

# Postgraduate Certificate Radiophysics in External Radiotherapy in Physical Dosimetry



## Postgraduate Certificate Radiophysics in External Radiotherapy in Physical Dosimetry

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

Website: [www.techtute.com/us/engineering/postgraduate-certificate/radiophysics-external-radiotherapy-physical-dosimetry](http://www.techtute.com/us/engineering/postgraduate-certificate/radiophysics-external-radiotherapy-physical-dosimetry)

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# 01

# Introduction

The complexity of the equipment and procedures in this area requires engineers to acquire specialized skills, in order to access leadership roles in medical institutions and medical technology companies. In this sense, there is a growing demand for professionals specialized in Radiophysics in External Radiotherapy in Physical Dosimetry, highlighting the need for more specific and advanced training. In this context, where precision and safety are fundamental, the importance of training that specifically addresses the challenges of these techniques is evident. With this in mind, TECH is launching this unique university program, based on the revolutionary *Relearning* method, focused on reinforcing key concepts to ensure a deep understanding of the content.





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*Thanks to this innovative TECH program,  
you will master photon beam and  
electron beam calibration procedures”*

In today's Medical Engineering landscape, External Radiotherapy plays a key role in oncology treatment, making Radiophysics specialization in this field more crucial than ever. Engineers face specific challenges when implementing and operating External Radiotherapy systems, from the analysis of basic interactions of ionizing radiation to the quality control of equipment.

The present academic pathway arises as a direct response to these professional demands, providing comprehensive training for engineers to accurately face the technological and scientific challenges inherent to External Radiotherapy. In fact, during the development of the Postgraduate Certificate in Radiophysics in External Radiotherapy in Physical Dosimetry, graduates will address in detail the essential skills they need to excel in this field.

In this way, every aspect of the program is designed to address both practical and theoretical elements, from the analysis of the basic interactions of ionizing radiation with tissues, to the precise control of photon and electron beam calibration procedures. In addition, the inclusion of the analysis of the quality control program for External Radiotherapy equipment will reinforce the direct applicability of the knowledge acquired, preparing the graduates to ensure precision and efficiency in clinical procedures.

In this sense, the methodology of this curriculum will reflect the flexibility necessary for practicing professionals. Being completely online, students will be able to adapt their learning to their work commitments. Furthermore, the *Relearning* methodology, based on the repetition of key concepts, will not only facilitate deep understanding, but will also ensure long-term retention of knowledge. This pedagogical approach will improve the assimilation of information, aligning with the demands of professional life.

This **Postgraduate Certificate in Radiophysics in External Radiotherapy in Physical Dosimetry** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ The development of case studies presented by experts in Radiophysics in External Radiotherapy in Physical Dosimetry
- ♦ The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics and practical information on those disciplines that are essential for professional practice
- ♦ Practical exercises where self-assessment can be used to improve learning
- ♦ Its special emphasis on innovative methodologies
- ♦ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ♦ Content that is accessible from any fixed or portable device with an Internet connection



*Do you want to experience a quality leap in your career? With TECH you will acquire skills for the implementation of External Radiotherapy equipment"*

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*You will acquire knowledge without geographical limitations or pre-established timing in the best rated university in the world by its students, according to the Trustpilot platform (4.9/5)"*

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.

*Through 150 hours of the best digital teaching, you will delve into the operation of simulation and localization equipment in External Radiotherapy.*

*Studying through videos, interactive summaries and evaluative tests, you will assimilate all the knowledge in External Radiotherapy in Physical Dosimetry in a fast and enjoyable way.*



# 02

# Objectives

The main objective of this program is to provide graduates with a comprehensive mastery of the quality control program for External Radiotherapy equipment. Designed specifically for Engineering professionals, this program will focus on providing the skills and knowledge necessary to apply rigorous procedures and maintain the highest standards of accuracy and safety in the implementation and operation of External Radiotherapy systems, standing out as experts in the field of Medical Engineering.







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*Take advantage of this opportunity and take the plunge! You will get up to date on the latest technological trends in equipment used in External Radiotherapy”*



## General Objectives

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- ♦ Analyze the basic interactions of ionizing radiation with tissues
- ♦ Establish the effects and risks of ionizing radiation at the cellular level
- ♦ Analyze elements of the measurement of photon and electron beams in external radiation therapy
- ♦ Examine the quality control program
- ♦ Identify the different planning techniques for external radiotherapy treatments





## Specific Objectives

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- Establish the different simulation, localization and image-guided radiotherapy equipment
- Develop photon beam and electron beam calibration procedures
- Examine the quality control program of external radiotherapy equipment

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*You will achieve your objectives through the study of real cases and the resolution of complex situations in simulated learning environments”*

# 03

# Course Management

TECH has selected an excellent teaching staff for the Postgraduate Certificate in Radiophysics in External Radiotherapy in Physical Dosimetry. In fact, each member of this faculty has an extensive and recognized professional background in the field of Radiotherapy. Composed of the best specialists, these professionals not only possess a deep theoretical understanding, but also a vast practical experience in the set-up and Physical Dosimetry of External Radiotherapy equipment. Their dedication to teaching will ensure that engineers acquire specialized knowledge and a practical, up-to-date perspective in this field.



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*You will learn from leading professionals the latest advances in Radiophysics in External Radiotherapy in Physical Dosimetry”*

## Management



### Dr. De Luis Pérez, Francisco Javier

- ♦ Specialist in Hospital Radiophysics
- ♦ Head of the Radiophysics and Radiological Protection Service at Quirónsalud Hospitals in Alicante, Torrevieja and Murcia
- ♦ Research Group in Personalized Multidisciplinary Oncology, Catholic University San Antonio of Murcia
- ♦ PhD in Applied Physics and Renewable Energies, University of Almeria
- ♦ Degree in Physical Sciences, specializing in Theoretical Physics, University of Granada
- ♦ Member of: Spanish Society of Medical Physics (SEFM), Royal Spanish Society of Physics (RSEF), Illustrious Official College of Physicists and Consulting and Contact Committee, Proton Therapy Center (Quirónsalud)

## Professors

### Dr. Morera Cano, Daniel

- ♦ Specialist in Hospital Radiophysics
- ♦ Physician in Hospital Radiophysics at the University Hospital Son Espases
- ♦ Professional Master's Degree in Industrial Safety and Environment by the Polytechnic University of Valencia
- ♦ Professional Master's Degree in Radiological Protection in Radioactive and Nuclear Facilities by the Polytechnic University of Valencia
- ♦ Degree in Industrial Engineering from the Polytechnic University of Valencia



# 04

## Structure and Content

This university program will provide essential training for engineers seeking to specialize in the field of Radiotherapy. Throughout the syllabus, graduates will be immersed in the commissioning of External Radiotherapy equipment, acquiring specialized knowledge and fundamental practical skills to ensure efficiency and precision in this critical process. Designed specifically for Engineering professionals, this syllabus will provide them with the tools necessary to address the technical and scientific challenges in the implementation and management of External Radiotherapy equipment, excelling in the field of Medical Engineering.



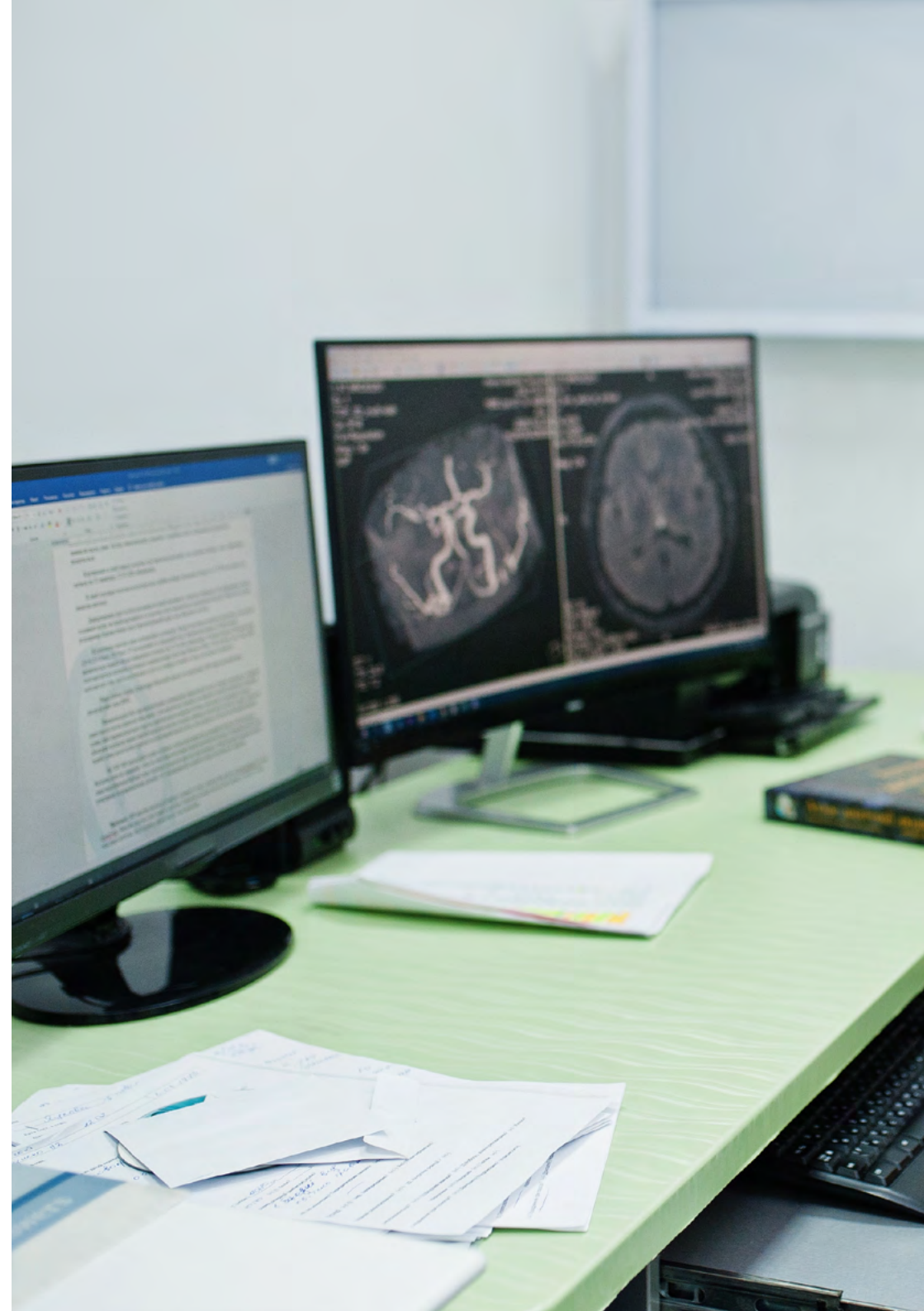


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*Interactive summaries of each topic will allow you to consolidate in a more dynamic way the concepts on quality control of External Radiotherapy equipment"*

## Module 1. External Radiotherapy. Physical Dosimetry

- 1.1. Linear Electron Accelerator. Equipment in External Radiotherapy
  - 1.1.1. Linear Electron Accelerator (LEA)
  - 1.1.2. External Radiotherapy Treatment Planner (TPS)
  - 1.1.3. Registration and Verification Systems
  - 1.1.4. Special Techniques
  - 1.1.5. Hadrontherapy
- 1.2. Simulation and Localization Equipment in External Radiotherapy
  - 1.2.1. Conventional Simulator
  - 1.2.2. Computed Tomography (CT) Simulation
  - 1.2.3. Other Image Modalities
- 1.3. Equipment in Image-Guided External Radiation Therapy
  - 1.3.1. Simulation Equipment
  - 1.3.2. Image-Guided Radiotherapy Equipment. CBCT
  - 1.3.3. Image-Guided Radiotherapy Equipment. Planar Image
  - 1.3.4. Auxiliary Localization Systems
- 1.4. Photon Beams in Physical Dosimetry
  - 1.4.1. Measurement Equipment
  - 1.4.2. Calibration Protocols
  - 1.4.3. Calibration of Photon Beams
  - 1.4.4. Relative Dosimetry of Photon Beams
- 1.5. Electron Beams in Physical Dosimetry
  - 1.5.1. Measurement Equipment
  - 1.5.2. Calibration Protocols
  - 1.5.3. Electron Beam Calibration
  - 1.5.4. Relative Electron Beam Dosimetry
- 1.6. Commissioning of External Radiation Therapy Equipment
  - 1.6.1. Installation of External Radiotherapy Equipment
  - 1.6.2. Acceptance of External Radiotherapy Equipment
  - 1.6.3. Initial Reference State (ERI)
  - 1.6.4. Clinical Use of External Radiation Therapy Equipment
  - 1.6.5. Treatment Planning System





- 1.7. Quality Control of External Radiation Therapy Equipment
  - 1.7.1. Quality Control in Linear Accelerators
  - 1.7.2. Quality Controls on IGRT Equipment
  - 1.7.3. Quality Controls on Simulation Systems
  - 1.7.4. Special Techniques
- 1.8. Quality Control of Radiation Measuring Equipment
  - 1.8.1. Dosimetry
  - 1.8.2. Measurement Instrumentation
  - 1.8.3. Dummies Used
- 1.9. Application of Risk Analysis Systems in External Radiation Therapy
  - 1.9.1. Risk Analysis Systems
  - 1.9.2. Error Reporting Systems
  - 1.9.3. Process Maps
- 1.10. Quality Assurance Program in Physical Dosimetry
  - 1.10.1. Responsibilities
  - 1.10.2. Requirements in External Radiation Therapy
  - 1.10.3. Quality Assurance Program. Clinical and Physical Aspects
  - 1.10.4. Maintenance of the Quality Assurance Program



*Thanks to the Relearning system used by TECH, you will reduce the long hours of study and memorization"*

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"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

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*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*



*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

“*Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## Relearning Methodology

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

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.





In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

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

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then 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.



### 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.



### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





**Case Studies**

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



**Interactive Summaries**

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

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



**Testing & Retesting**

We periodically 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.



06

# Certificate

The Postgraduate Certificate in Radiophysics in External Radiotherapy in Physical Dosimetry 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"*

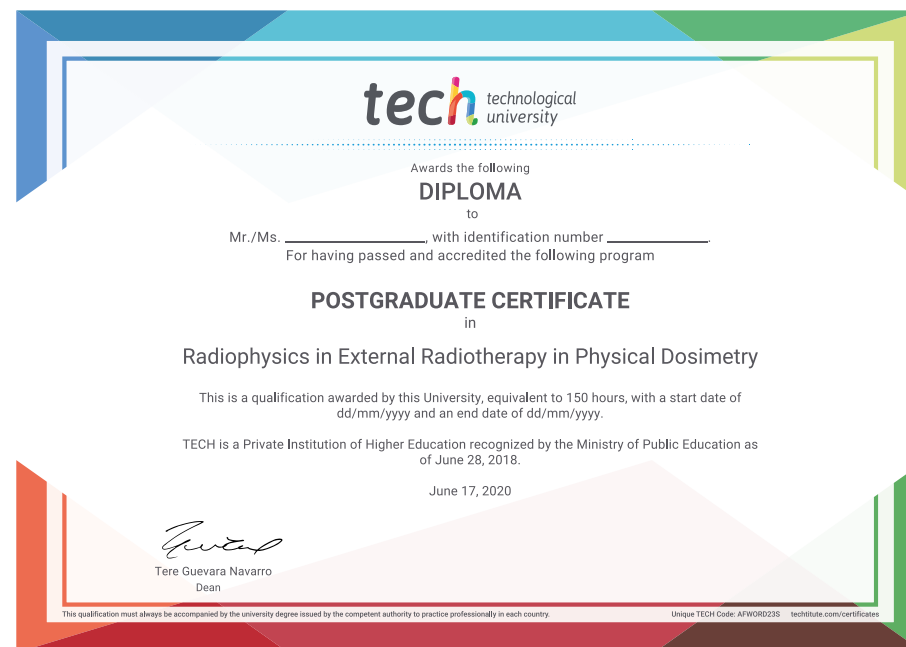
This **Postgraduate Certificate in Radiophysics in External Radiotherapy in Physical Dosimetry** contains the most complete and up-to-date program on the market.

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

The diploma 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 Radiophysics in External Radiotherapy in Physical Dosimetry**

Official N° of Hours: **150 h.**



\*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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