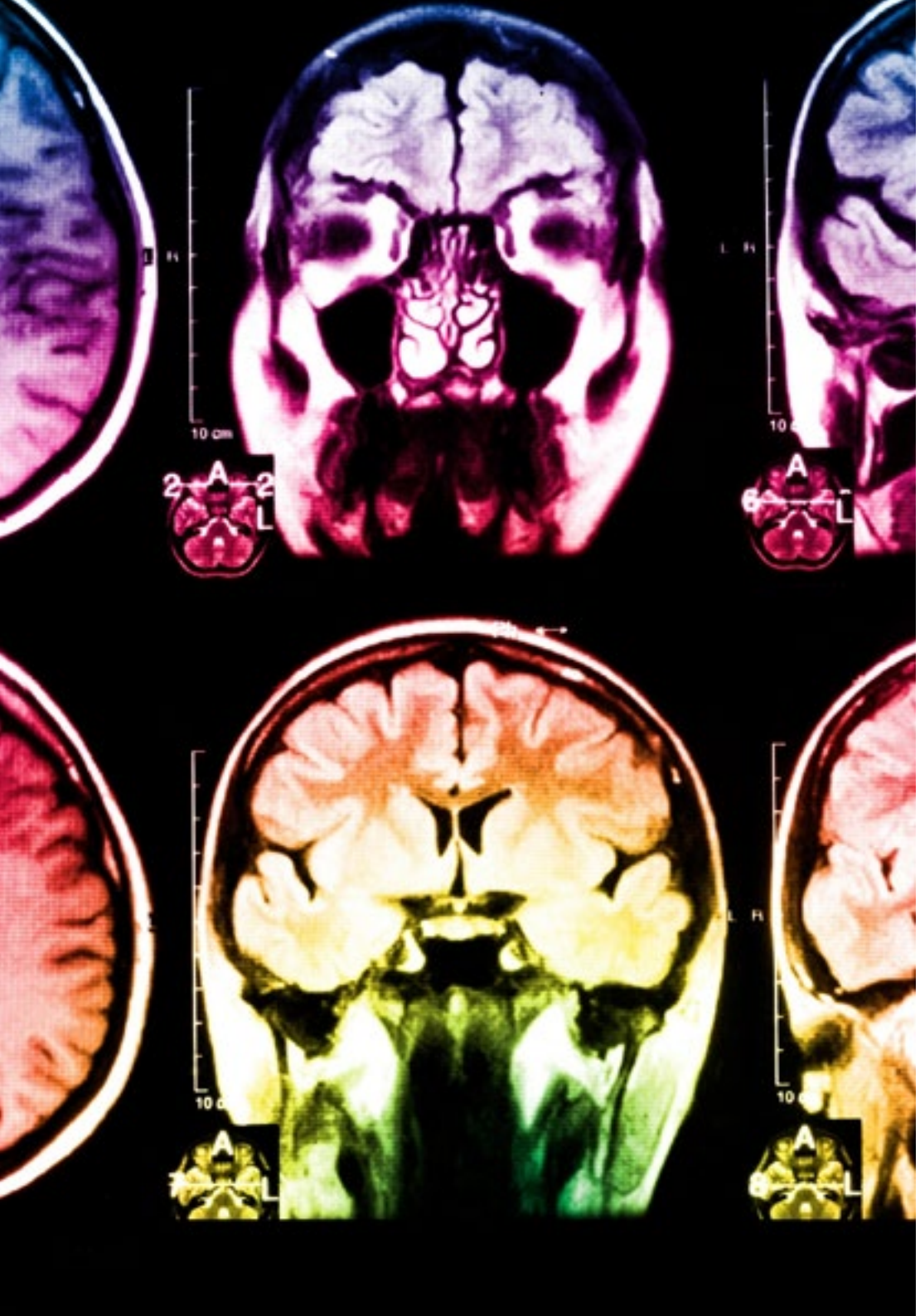
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



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. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

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

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

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.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

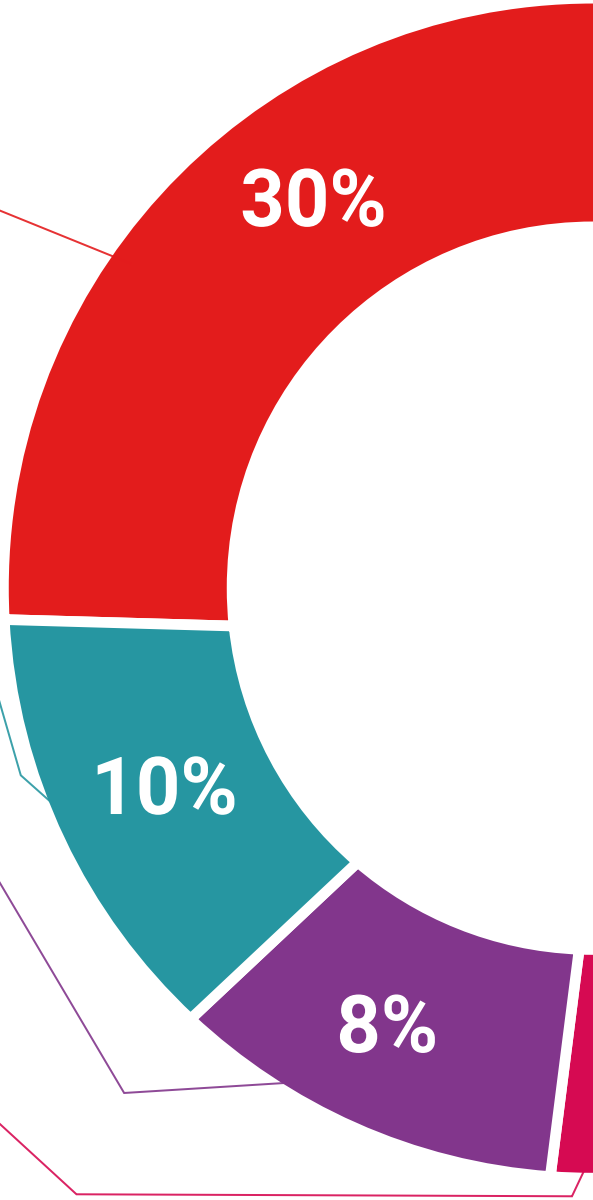
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

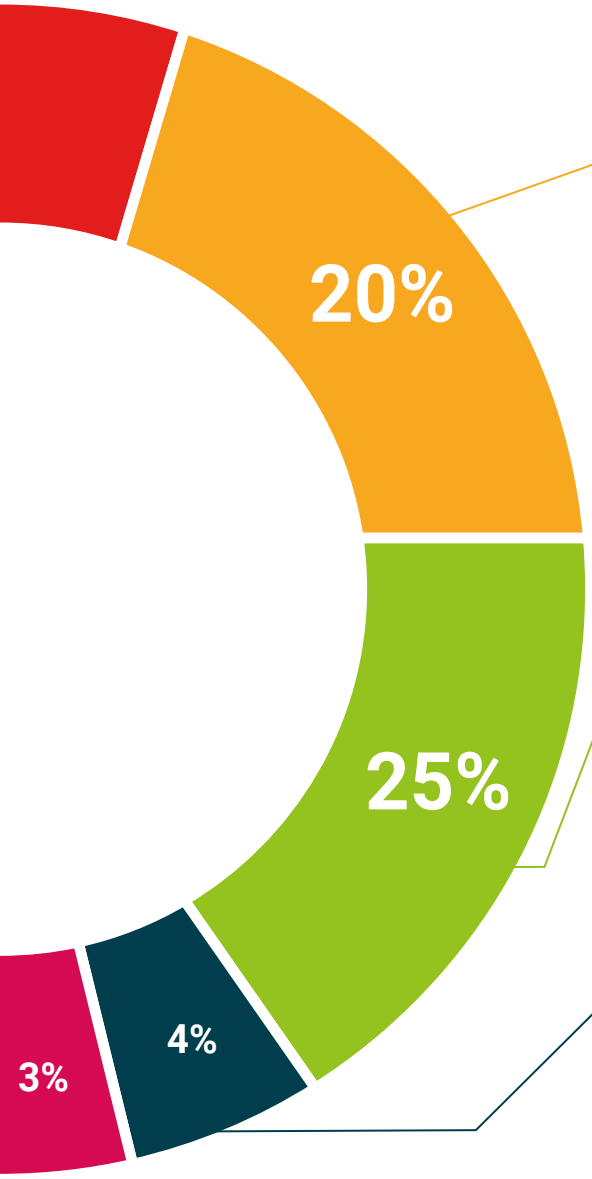
Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

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.





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

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".

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.

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.

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.

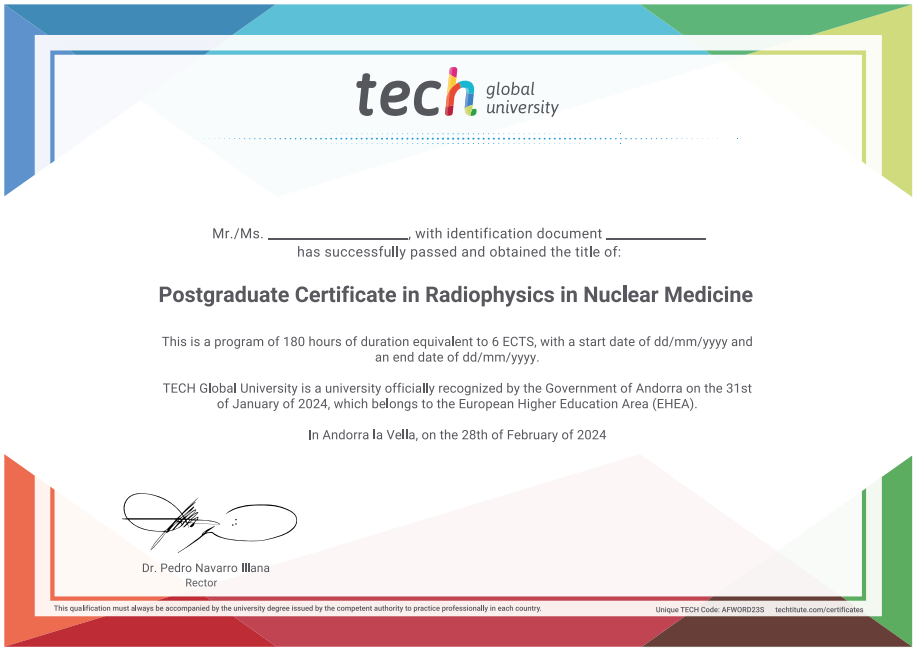
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

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

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Certificate in Radiophysics in Nuclear Medicine

This is a program of 180 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

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 diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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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**

Postgraduate Certificate

Radiophysics in Nuclear Medicine

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