

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/pk/nursing/postgraduate-certificate/radiation-measurement-radiophysics

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01

Introduction

In the context of radiotherapy, detectors for measuring ionizing radiation play a key role in the application of treatments. The main reason is that these tools make it possible to establish the amount of radiation to which patients and health professionals are exposed. In this way, these instruments ensure that the rays are precisely aimed at the tumors in order to administer the prescribed dose. In turn, they are an important factor in medical research to evaluate the efficacy of new therapies involving ionizing radiation. In order to train nursing professionals who will intervene in this kind of treatment, TECH implements this 100% online program that will delve into the most modern dosimeters for the measurement of irradiation.



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This 100% online Postgraduate Certificate from TECH will boost your nursing practice by guaranteeing you the mastery of safe radiation measurements in the hospital context"

Nursing health care personnel engaged in providing services related to Ionizing Radiation have a responsibility to ensure that the instruments used are accurately calibrated to provide reliable results. In this regard, they need to be aware of the guidelines provided by the authorities governing Nuclear Energy. However, there are frequent changes in the recommendations due to the introduction of new procedures. This makes their work very difficult as they have a busy schedule and lack the time to carry out traditional studies on the subject.

To facilitate their update in this area, TECH has developed a program that will allow them to immediately learn the physical basis of Radiation Dosimetry. The syllabus, which covers only 150 hours, will analyze aspects related to the value of the quantities (including accuracy, reproducibility and traceability). Likewise, the agenda will delve into the spectrum when electrons collide with a high Z material, which will have beneficial applications in Computed Tomography to obtain high quality medical images. The training will also address the phenomenon of luminescence excitation in solids, and ways to measure the doses of radiation absorbed by exposed tissues.

To consolidate all these contents, TECH is based on the innovative *Relearning* system. This teaching method is based on the repetition of key contents, to guarantee a progressive and natural learning process. In addition, the only thing graduates will need is a device with Internet access to access the study materials remotely, at the time or place of their choice. In addition, the Virtual Campus will be available at all times and will allow users to download the contents so that they can consult them whenever they wish.

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 delve into the Ionizing Radiation detectors present in a hospital to ensure the safety of patients at all times"

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The interactive summaries of each topic will allow you to consolidate in a more dynamic way the concepts on the interaction between Ionizing Radiation and matter"

The program's teaching staff includes professionals from the sector who contribute their work experience to this training 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 limits of the various dosimetric magnitudes to avoid excessive radiological exposures.

Thanks to the revolutionary Relearning methodology, you will integrate all the knowledge in an optimal way to successfully achieve the results you are looking for.



02 Objectives

This curriculum will provide students with a comprehensive approach to the physical basis of radiation dosimetry. In this line, graduates will be aware of the limits of the different dosimetric magnitudes and will prevent long-term side effects. In turn, nurses will delve into the applications in clinical practice of the Bragg-Gray cavity theory and its usefulness to perform an optimal calibration of linear accelerators to administer the different doses.



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This syllabus includes clinical cases to bring the development of the program as close as possible to the reality of health care"



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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*A unique, and decisive experience
to boost your professional
development in Nursing in only
6 weeks. Enroll now!”*

03

Course Management

TECH, for this Postgraduate Certificate, has a teaching staff of international prestige. These specialists have extensive professional experience and are active specialists in highly renowned hospitals. In addition, they are characterized by a deep knowledge in Radiation Measurement Radiophysics and master the most advanced technological resources in the health market. In this way, students have the guarantees they need to update their skills and acquire pioneering skills in the development of quality health services.



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The diversity of talents and knowledge of the faculty will create a dynamic and enriching learning environment. Learn with the best!”

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 program will delve into the different interactions of ionizing radiation as it interrelates with matter. Developed by a first class teaching staff, the syllabus will address the physical basis of radiation dosimetry.

In this way, students will incorporate among their knowledge the key aspects of both personal and environmental dose measurements. The didactic contents will also highlight the typical radiation detectors in the hospital environment, which will allow monitoring the exposure to irradiation.





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You will delve into the parameters involved in the quality controls of ionization chambers and the impact of these safety measures in your daily professional practice"

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 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.



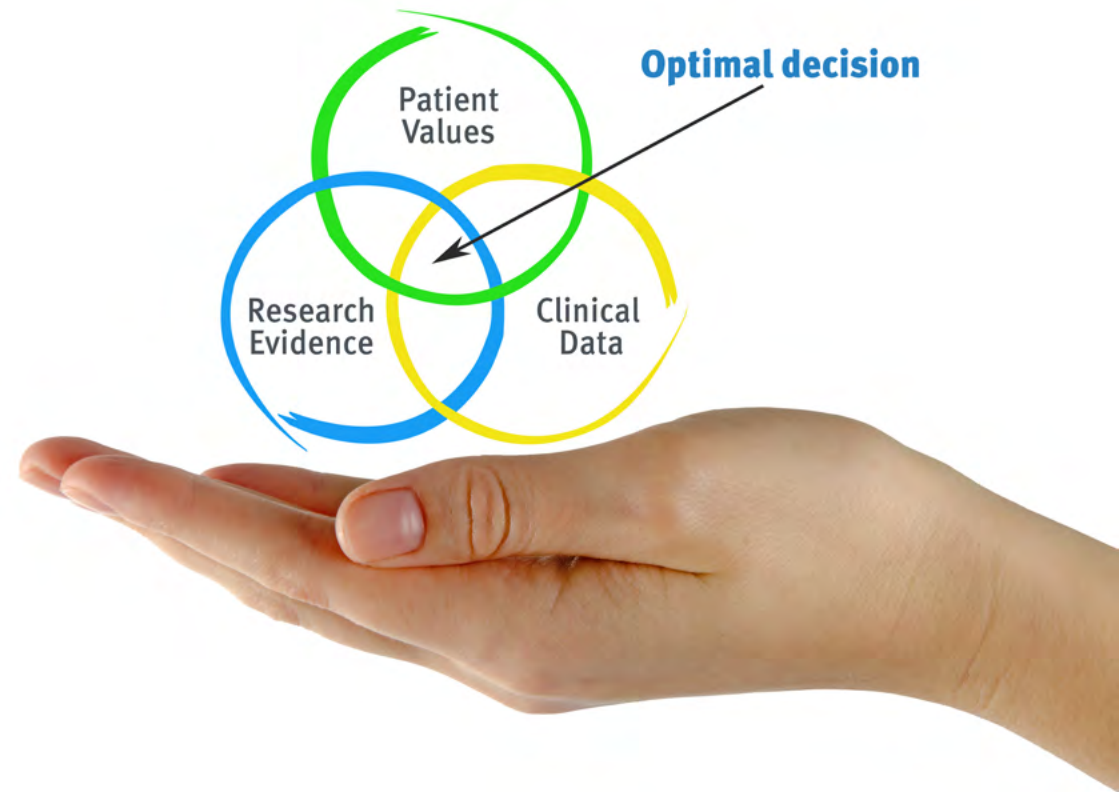
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Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization”

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. 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 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

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.

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 prepared more than 175,000 nurses with unprecedented success in all specialities regardless of practical workload. Our educational 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.

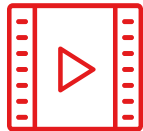
Relearning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.

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 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.



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

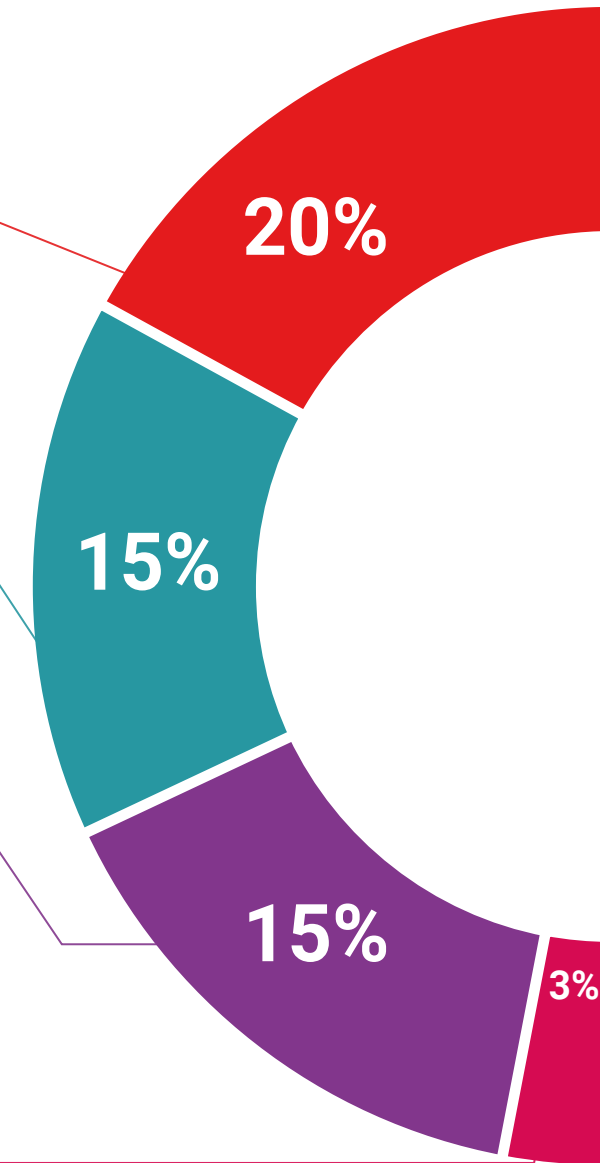
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

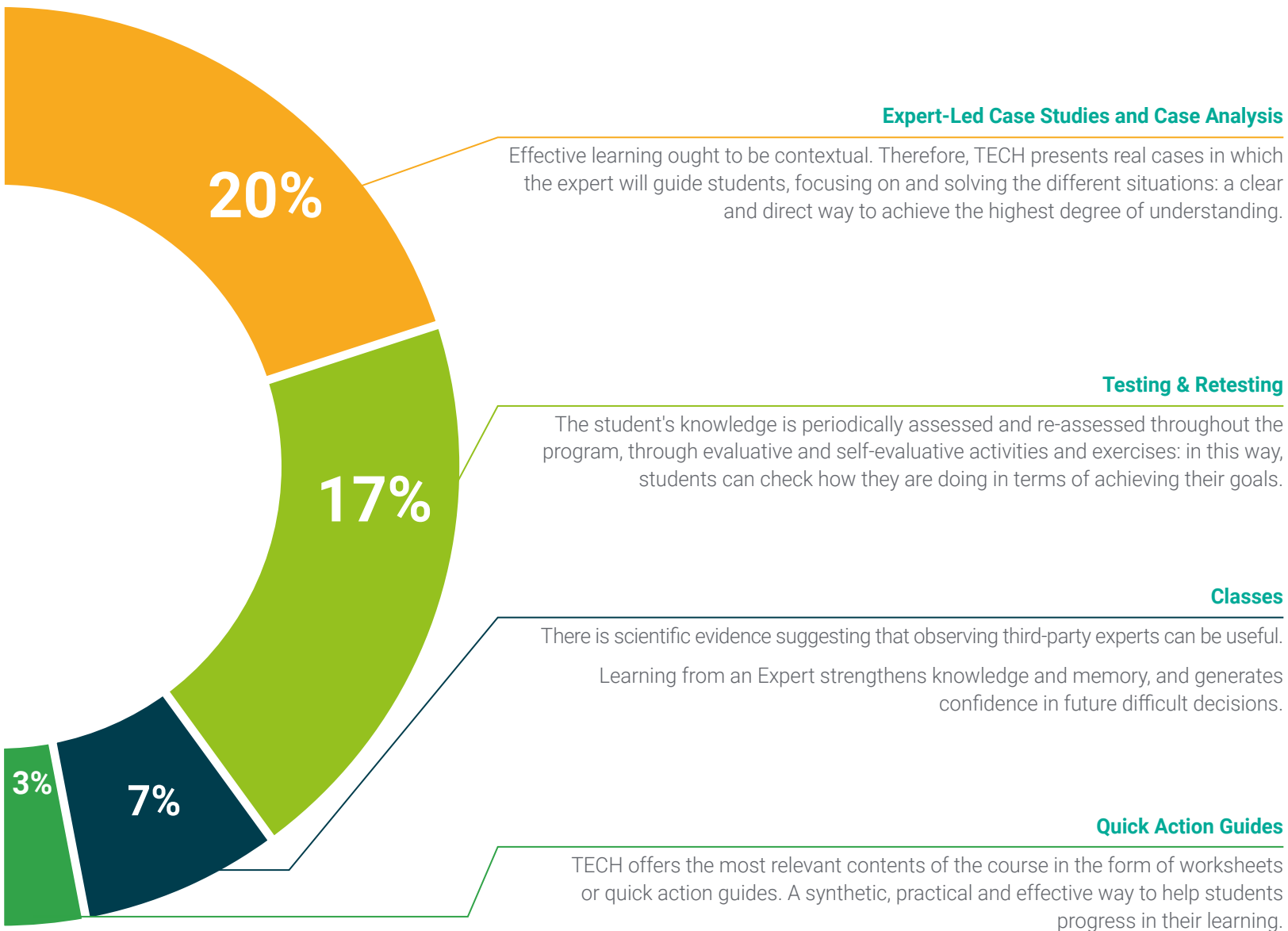
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



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.





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.



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Postgraduate Certificate

Radiation Measurement

Radiophysics

