Postgraduate Diploma

Radiophysics Applied to Advanced Radiotherapy Procedures

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Postgraduate Diploma
Radiophysics Applied to Advanced Radiotherapy Procedures

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

Website: www.techtitute.com/in/nursing/postgraduate-diploma/postgraduate-diploma-radiophysics-applied-advanced-radiotherapy-procedures

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01

Introduction

According to the World Health Organization, lung cancer has killed approximately 1.8 million people in recent years. Scientists have taken advantage of the boom in technology to develop new treatments for this pathology. Among the most effective therapies, Intraoperative Radiotherapy stands out, consisting of the administration, during surgery, of a single fraction of X-rays on the tumor bed. This has numerous benefits, such as the preservation of healthy tissues or the reduction of subsequent treatments. Aware of this reality, TECH has developed a pioneering program, 100% online, which will provide nurses with the keys to perform this procedure and collaborate in other related procedures such as preoperative preparation.

You'll master the most advanced techniques for postoperative follow-up, all thanks to the world's best digital university, according to Forbes"

Within the framework of advanced Radiotherapy procedures, nurses play a key role when it comes to patient care. In most cases, these experts are responsible for communicating relevant information about treatments to users. For this reason, it is essential that they acquire a comprehensive approach to issues such as therapy goals, therapy planning and the ways in which radiation therapy is administered. In this context, these professionals need to broaden their knowledge in this area and be at the technological forefront to offer services based on healthcare excellence.

To help them with this specialization, TECH has implemented the most complete Postgraduate Diploma in the market, to provide professionals with the most effective Radiotherapy techniques. In this way, the curriculum will delve into the specificities of Brachytherapy, so that graduates minimize irradiation of healthy tissues and perform administration techniques to combat diseases such as prostate cancer.

Likewise, they will delve into the handling of Mobile Linear Accelerators as well as intraoperative imaging systems. As a result, graduates will be highly qualified to participate in surgical procedures in Intraoperative Radiotherapy. The didactic materials will also focus on real-time monitoring during surgeries, which will make it possible to detect any change in the patients' conditions.

In this way, the academic program is based on a 100% online methodology, providing greater flexibility and convenience to the students. In addition, the *Relearning* teaching system, focused on the repetition of key concepts to fix knowledge, facilitating a solid and lasting learning, and avoiding the extra effort involved in memorization. In this sense, the only thing the specialist will need to enter the Virtual Campus will be an electronic device with Internet access.

This **Postgraduate Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The development of practical cases presented by experts in Radiophysics applied to Advanced Radiotherapy Procedures
- Graphic, schematic, and practical contents which provide scientific and practical information on the 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

You will acquire a broad knowledge of the Flash Technique, which will help you to provide quality emotional support to patients and their families"

You will delve into the advances that have emerged in Protontherapy and will achieve high precision during treatments"

You will develop risk mitigation strategies to ensure the well-being of users during therapy sessions.

Based on the Relearning methodology, this university program will provide you with a flexible and effective learning experience.

The program's teaching staff includes professionals from the sector who contribute their work experience to this program, as well as renowned specialists from leading societies and prestigious universities.

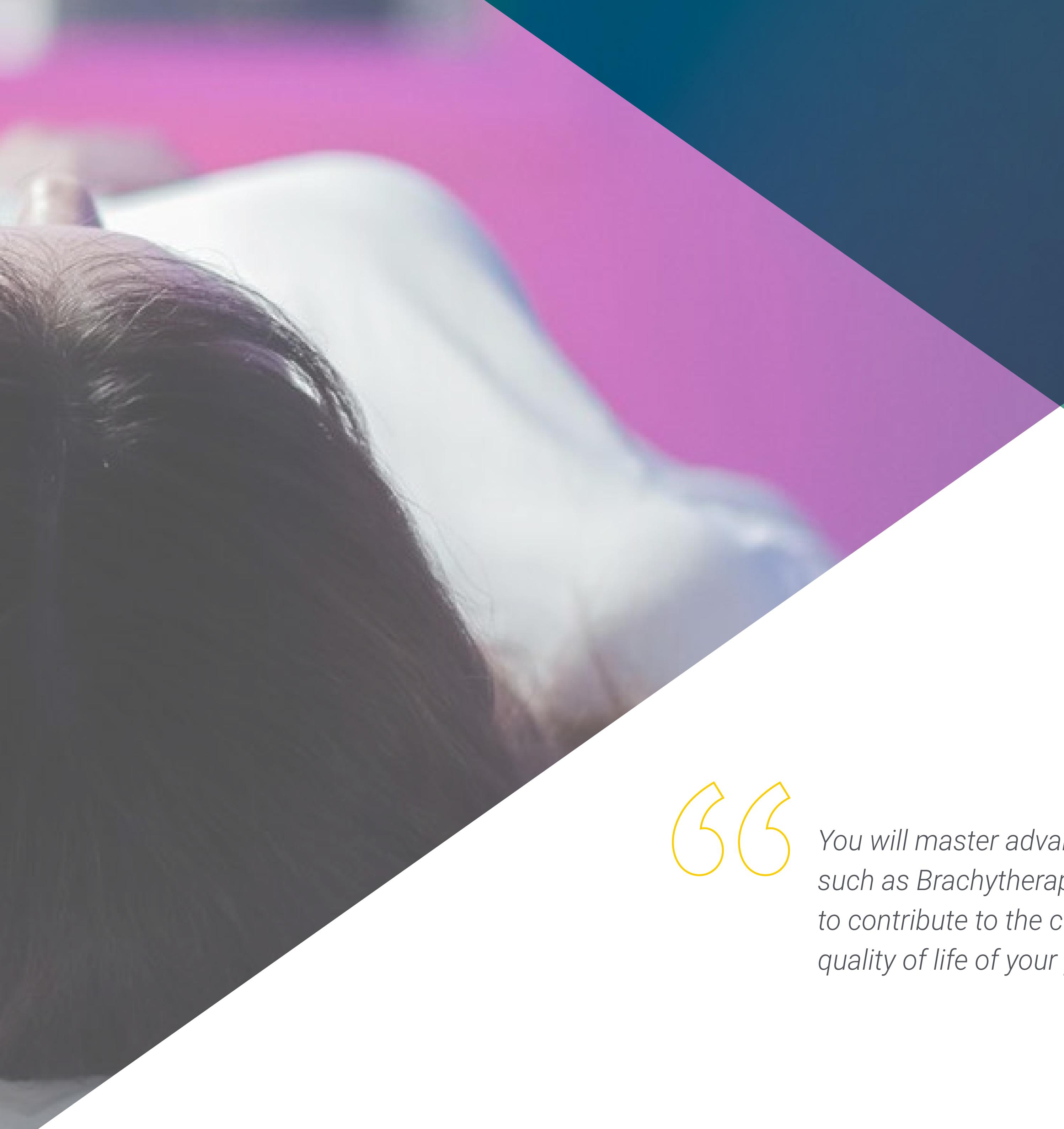
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

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

This curriculum will enable students to master the most innovative techniques related to the approach to carcinomas. As a result, graduates will be able to use proton beams to deliver radiation with precision. In addition, they will control advanced intraoperative imaging systems, thus optimizing both doses and fractionations. They will also develop specific quality management protocols for Brachytherapy procedures and ensure safety in hospital settings.



You will master advanced techniques, such as Brachytherapy, enabling you to contribute to the cure rates and quality of life of your patients"

General Objectives

- Investigate into the interactions of protons with matter
- Establish the differences in physical and clinical dosimetry in Proton Therapy
- Examine radiation protection and radiobiology in Proton Therapy
- Develop the fundamental principles of Intraoperative Radiotherapy
- Analyze the technology and equipment used in intraoperative radiation therapy
- Evaluate the methods of treatment planning in intraoperative radiation therapy
- Establish radiation protection and patient safety practices
- Identify and compare the radiation sources used in Brachytherapy, demonstrating a thorough knowledge of their properties and clinical applications
- Plan doses in Brachytherapy, optimizing radiation distribution on the target
- Propose specific quality management protocols for Brachytherapy procedures

"The skills you will acquire after completing this program will enable you to implement successful treatments using intraoperative imaging systems"

Specific Objectives

Module 1. Advanced Radiotherapy Method. Proton Therapy
- Analyze proton beams and their clinical use
- Evaluate the necessary requirements for the characterization of this radiotherapy technique
- Establish the differences of this modality with conventional radiotherapy
- Develop specialized knowledge in the field of Radiological Protection

Module 2. Advanced Radiotherapy Method. Intraoperative radiotherapy
- Identify the clinical indications for the application of intraoperative radiotherapy
- Analyze in detail the methods of dose calculation in intraoperative radiotherapy
- Examine the factors influencing patient and medical staff safety
- Justify the importance of interdisciplinary collaboration in the planning and execution of intraoperative radiotherapy treatments

Module 3. Brachytherapy in the Field of Radiotherapy
- Develop source calibration techniques using well and air chambers
- Examine the application of the Monte Carlo Method in Brachytherapy
- Evaluate planning systems using the TG 43 formalism
- Identify the key differences between High Dose Rate (HDR) and Low Dose Rate Brachytherapy (LDR)
- Specify the procedures and planning for prostate Brachytherapy

03

Course Management

Each faculty member at the head of this university program has been carefully selected for their broad experience and multidisciplinary expertise. These professionals stand out for their in-depth mastery of the most advanced techniques in Radiation Therapy, as well as their commitment to enriching the educational experience of graduates through a holistic approach, preparing them not only with advanced theoretical knowledge, but also with practical skills and a critical mindset needed in today's Nursing world.

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

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. Irazola Rosales, Leticia

- Specialist in Hospital Radiophysics
- Physician in Hospital Radiophysics at the Biomedical Research Center of La Rioja
- Working group on Lu-177 treatments at the Spanish Society of Medical Physics (SEFM)
- Collaborator in the University of Valencia
- Reviewer of the journal Applied Radiation and Isotopes
- International PhD in Medical Physics, University of Seville
- Master's Degree in Medical Physics from the University of Rennes I
- Degree in Physics from the Universidad de Zaragoza
- Member of: European Federation of Organisations in Medical Physics (EFOMP) and Spanish Society of Medical Physics (SEFM)

Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"

04

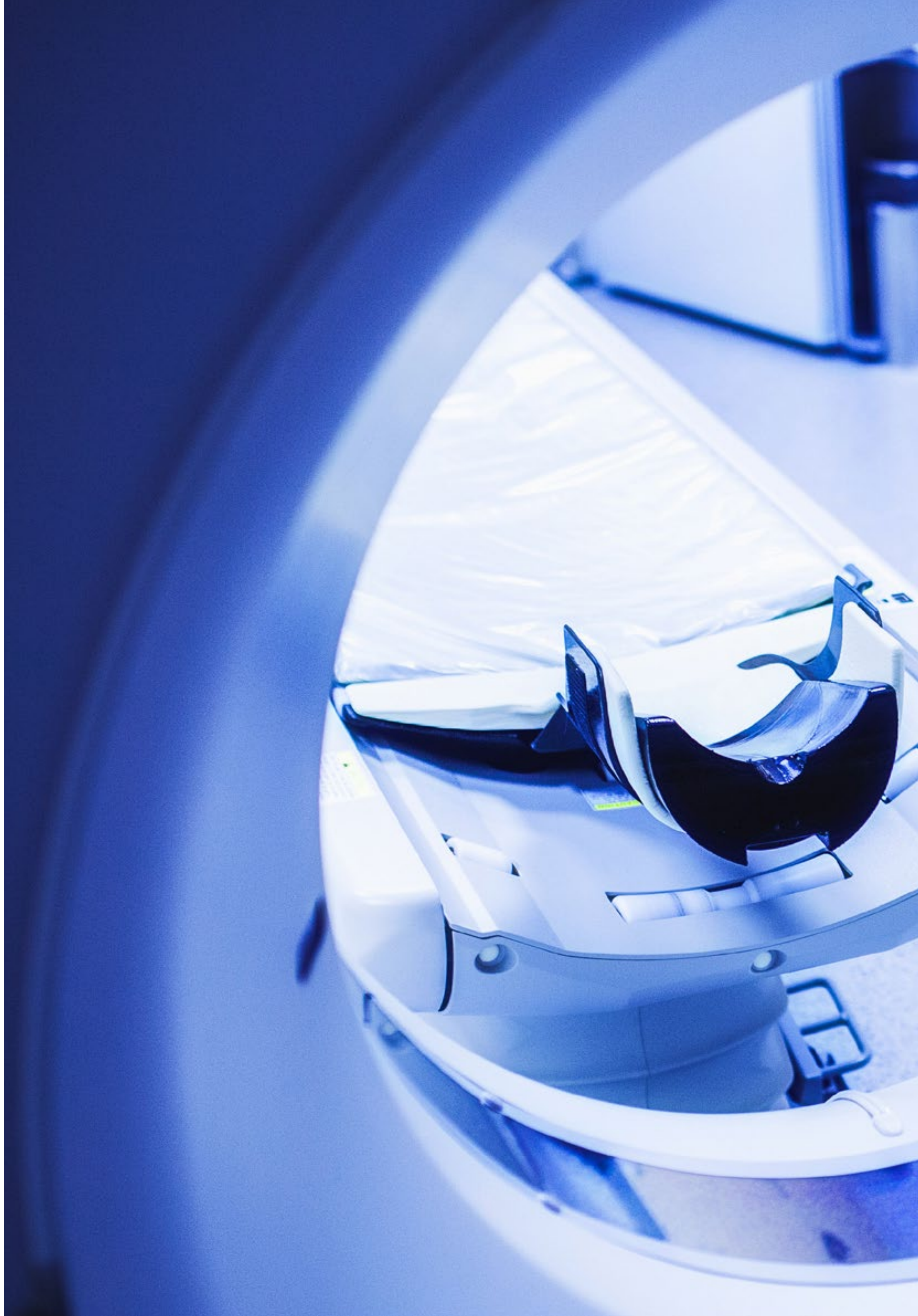
Structure and Content

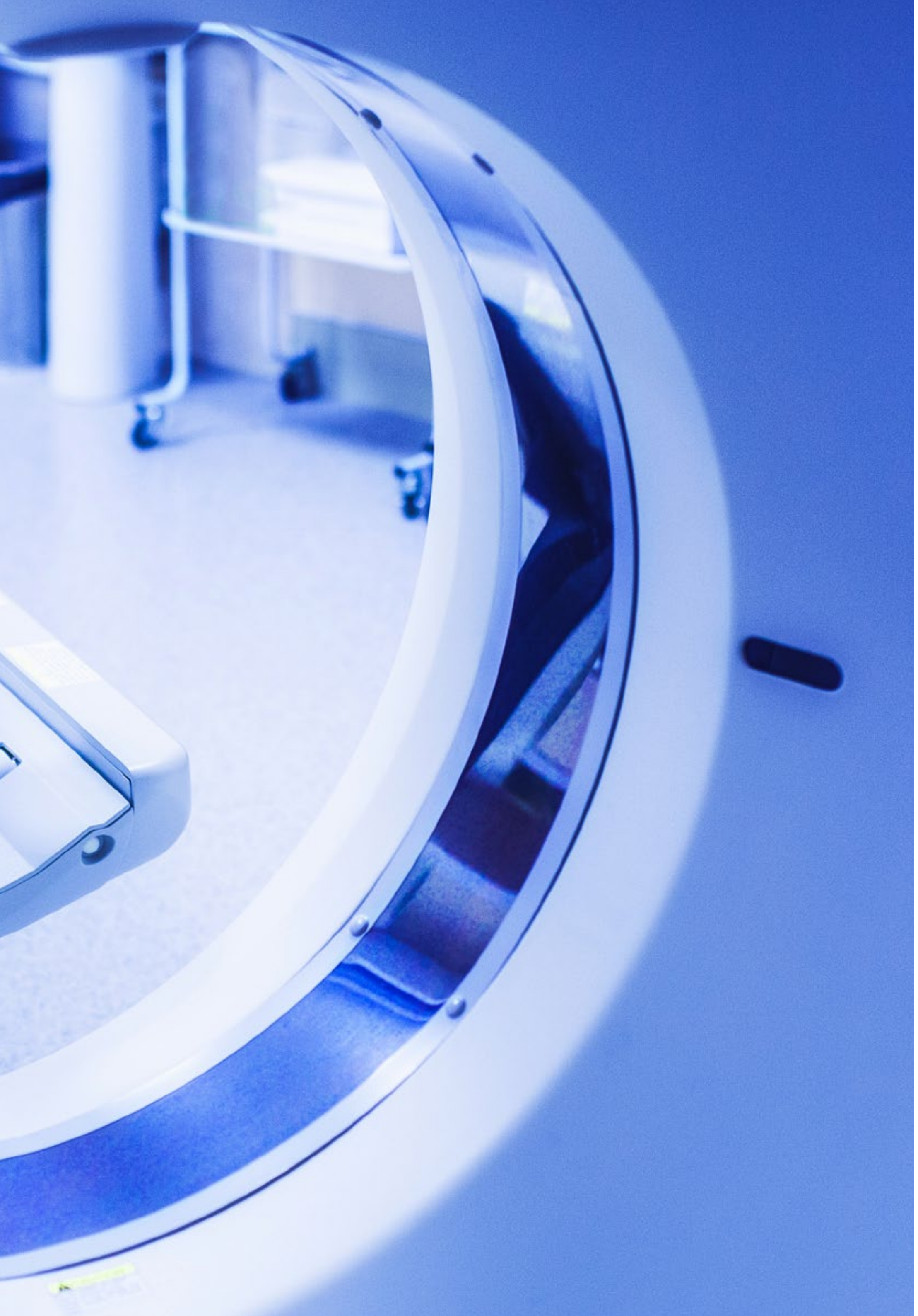
This curriculum, organized in 3 modules, will focus on the interaction of protons with matter, to understand its implications in measurement processes and quality controls. With a theoretical-practical approach, the syllabus will address dose calculations and treatment planning, incorporating key methodologies to ensure maximum accuracy in radiation delivery. It will also delve into dose planning techniques in Brachytherapy, in order to optimize the distribution of irradiation in the target tissue.

This program will give you the opportunity to update your knowledge with the maximum scientific rigor of an institution at the technological forefront"

Module 1. Advanced Radiotherapy Method. Proton Therapy

1.1. Proton Therapy Radiotherapy with Protons
 1.1.1. Interaction of Protons with Matter
 1.1.2. Clinical Aspects of Proton Therapy
 1.1.3. Physical and Radiobiological Basis of Proton Therapy
1.2. Equipment in Proton Therapy
 1.2.1. Facilities
 1.2.2. Components in Proton Therapy Systems
 1.2.3. Physical and Radiobiological Basis of Proton Therapy
1.3. Proton Beam
 1.3.1. Parameters
 1.3.2. Clinical Implications
 1.3.3. Application in Oncological Treatments
1.4. Physical Dosimetry in Proton Therapy
 1.4.1. Absolute Dosimetry Measurements
 1.4.2. Beam Parameters
 1.4.3. Materials in Physical Dosimetry
1.5. Clinical Dosimetry in Proton Therapy
 1.5.1. Application of Clinical Dosimetry in Proton Therapy
 1.5.2. Planning and Calculation Algorithms
 1.5.3. Imaging Systems
1.6. Radiological Protection in Proton Therapy Procedures
 1.6.1. Design of an Installation
 1.6.2. Neutron Production and Activation
 1.6.3. Activation
1.7. Proton Therapy Treatments
 1.7.1. Image-Guided Treatment
 1.7.2. In Vivo Treatment Verification
 1.7.3. BOLUS Usage
1.8. Biological Effects of Proton Therapy
 1.8.1. Physical Aspects
 1.8.2. Radiobiology
 1.8.3. Dosimetric Implications





1.9. Measuring Equipment in Proton Therapy
  1.9.1. Dosimetric Equipment
  1.9.2. Radiation Protection Equipment
  1.9.3. Personal Dosimetry
1.10. Uncertainties in Proton Therapy
  1.10.1. Uncertainties Associated with Physical Concepts
  1.10.2. Uncertainties Associated with the Therapeutic Process
  1.10.3. Advances in Proton Therapy

Module 2. Advanced Radiotherapy Method. Intraoperative radiotherapy

2.1. Intraoperative radiotherapy
  2.1.1. Intraoperative radiotherapy
  2.1.2. Current Approach to Intraoperative Radiotherapy
  2.1.3. Intraoperative Radiotherapy versus Conventional Radiotherapy
2.2. Technology in Intraoperative Radiotherapy
  2.2.1. Mobile Linear Accelerators in Intraoperative Radiotherapy
  2.2.2. Intraoperative Imaging Systems
  2.2.3. Quality Control and Maintenance of Equipment
2.3. Treatment Planning Systems in Intraoperative Radiotherapy
  2.3.1. Dose Calculation Methods
  2.3.2. Volumetry and Delineation of Organs at Risk
  2.3.3. Dose Optimization and Fractionation
2.4. Clinical Indications and Patient Selection for Intraoperative Radiotherapy
  2.4.1. Types of Cancer Treated with Intraoperative Radiotherapy
  2.4.2. Assessment of Patient Suitability
  2.4.3. Clinical Studies and Discussion
2.5. Surgical Procedures in Intraoperative Radiotherapy
  2.5.1. Surgical Preparation and Logistics
  2.5.2. Radiation Administration Techniques During Surgery
  2.5.3. Postoperative Follow-up and Patient Care
2.6. Calculation and Administration of Radiation Dose for Intraoperative Radiotherapy
  2.6.1. Formulas and Dosis Calculation Algorithms
  2.6.2. Dose Correction and Adjustment Factors
  2.6.3. Real-time Monitoring during Surgery

2.7. Radiation Protection and Safety in Intraoperative Radiotherapy
- 2.7.1. International Radiation Protection Standards and Regulations
- 2.7.2. Safety Measures for the Medical Staff and the Patient
- 2.7.3. Risk Mitigation Strategies

2.8. Interdisciplinary Collaboration in Intraoperative Radiotherapy
- 2.8.1. Role of the Multidisciplinary Team in Intraoperative Radiotherapy
- 2.8.2. Communication between Radiation Therapists, Surgeons and Oncologists
- 2.8.3. Practical Examples of Interdisciplinary Collaboration

2.9. Flash Technique. Latest Trend in Intraoperative Radiotherapy
- 2.9.1. Research and Development in Intraoperative Radiotherapy
- 2.9.2. New Technologies and Emerging Therapies in Intraoperative Radiotherapy
- 2.9.3. Implications for Future Clinical Practice

2.10. Ethics and Social Aspects in Intraoperative Radiotherapy
- 2.10.1. Ethical Considerations in Clinical Decision-Making
- 2.10.2. Access to Intraoperative Radiotherapy and Equity of Care
- 2.10.3. Communication with Patients and Family in Complex Situations

Module 3. Brachytherapy in the Field of Radiotherapy

3.1. Brachytherapy
- 3.1.1. Physical Principles of Brachytherapy
- 3.1.2. Biological Principles and Radiobiology Applied to Brachytherapy
- 3.1.3. Brachytherapy and External Radiotherapy. Differences

3.2. Radiation Sources in Brachytherapy
- 3.2.1. Radiation Sources Used in Brachytherapy
- 3.2.2. Radiation Emission of the Sources Used
- 3.2.3. Calibration of Sources
- 3.2.4. Safety in the Handling and Storage of Brachytherapy Sources

3.3. Dose Planning in Brachytherapy
- 3.3.1. Techniques of Dose Planning in Brachytherapy
- 3.3.2. Optimization of the Dose Distribution in the Target Tissue
- 3.3.3. Application of the Monte Carlo Method
- 3.3.4. Specific Considerations to Minimize Irradiation of Healthy Tissues
- 3.3.5. TG 43 Formalism

3.4. Administration Techniques in Brachytherapy
- 3.4.1. High Dose Rate Brachytherapy (HDR) versus Low Dose Rate Brachytherapy (LDR)
- 3.4.2. Clinical Procedures and Treatment Logistics
- 3.4.3. Management of Devices and Catheters Used in the Administration of Brachytherapy

3.5. Clinical Indications for Brachytherapy
- 3.5.1. Application of Brachytherapy in the Treatment of Prostate cancer
- 3.5.2. Brachytherapy in Cervical Cancer: Technique and Results
- 3.5.3. Brachytherapy in Breast Cancer: Clinical Considerations and Results

3.6. Brachytherapy Quality Management
- 3.6.1. Specific Quality Management Protocols for Brachytherapy
- 3.6.2. Quality Control of Equipment and Treatment Systems
- 3.6.3. Audit and Compliance with Regulatory Standards

3.7. Clinical Results in Brachytherapy
- 3.7.1. Review of Clinical Studies and Outcomes in the Treatment of Specific Cancers
- 3.7.2. Brachytherapy Efficacy and Toxicity Assessment
- 3.7.3. Clinical Cases and Discussion of Results

3.8. Ethics and International Regulatory Aspects in Brachytherapy
- 3.8.1. Ethical Issues in Shared Decision-Making with Patients
- 3.8.2. Compliance with International Radiation Safety Standards and Regulations
- 3.8.3. International Liability and Legal Aspects in Brachytherapy Practice

3.9. Technological Development in Brachytherapy
- 3.9.1. Technological Innovations in the Field of Brachytherapy
- 3.9.2. Research and Development of New Techniques and Devices in Brachytherapy
- 3.9.3. Interdisciplinary Collaboration in Brachytherapy Research Projects

3.10. Practical Application and Simulations in Brachytherapy
- 3.10.1. Clinical Simulation for Brachytherapy
- 3.10.2. Resolution of Practical Situations and Technical Challenges
- 3.10.3. Evaluation of Treatment Plans and Discussion of Results

05

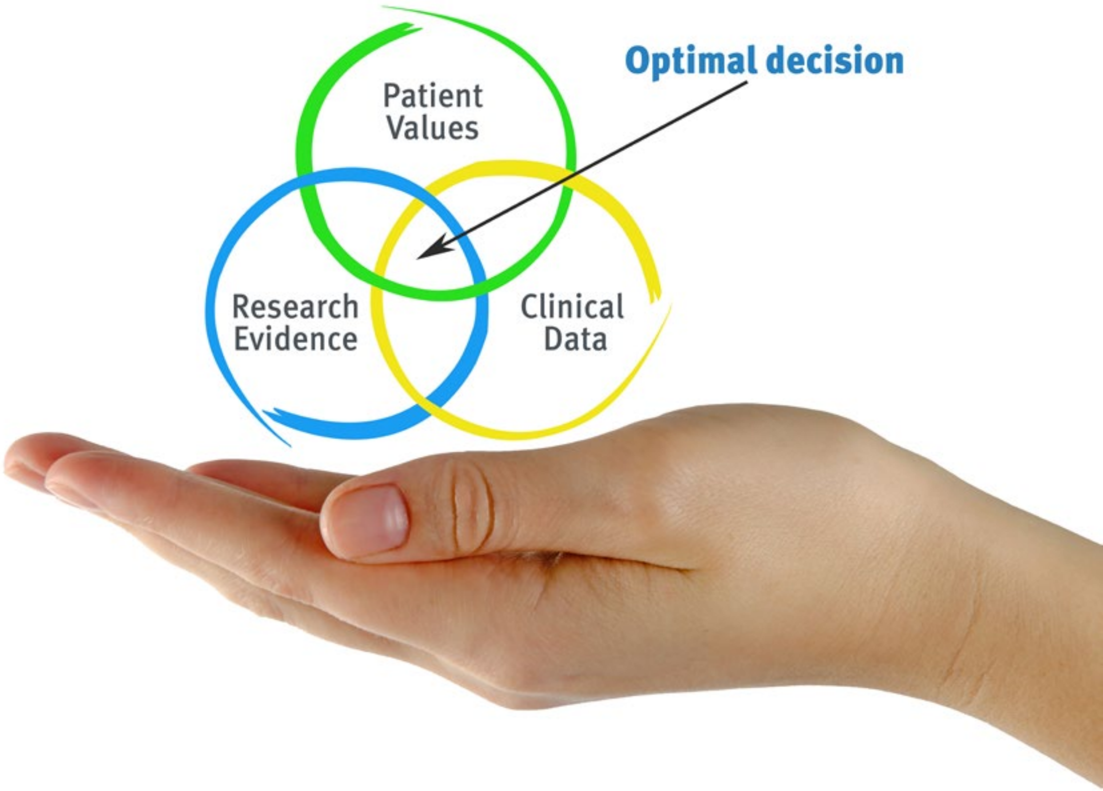
Methodology

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"

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.

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:

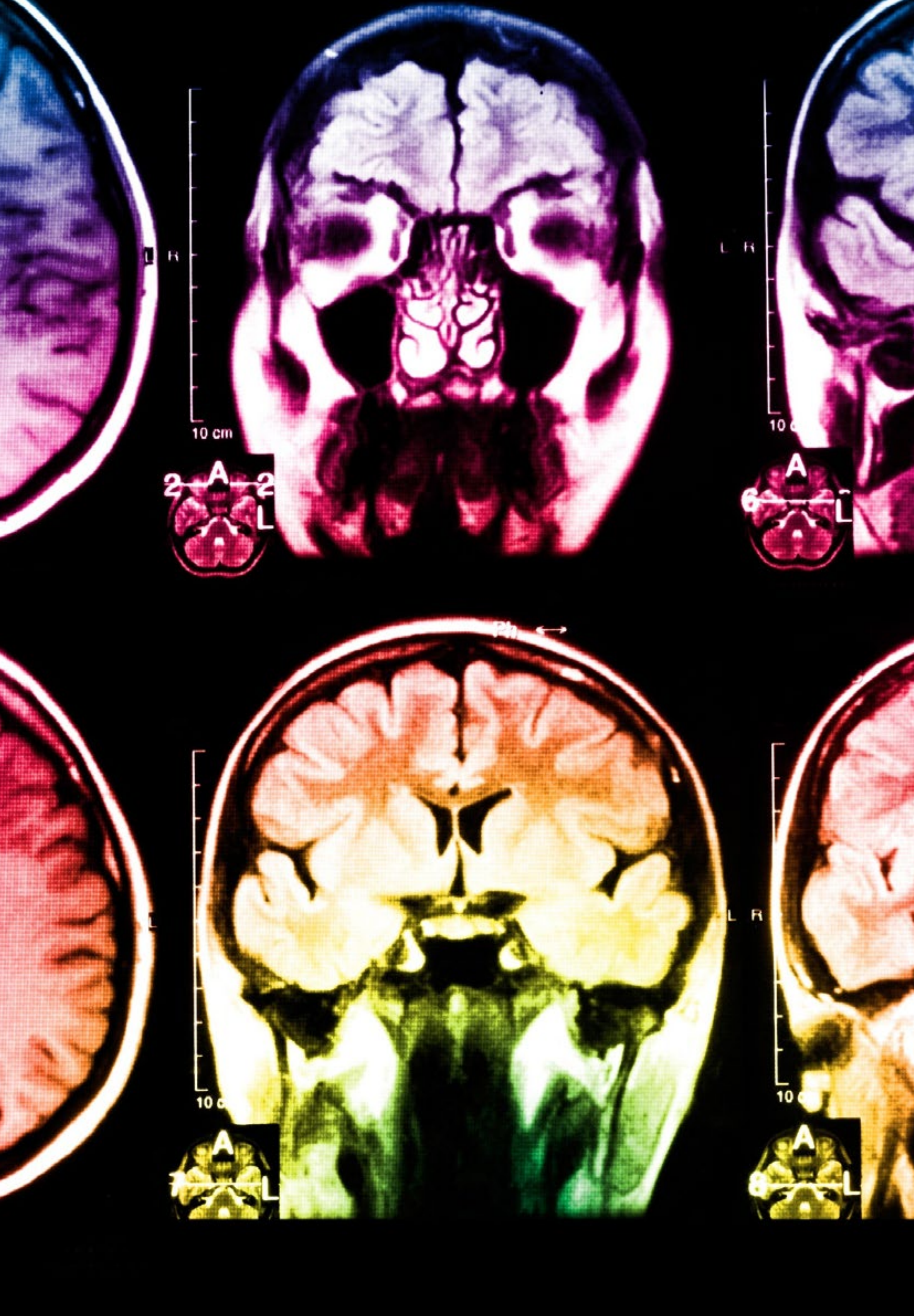
1. Nurses who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their knowledge.
2. The learning process has a clear focus on practical skills that allow the nursing professional to better integrate knowledge acquisition into 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).

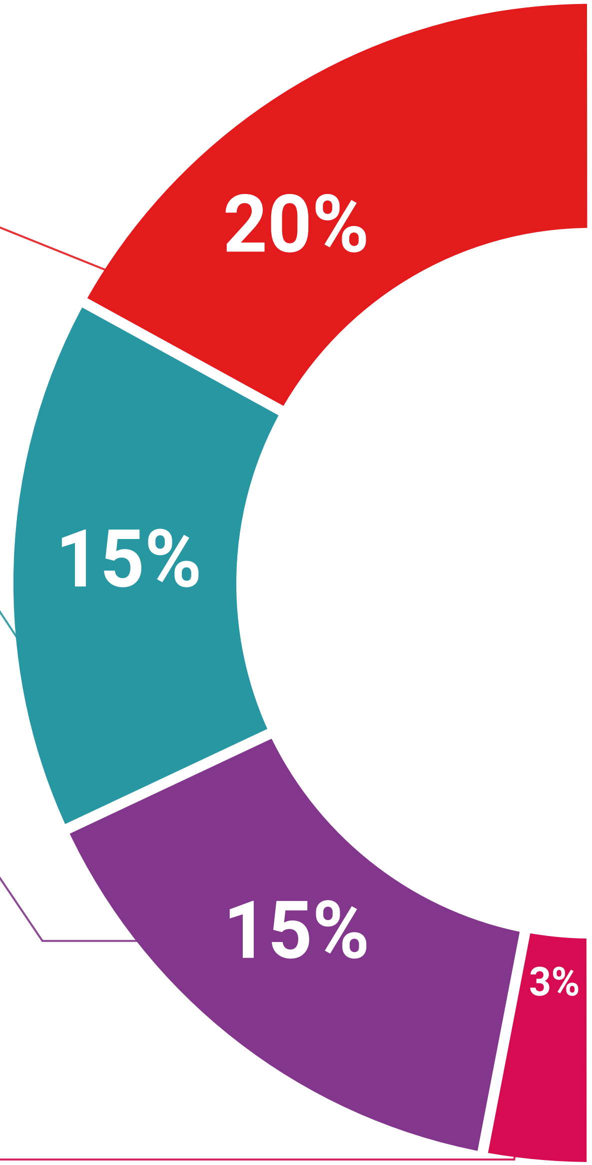
With this methodology we have trained more than 175,000 nurses with unprecedented success in all specialities regardless of practical workload. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average 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.

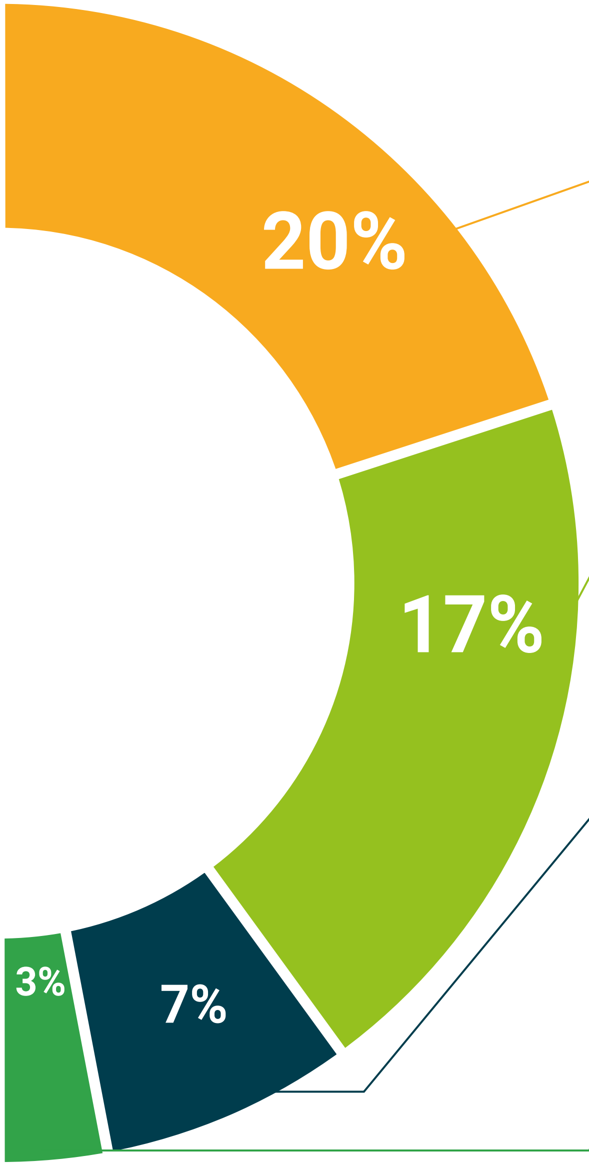
Interactive Summaries

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 Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures guarantees, in addition to the most rigorous and up to date program, access to a Postgraduate Diploma 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 Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures** contains the most complete and up-to-date scientific on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Diploma** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Diploma, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures**

Official Nº of Hours: **450 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

Radiophysics Applied to Advanced Radiotherapy Procedures

This is a qualification awarded by this University, equivalent to 450 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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