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/us/medicine/postgraduate-diploma/postgraduate-diploma-radiophysics-applied-advanced-radiotherapy-procedures**

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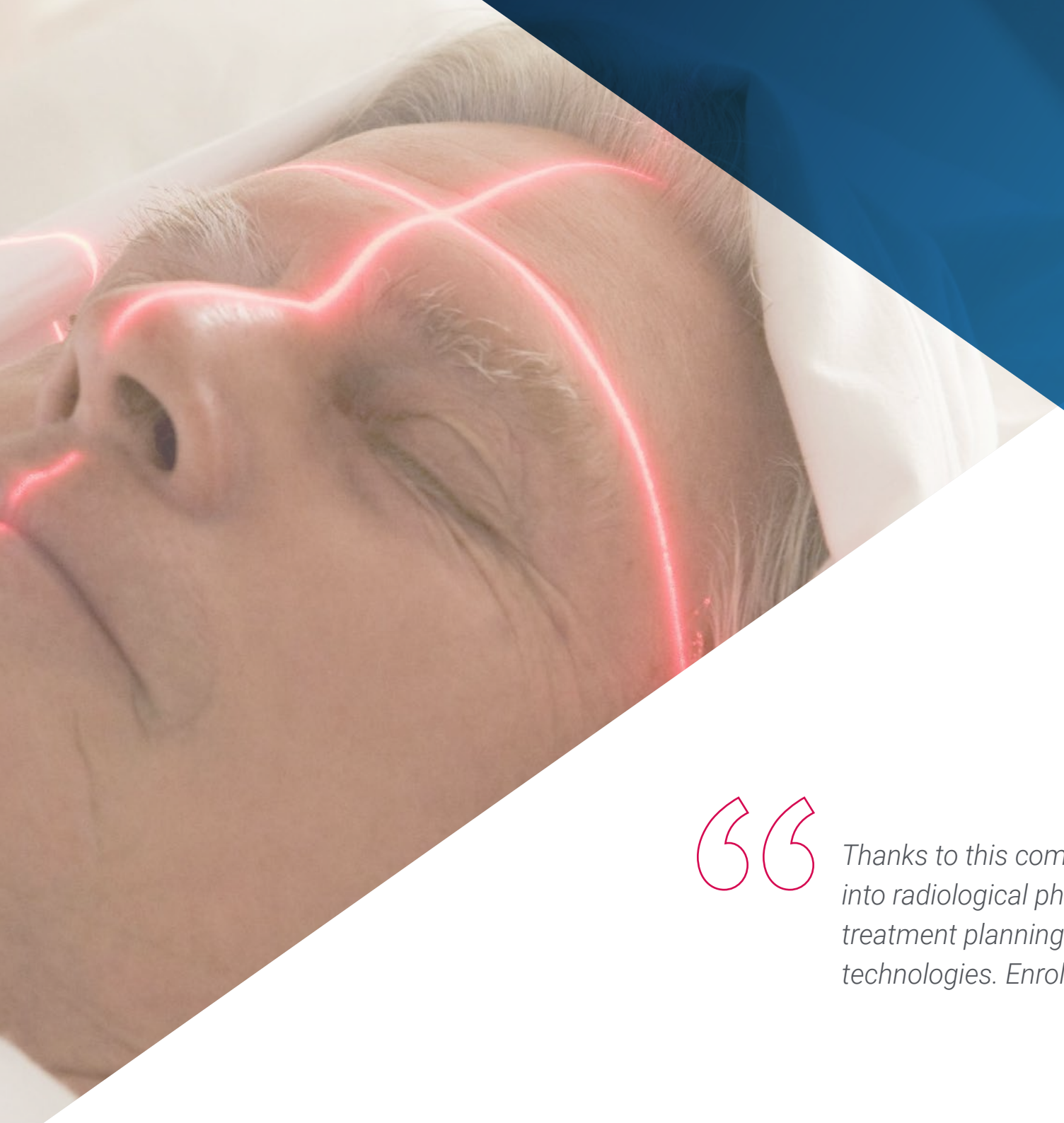
01

Introduction

Radiophysics is crucial in terms of its application in Advanced Radiotherapy Procedures, as it merges Physics with Medicine to guarantee precise and effective treatments against serious conditions, such as Cancer.

This discipline employs innovative technologies, such as image-guided radiotherapy, Proton Therapy and Brachytherapy, to deliver precise therapeutic doses to the tumor, minimizing damage to surrounding healthy tissues. Given the high demand for specialized professionals in this field, TECH offers its graduates an exhaustive academic program. Thanks to this, the physician will have access to the most updated contents in advanced procedures for the diagnosis and treatment of pathologies through radiotherapy techniques.



Thanks to this complete program, you will delve into radiological phenomena, three-dimensional treatment planning and the use of innovative technologies. Enroll now!"

Radiophysics Applied to Advanced Radiotherapy Procedures is a discipline of great relevance in the field of Oncological Medicine, since it is focused on the application of physical and technological principles to optimize and perfect radiotherapeutic treatments. In this context, the design and implementation of advanced techniques allow for greater precision in the administration of radiation, while minimizing the risk of radiation, while minimizing the impact on the surrounding healthy tissues. The application of various advanced procedures not only enhances the therapeutic efficacy, but also contributes significantly to improving patients' quality of life.

As a result, this Postgraduate Diploma in Applied Radiophysics has been created, which will address such important topics as Proton Therapy, a consolidated modality that uses protons to minimize radiation in healthy tissues during cancer treatment. This approach will analyze the interaction of protons with matter, advanced equipment and clinical aspects, including radiation protection.

On the other hand, Intraoperative Radiotherapy will also be explored, focusing on highly precise treatments during surgery and analyzing state-of-the-art technology, dose calculations and safety. Finally, the graduate will be introduced to the physical and biological principles of Brachytherapy, radiation sources, clinical applications and ethical considerations, so that the professionals will be able to contribute to the practice and research in Hospital Radiophysics.

This university program is presented as a comprehensive program, whose didactic resources have been developed according to the state-of-the-art Relearning methodology, pioneer in TECH. This system consists of the strategic repetition of key concepts, guaranteeing an optimal assimilation of all the material. In addition, thanks to its 100% online mode, access to the platform will be available to the graduate 24 hours a day and will only require an electronic device with an Internet connection. Therefore, the student will not have to travel or adapt to pre-established schedules.

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 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

With this 100% online program you will master the most innovative procedures, such as the Flash Technique, the latest trend in Intraoperative Radiotherapy"

Bet on TECH! You will be immersed in Brachytherapy implantation techniques, as this involves the placement of radioactive sources directly into the patient's body"

You will delve into Intraoperative Radiation Therapy, i.e., the administration of radiation during surgery, with emphasis on technical and clinical aspects.

You will cover the physical fundamentals and clinical applications of Proton Therapy, through the extensive library of multimedia resources offered by TECH.

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

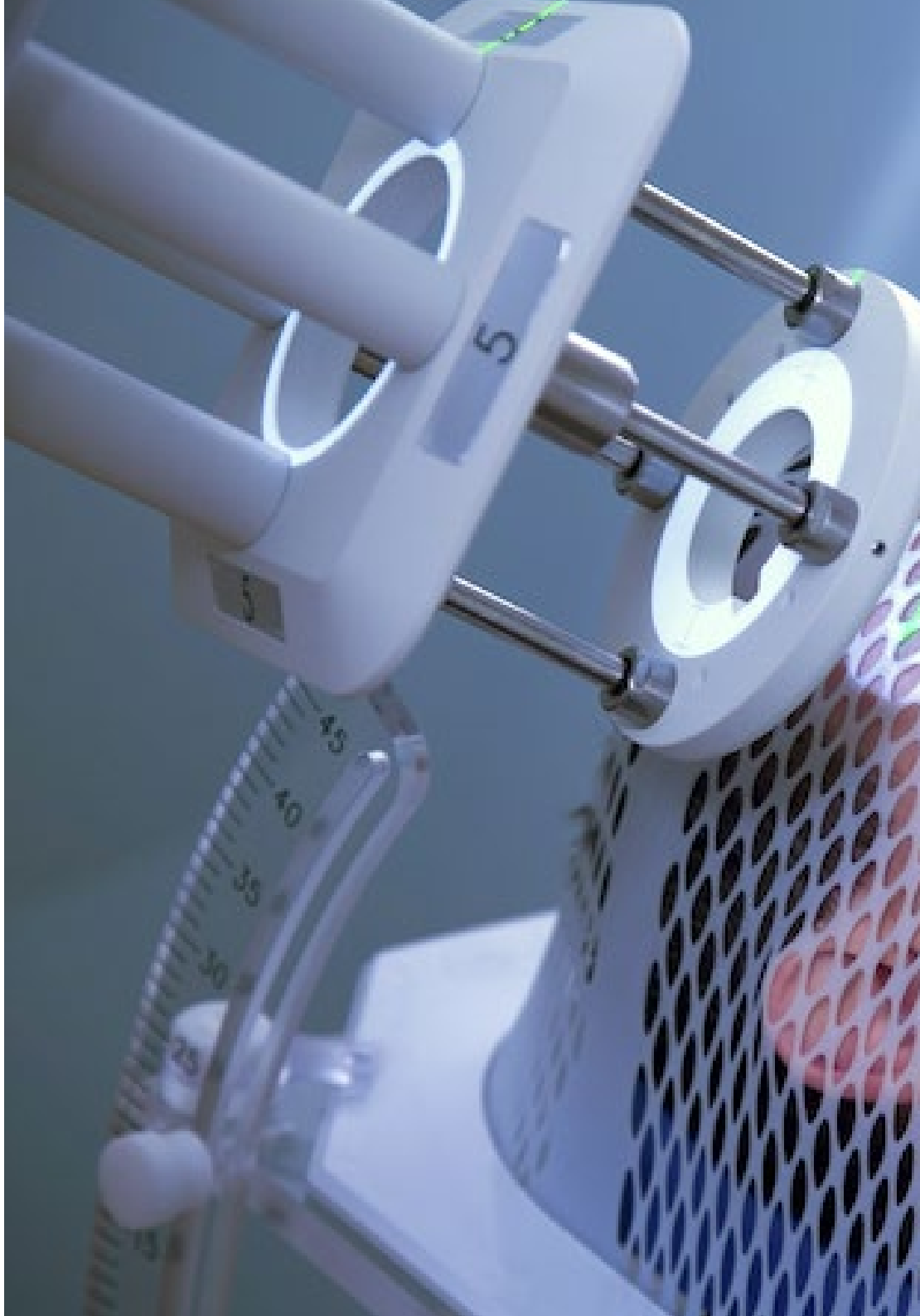
The objectives of this Postgraduate Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures are to provide a comprehensive understanding of the most advanced techniques, such as Proton Therapy, Intraoperative Radiotherapy and Brachytherapy, equipping physicians with solid theoretical and practical skills. Beyond specializing, the program aspires to cultivate innovative minds that will not only apply, but also drive constant advancement in this critical field of medicine. Accordingly, the primary goal of the program will be to unite knowledge, skills and vision to make a tangible difference in the lives of patients.

The main objective of TECH and this academic program is to forge leaders capable of facing the most demanding challenges in Radiotherapy"

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 to 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

You will achieve your goals thanks to TECH's revolutionary tools, as well as the guidance and support of top professionals"



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

The faculty leading the program epitomizes excellence and an unwavering commitment to innovation. Meticulously selected for their vast experience and multidisciplinary expertise, these professionals not only possess a deep mastery of the most advanced techniques in radiation therapy, but also embody a passion for transmitting that knowledge in a clear, inspiring and adaptable manner to the changing challenges of the medical field. Indeed, their approach is not limited to teaching alone, but encompasses the encouragement of critical thinking, ongoing research and the promotion of hands-on learning.

The faculty of this academic program is fully committed to the optimal development of physicians' radiotherapy skills"

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
- 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. 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 Ph.D. 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

The program in Radiophysics Applied to Advanced Radiotherapy Procedures is meticulously designed to foster professional growth and excellence in clinical practice. Its structure encompasses an innovative and comprehensive curricular fabric, interweaving three fundamental modules: Proton Therapy, Intraoperative Radiation Therapy and Brachytherapy. From the interaction of protons with matter, to clinical applications and dose management, the content will challenge the limits of knowledge and prepare graduates to lead the revolution in the field of radiotherapy.

This curriculum will be your springboard to an outstanding career! You will equip yourself with the tools and confidence to positively impact the fight against Cancer"

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.**

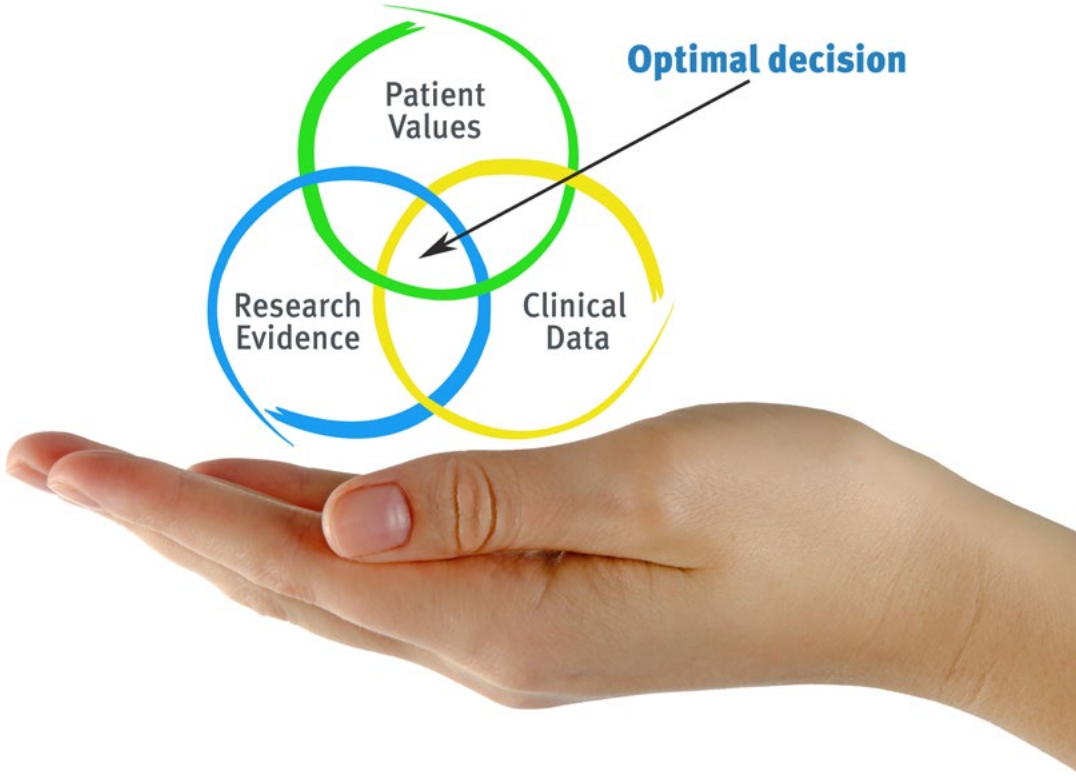
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

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 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.

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:

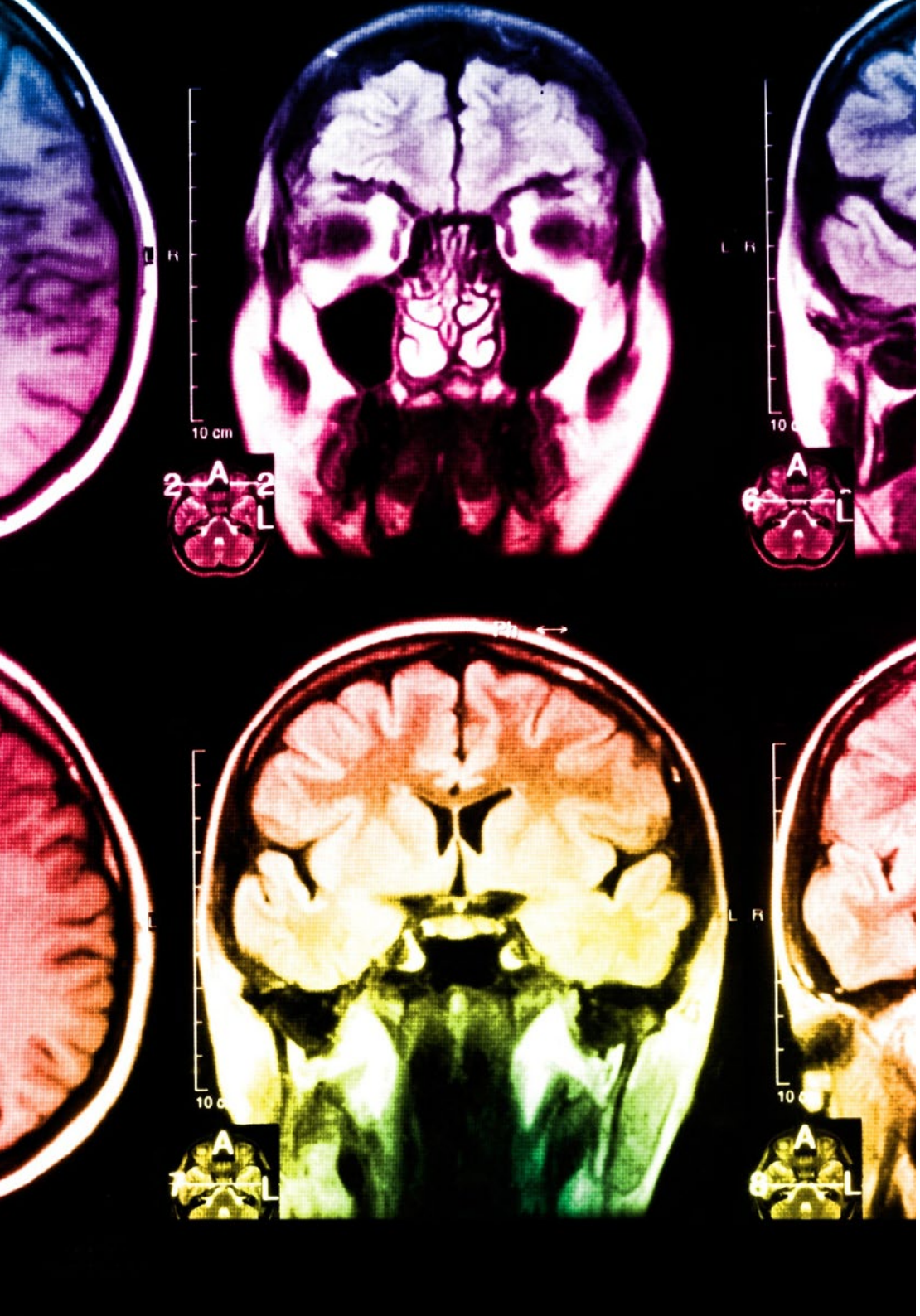
1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better 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.

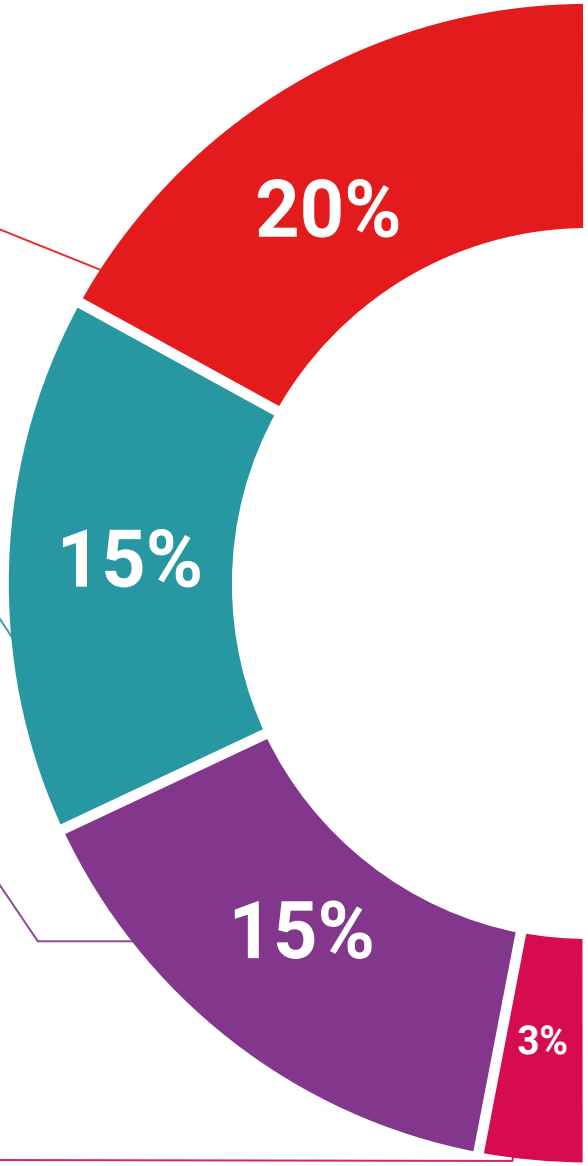
Interactive Summaries

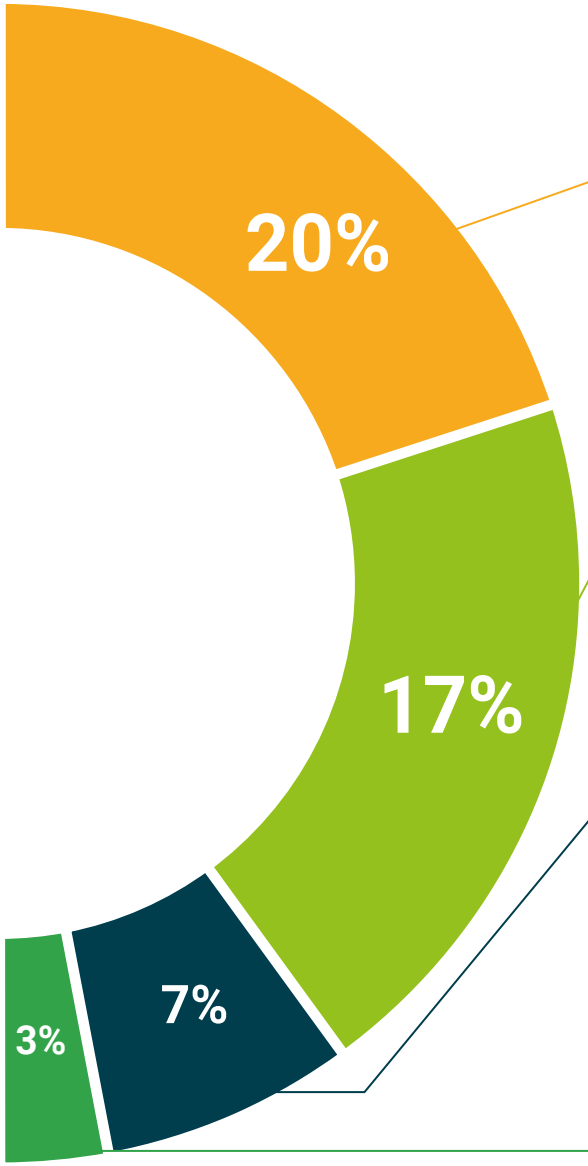
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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 Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures guarantees students, in addition to the most rigorous and up-to-date education, 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"

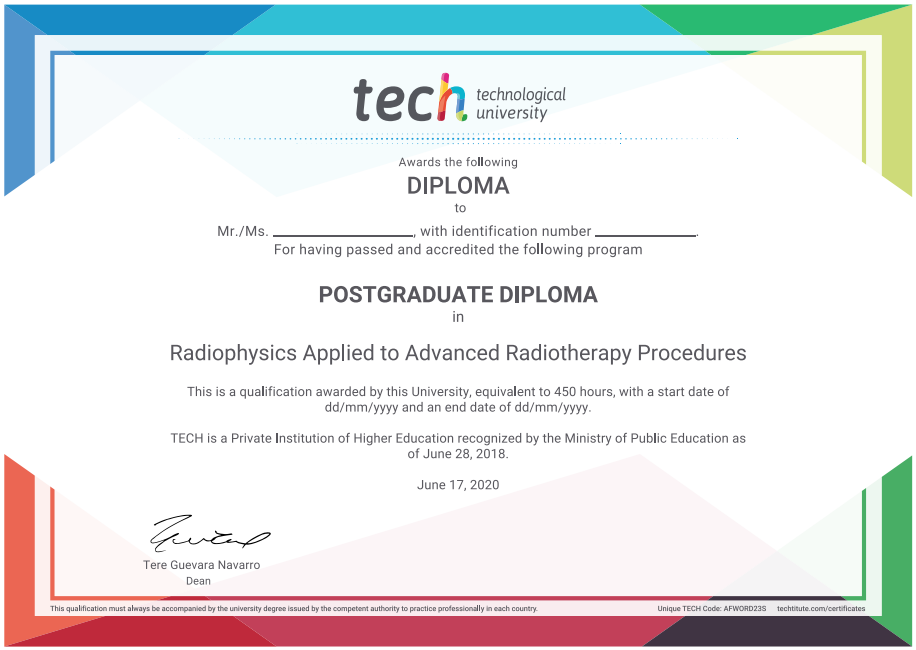
This **Postgraduate Diploma in Radiophysics Applied to Advanced Radiotherapy Procedures** contains the most complete and up-to-date scientific on the market.

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

The diploma 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

DIPLOMA

to

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

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

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

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