Postgraduate Certificate

Radiation Measurement Radiophysics

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Postgraduate Certificate
Radiation Measurement
Radiophysics

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

Website: **www.techtitute.com/pk/engineering/postgraduate-certificate/radiation-measurement-radiophysics**

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Introduction

The constant technological evolution associated with radiological equipment is one of the main challenges of Radiophysics. Although these sophisticated tools have allowed a better control of the uncertainty values when emitting a radiation dose, the verification of these data is still essential and must be adjusted to the latest scientific evidence. In this sense, engineers must have the most updated knowledge to be able to implement sophisticated verification methods with the minimum possible errors. Under this premise, TECH has designed a comprehensive program where these professionals can expand their skills in relation to the components of the measurement detectors and the latest discoveries on photon-matter interaction. All this, in addition, through a disruptive 100% online methodology.

Thanks to this exclusive TECH program you will be able to design efficient radiological systems, contributing to the technological and scientific progress of society"

The study of the interactions between ionizing radiation and protons with matter has led to the development of complex radiophysical technologies that have an impact on various sectors. One of them is the medical field, which today has sophisticated equipment for the diagnosis of different pathologies or for the intervention of tumors. In order to make the most of these tools, it is necessary to have highly trained professionals for their maintenance and to be able to solve potential incidents. For this reason, engineers must keep their knowledge and skills up to date, handling the most advanced dosimetric instruments and state-of-the-art procedures for their calibration.

Providing these specialists with a rigorous update is the main objective of this TECH Technological University Postgraduate Certificate. Its syllabus includes innovative aspects regarding the Radiation Measurement Radiophysics, specifically in relation to its accuracy, reproducibility, traceability and quality control. Also, the syllabus covers the design and maintenance of radiological equipment and applications of thermoluminescence dosimeters, as well as detectors for the measurement of ionizing radiation.

In addition, this syllabus has a disruptive methodology in a 100% online format that allows students to combine their studies with other work obligations. Likewise, the innovative Relearning system, of which TECH is a pioneer, facilitates the natural assimilation of concepts through its continuous, gradual and flexible reiteration. On the other hand, in its very complete Virtual Campus, graduates have access to complementary study materials. These include explanatory videos, interactive summaries, infographics, self-knowledge tests and many more. In short, the entire academic itinerary is designed so that engineers can adjust their learning to their schedules and work obligations. All thanks to the fact that this academic itinerary is not subject to hermetic schedules or strict evaluation chronograms.

This **Postgraduate Certificate in Radiation Measurement Radiophysics** contains the most complete and up-to-date program on the market. Its most notable features are:

- Development of practical case studies presented by experts in Radiation Measurement Radiophysics
- 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 self-assessment can be used 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

The interactive summaries of each topic will allow you to consolidate in a more dynamic way the concepts on the international regulations applicable to radiation protection"

In just 6 weeks you will deepen your knowledge of radiological protection and radiobiology thanks to TECH, the best digital university in the world according to Forbes"

The 100% online methodology of this program will allow you to update your knowledge without interrupting your professional work.

You will delve into dosimeter calibration with this innovative university program.

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.

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Objectives

The objectives of this Postgraduate Certifacte converge in the integral training of engineers in the physical principles of ionizing radiation. The main purpose is for graduates to achieve a deep understanding of the fundamental interactions of ionizing radiation with biological tissues and other material elements. Throughout this program, professionals have the opportunity to comprehensively analyze the associated physical and biological processes, acquiring the necessary skills to evaluate, interpret and manage radiation.

You will achieve your objectives thanks to TECH's didactic tools, including explanatory videos and interactive summaries"

General Objectives

- Analyze the basic interactions of ionizing radiation with tissues
- Establish the effects and risks of ionizing radiation at the cellular level
- Analyze elements of the measurement of photon and electron beams in external radiation therapy
- Examine the quality control program
- Identify the different planning techniques for external radiotherapy treatments
- 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 oncologic settings
- Analyze the importance of radiation protection
- Assimilate the existing risks derived from the use of ionizing radiation
- Develop the international regulations applicable to radiation protection

Specific Objectives

- Internalize the Bragg-Gray theory and the dose measured in air
- Develop the limits of the different dosimetric quantities
- Analyze the calibration of a dosimeter

Do you want to experience a quality leap in your career as an engineer? With TECH you will master the techniques of source calibration using well chambers and in air"

03

Course Management

The faculty of this university program is composed of a select group of experts. Each member of this faculty has an extensive and recognized professional background in the field of Radiophysics, guaranteeing engineering professionals access to quality training. These specialists not only contribute their vast practical experience, but also their commitment to academic excellence, ensuring that students acquire solid and updated knowledge in Radiation Measurement technologies, essential to excel in this demanding field.

Enroll and you will have access to a syllabus designed by a reputable faculty that will guarantee rigorous learning"

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
- 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)

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Structure and Content

The Postgraduate Certificate in Radiation Measurement Radiophysics is a solid training for engineering professionals seeking to specialize in the field of radiology. Throughout the program, graduates will explore in depth the fundamental principles of gamma cameras and their application in radiation detection, as well as the advanced aspects of Positron Emission Tomography (PET). This academic program will provide the necessary tools to understand, evaluate and apply specialized techniques in the field of Radiophysics, preparing students to face the latest technological and scientific challenges.

Get updated in the dosimetry of ionizing radiation by the best experts in the field. Boost your career with TECH!"

Module 1. Interaction of Ionizing Radiation with Matter

1.1. Ionizing Radiation-Matter Interaction
- 1.1.1. Ionizing Radiation
- 1.1.2. Collisions
- 1.1.3. Braking Power and Range

1.2. Charged Particle-Matter Interaction
- 1.2.1. Fluorescent Radiation
  - 1.2.1.1. Characteristic Radiation or X-rays
  - 1.2.1.2. Auger Electrons
- 1.2.2. Braking Radiation
- 1.2.3. Spectrum Upon Collision of Electrons with a High Z Material
- 1.2.4. Electron-Positron Annihilation

1.3. Photon-Matter Interaction
- 1.3.1. Attenuation
- 1.3.2. Hemireductive Layer
- 1.3.3. Photoelectric Effect
- 1.3.4. Compton Effect
- 1.3.5. Pair Creation
- 1.3.6. Predominant Effect According to Energy
- 1.3.7. Imaging in Radiology

1.4. Radiation Dosimetry
- 1.4.1. Equilibrium of Charged Particles
- 1.4.2. Bragg-Gray Cavity Theory
- 1.4.3. Spencer-Attix Theory
- 1.4.4. Absorbed Dose in Air

1.5. Radiation Dosimetry Quantities
- 1.5.1. Dosimetric Quantities
- 1.5.2. Radiation Protection Quantities
- 1.5.3. Radiation Weighting Factors
- 1.5.4. Weighting Factors of the Organs According to Radiosensitivity

1.6. Detectors for the Measurement of Ionizing Radiation
- 1.6.1. Ionization of Gases
- 1.6.2. Excitation of Luminescence in Solids
- 1.6.3. Dissociation of Matter
- 1.6.4. Detectors in the Hospital Environment

1.7. Ionizing Radiation Dosimetry
- 1.7.1. Environmental Dosimetry
- 1.7.2. Area Dosimetry
- 1.7.3. Personal Dosimetry

1.8. Thermoluminescence Dosimeters
- 1.8.1. Thermoluminescence Dosimeters
- 1.8.2. Dosimeter Calibration
- 1.8.3. Calibration at the National Dosimetry Center

1.9. Physics of Radiation Measurement
- 1.9.1. Value of a Quantity
- 1.9.2. Accuracy
- 1.9.3. Precision
- 1.9.4. Repeatability
- 1.9.5. Reproducibility
- 1.9.6. Traceability
- 1.9.7. Quality in Measurement
- 1.9.8. Quality Control of an Ionization Chamber

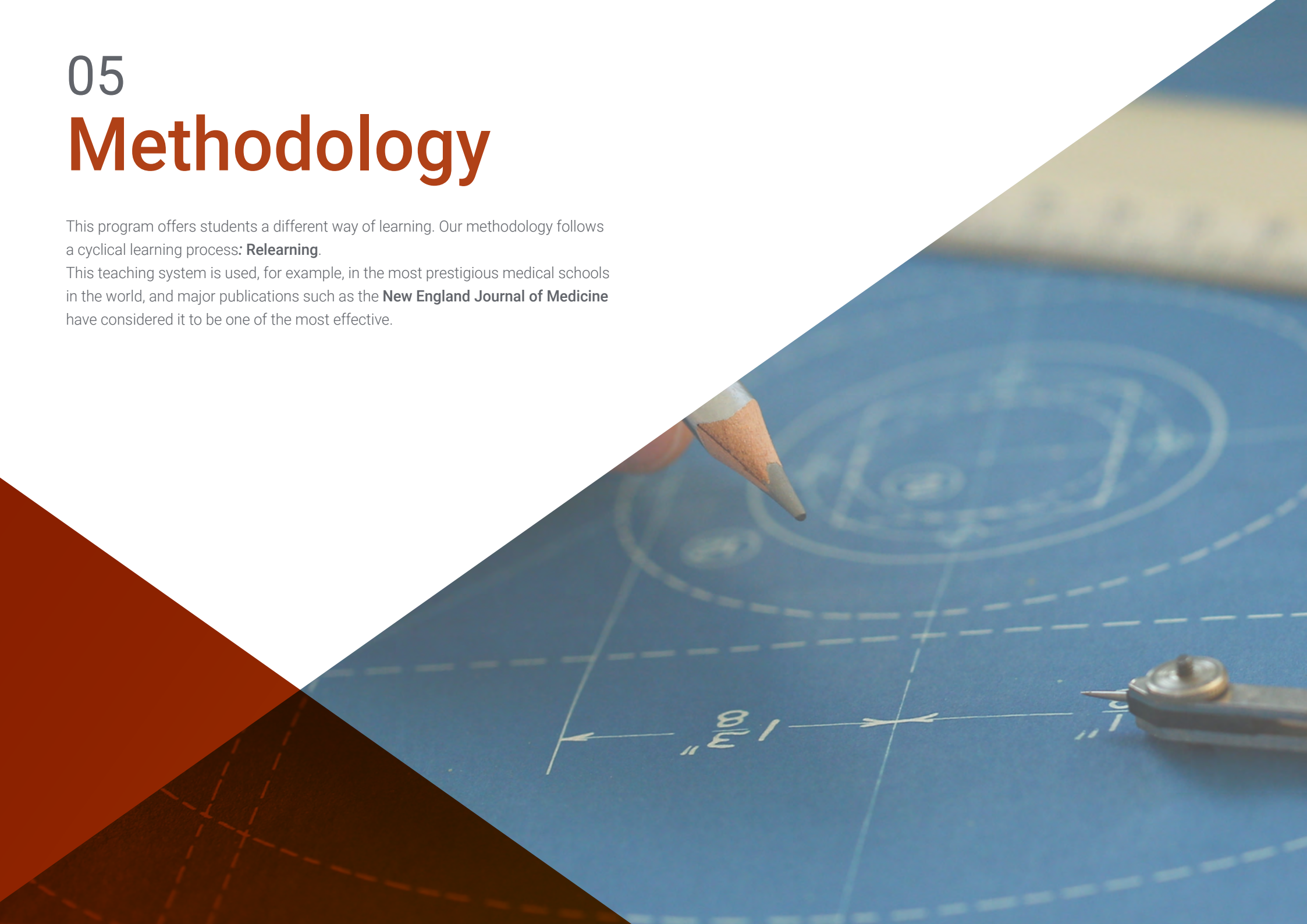
1.10. Uncertainty in Radiation Measurement
- 1.10.1. Measurement Uncertainty
- 1.10.2. Tolerance and Action Level
- 1.10.3. Type A Uncertainty
- 1.10.4. Type B Uncertainty

05

Methodology

This program offers students a different way of learning. Our methodology follows a cyclical learning process**: 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 method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a way of learning 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

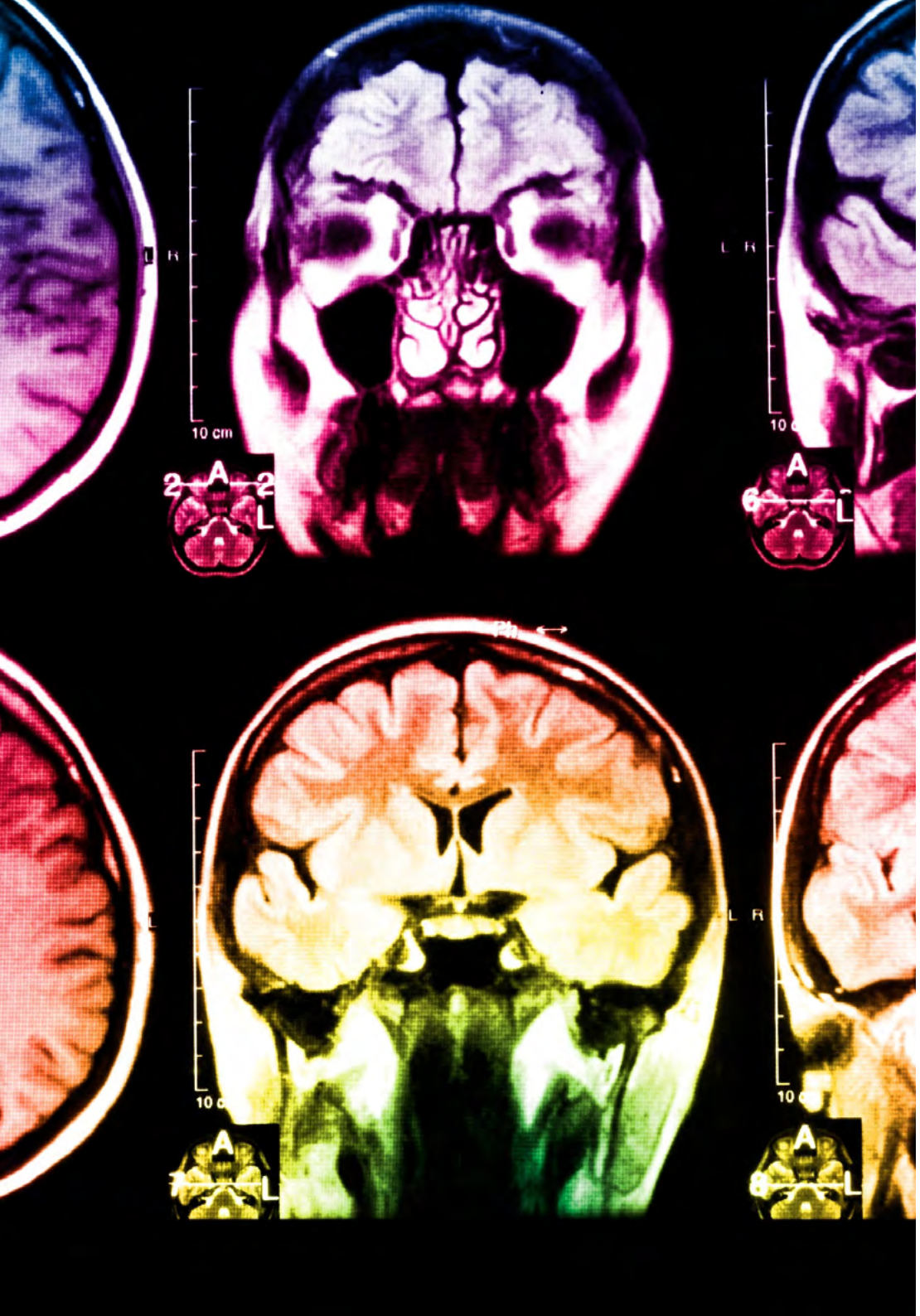
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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 prepare 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 prepared 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 education, 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 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.

Classes

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

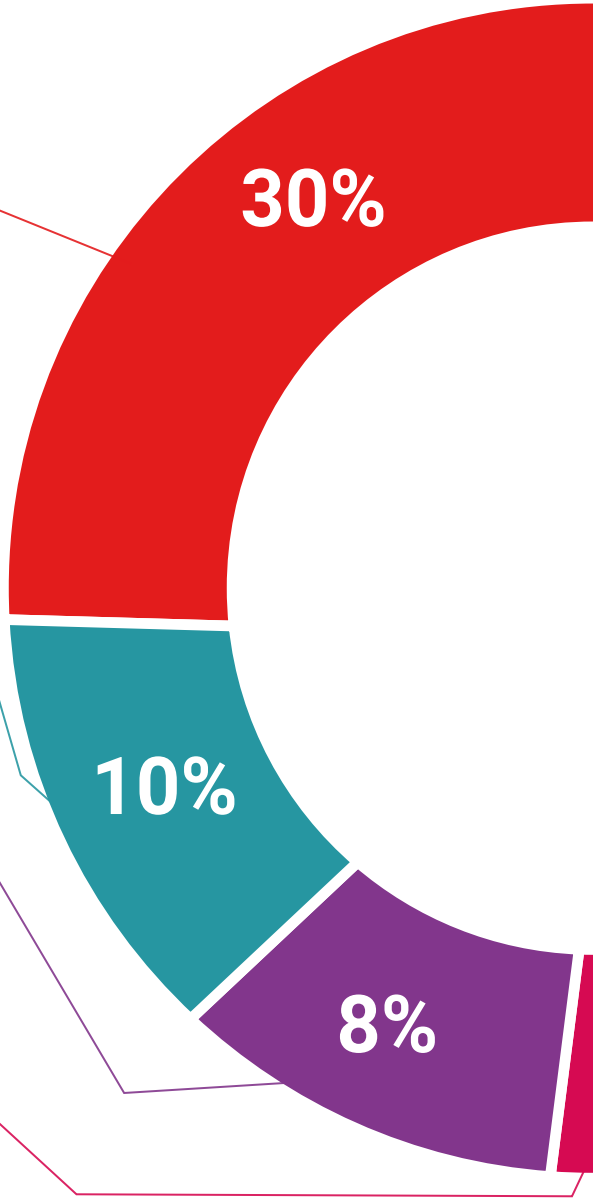
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

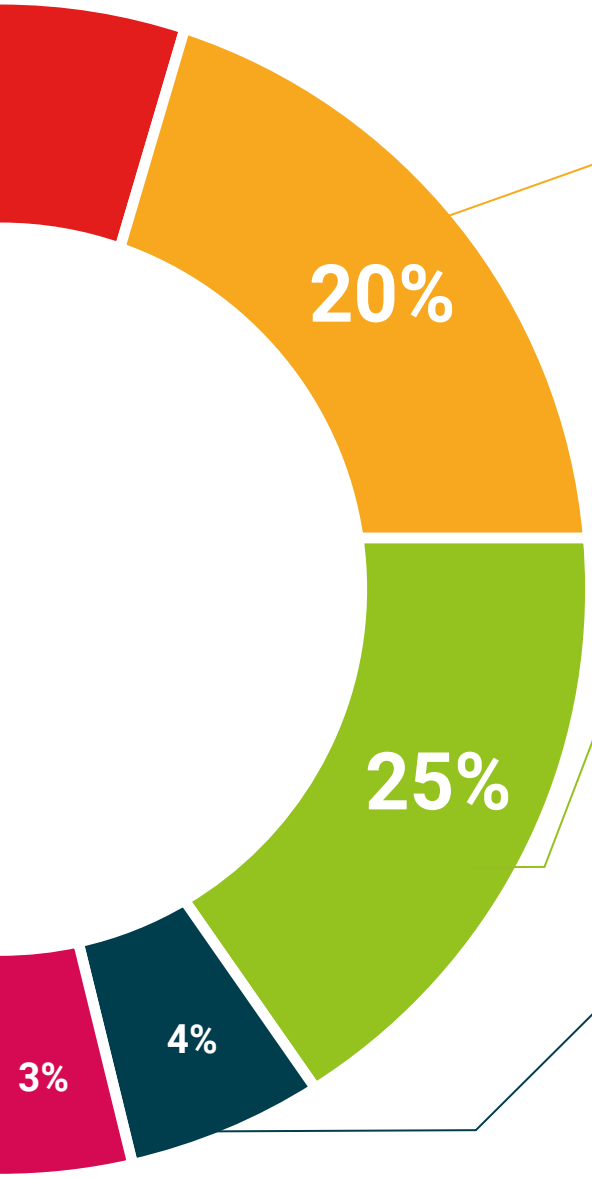
Practicing Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic field. 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 assess and re-assess 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 Radiation Measurement Radiophysics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.

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

This **Postgraduate Certificate in Radiation Measurement Radiophysics** contains the most complete and up-to-date 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 certificate 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 Radiation Measurement Radiophysics**

Official Nº of Hours: **150 h.**


tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Radiation Measurement Radiophysics

This is a qualification awarded by this University, equivalent to 150 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

June 17, 2020

Tere Guevara Navarro

Dean

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

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

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