

Postgraduate Certificate

Radiation Measurement

Radiophysics





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.techtute.com/in/medicine/postgraduate-certificate/radiation-measurement-radiophysics

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01

Introduction

The ionization chamber is a device that is increasingly used in radiation therapy as it is used to measure the radiation dose administered to patients during their treatments. However, inadequate maintenance could entail significant risks for both users and professionals. These include the dangers of leakage or unwanted exposure. To prevent this from happening, clinicians must be up to date on the safety procedures established to the letter. In this context, TECH has developed a comprehensive program that delves into quality control in these chambers. In addition, it is taught in a 100% online mode to ensure greater convenience and flexibility for students.





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You will incorporate to your professional practice the use of the latest detectors for radiation measurement through this complete 100% online program"

Radiation Dosimetry is of great importance to the medical industry. It is a critical aspect to ensure that users are protected from the harmful effects of irradiations while they are used for disease diagnosis. In addition, this measure also makes it possible to control the amount of irradiation to which workers are exposed, thus ensuring that they do not exceed the established safety limits. In view of this, more and more entities are seeking to incorporate Radiophysics professionals into their teams to take the appropriate procedures to minimize risks.

In response to this need, TECH has implemented a comprehensive program focused on the technology used in healthcare fields such as Radiodiagnosis. Designed by an experienced faculty, this curriculum will analyze charged particle interactions, among which Auger electrons and X-rays stand out. In addition, the teaching materials will address detectors for the measurement of ionizing radiation, addressing factors such as the dissociation of matter or detectors in the hospital setting. The contents will also delve into thermoluminescence dosimeters, emphasizing the usefulness of the calibration process. In this way, graduates will effectively develop the limits of the different dosimetric magnitudes.

It should be noted that the methodology of this program reinforces its innovative character. TECH offers a 100% online learning environment, adapted to the needs of busy professionals seeking to advance their careers. In addition, it will employ the Relearning methodology, based on the repetition of key concepts to fix knowledge and facilitate learning. In this way, the combination of flexibility and a robust pedagogical approach makes it highly accessible. In addition, physicians will have access to a didactic library with a variety of multimedia resources in different formats such as interactive summaries, explanatory videos and infographics. Specialists will also learn in simulated learning environments to extract valuable lessons to be applied in their work practice.

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

- ♦ 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 approach the braking radiation and its medical applications thanks to TECH, the best digital university in the world according to Forbes"

“

You will analyze in detail the Dosimetry of Ionizing Radiation and plan the most advanced radiotherapy treatments”

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 Compton Effect to obtain the most detailed images of the inside of the human body.

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



02 Objectives

This Postgraduate Certificate will enable the physician to master the basics of Ionizing Radiation Dosimetry. In this sense, the specialists will make a clear differentiation between radiological and dosimetric protection measures. Likewise, they will internalize both the Bragg-Gray theory and the dose measured in the air, so that the ionization chambers have a proper functioning.





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You will extend your practical skills through real cases and resolution of complex situations in simulated learning environments”



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 photon and electron beam measurement in external radiotherapy
- ♦ 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 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

- 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

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The Relearning system, in which TECH is a pioneer, will guarantee you the highest standards of medical excellence”

03

Course Management

In its maximum to offer educational best quality, TECH has a prestigious teaching faculty. These specialists have an extensive work background, having been part of renowned hospital centers. In addition, they are characterized by a deep knowledge in Radiation Measurement Radiophysics and offer the most advanced technological resources in the health market. In this way, the students have the guarantees they need to update their skills and acquire new skills to provide quality service to their patients.



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The faculty of this training has a long history of research and professional application of Radiophysics in Medicine"

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, 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)



04

Structure and Content

This curriculum will thoroughly address the interactions of ionizing radiation as it interacts with matter. In this way, the syllabus will delve into the physical basis of radiation dosimetry to understand how to measure personal and environmental dose. On the other hand, the didactic materials will analyze the quality control aimed at the camera detectors most commonly used in the Physics and Radiation Protection Service in hospital centers.

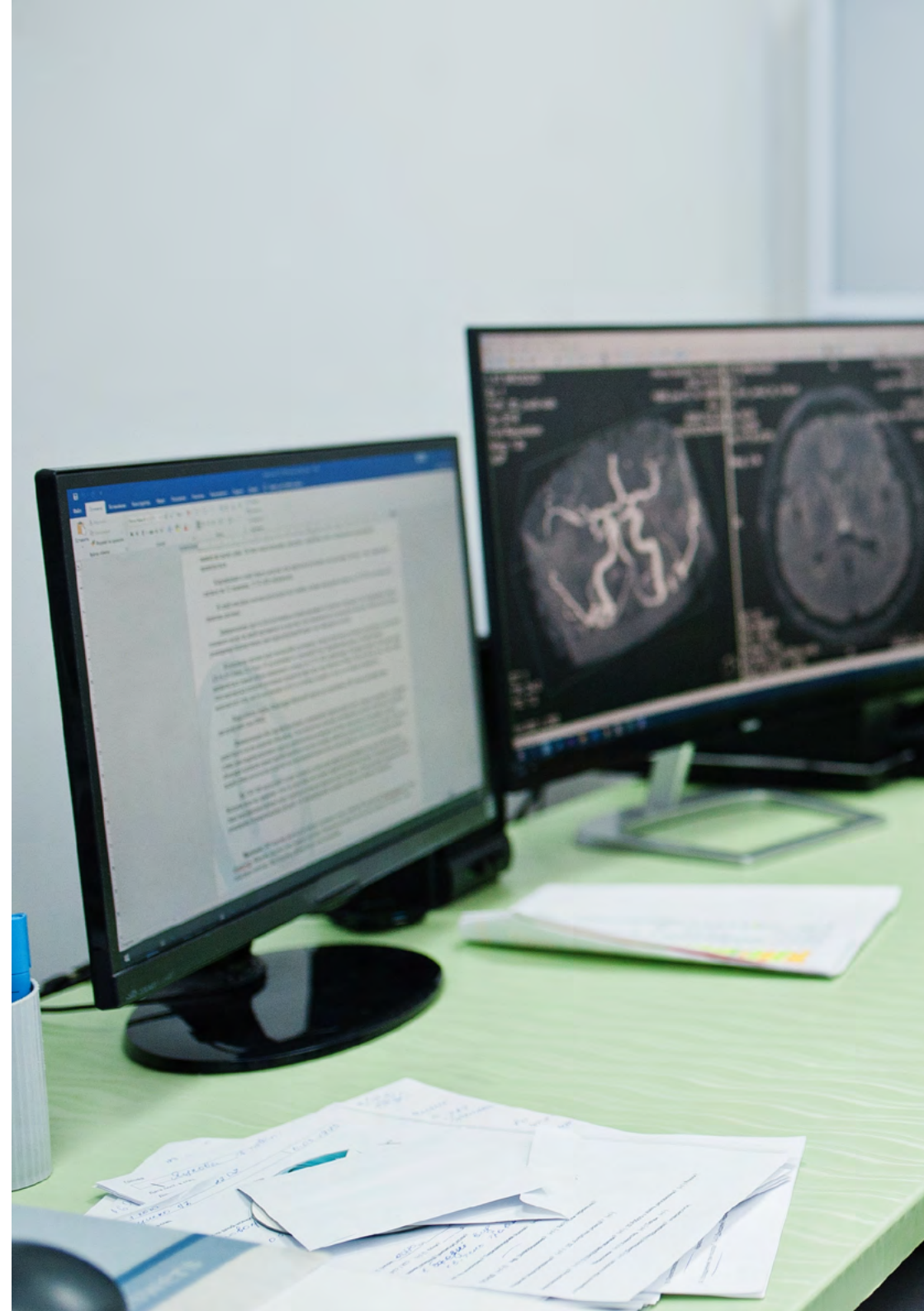


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You will be able to distinguish between dosimetric and radiological protection measurements through this intensive 6-week academic itinerary”

Module 1. Interaction of Ionizing Radiation with Matter

- 1.1. Radiation Ionizing-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. Charged Particle Equilibrium
 - 1.4.2. Bragg-Gray Cavity Theory
 - 1.4.3. Spencer-Attix Theory
 - 1.4.4. Absorbed Dose in Air
- 1.5. Magnitudes in Radiation Dosimetry
 - 1.5.1. Dosimetric Quantities
 - 1.5.2. Radiation Protection Quantities
 - 1.5.3. Radiation Weighting Factors
 - 1.5.4. Weighting Factors of Organs according to their 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 Setting
- 1.7. Dosimetry of Ionizing Radiation
 - 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. Calibration of Dosimeters
 - 1.8.3. Calibration at 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 the Measurement
 - 1.9.8. Quality Control of an Ionization Chamber
- 1.10. Uncertainty in Radiation Measurement
 - 1.10.1. Uncertainty in the Measurement
 - 1.10.2. Tolerance and Action Level
 - 1.10.3. Type A Uncertainty
 - 1.10.4. Type B Uncertainty

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 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.



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 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.



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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 Radiation Measurement Radiophysics** 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 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 N° of Hours: **150 h.**



*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.

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



Postgraduate Certificate
Radiation Measurement
Radiophysics

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

Postgraduate Certificate

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