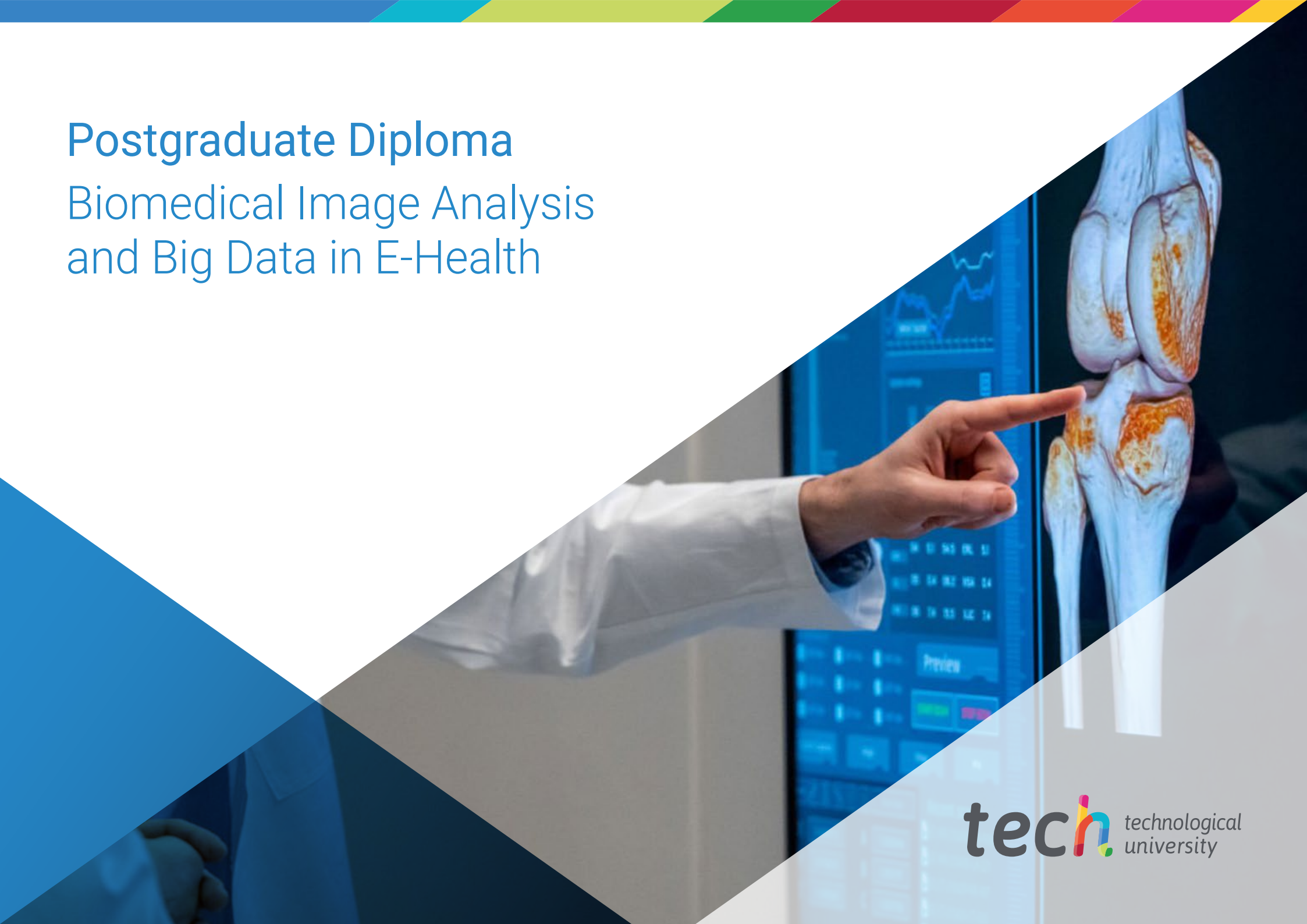
Postgraduate Diploma

Biomedical Image Analysis and Big Data in E-Health



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Postgraduate Diploma

Biomedical Image Analysis and Big Data in E-Health

- Modalität: **online**
- Dauer: **6 Monate**
- Qualifizierung: **TECH Technologische Universität**
- Aufwand: **16 Std./Woche**
- Zeitplan: **in Ihrem eigenen Tempo**
- Prüfungen: **online**

Website: **www.techtitute.com/us/physiotherapy/postgraduate-diploma/postgraduate-diploma-biomedical-image-analysis-big-data-e-health**

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01

Introduction

Diagnostic imaging is one of the main strategies used by Physiotherapy professionals in their daily practice. Thanks to this, it is possible to detect and evaluate the state of each body region of the patient, being able to apply the best and most effective treatments for each case. That is why, being up to date on the news of Biomedicine and the multiple advances that have been made in relation to ultrasound, computed tomography or magnetic resonance, has become a necessity for all those specialists who want to carry out carry out its praxis always based on the most modern and beneficial techniques and guidelines. Therefore, the course of this program is presented as a perfect opportunity to achieve it 100% online, through exhaustive knowledge of the latest advances related to E-Health and Big Data applied to the different fields of Telemedicine.

TECH has the best program on the educational market to update you on recognition and intervention techniques through biomedical images and you are only 1 click away from being able to access it"

The development of biomedical sciences and the application of Big Datastrategies for the analysis and processing of information have favored the evolution of imaging diagnosis. Today it is possible to obtain high resolution, clear and concise results, thanks to which professionals such as Physiotherapy can work in a more specific, safe and personalized way depending on the physical characteristics of the patient, as well as the specifications of your ailment: a contracture, a muscle tear, a bone displacement, an overload, etc.

Thanks to this, the effectiveness of the treatments increases, reducing recovery times and, therefore, guaranteeing a considerable and faster improvement in your quality of life. Based on this and the need on the part of these specialists to have a program that allows them to be up-to-date on developments in this field, TECH and its team of experts in Bioinformatics and Biomedical Engineering have developed this Postgraduate Diploma It is a 450-hour educational experience through which the graduate will be able to delve into scientific advances in relation to recognition and intervention techniques through biomedical images. You will also be able to update your knowledge on the massive processing of clinical data through the most innovative Big Data techniques. To conclude, there will be a brief but intensive review of the applications of Artificial Intelligence and the Internet of Things (IoT) to Telemedicine.

All this throughout 6 months of the best and most exhaustive educational experience, in which a multitude of additional material has been included so that the graduate can delve into the different sections of the agenda in a personalized way: research articles, complementary readings, dynamic summaries, news, self-knowledge exercises and clinical cases. It is, therefore, a unique opportunity to update and renew your clinical practice through a 100% online degree that is perfectly compatible with your work activity.

This **Postgraduate Diploma in Biomedical Image Analysis and Big Data in E-Health** 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 Biomedical Imaging and databases
- The graphic, schematic, and practical contents with which they are created, provide 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 for 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

A unique educational opportunity to delve into the advantages and disadvantages of image-guided interventionism through a 100% online educational experience"

The TECH team of experts has included hundreds of hours of diverse material in this program so that you can delve into the different sections of the agenda in a personalized way"

A perfect program to update you on the aspects to take into account in relation to radiation protection, both for you and for the patient.

You will be able to access the Virtual Campus from anywhere thanks to the compatibility of the platform with any device with an Internet connection, be it a tablet, PC or mobile.

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

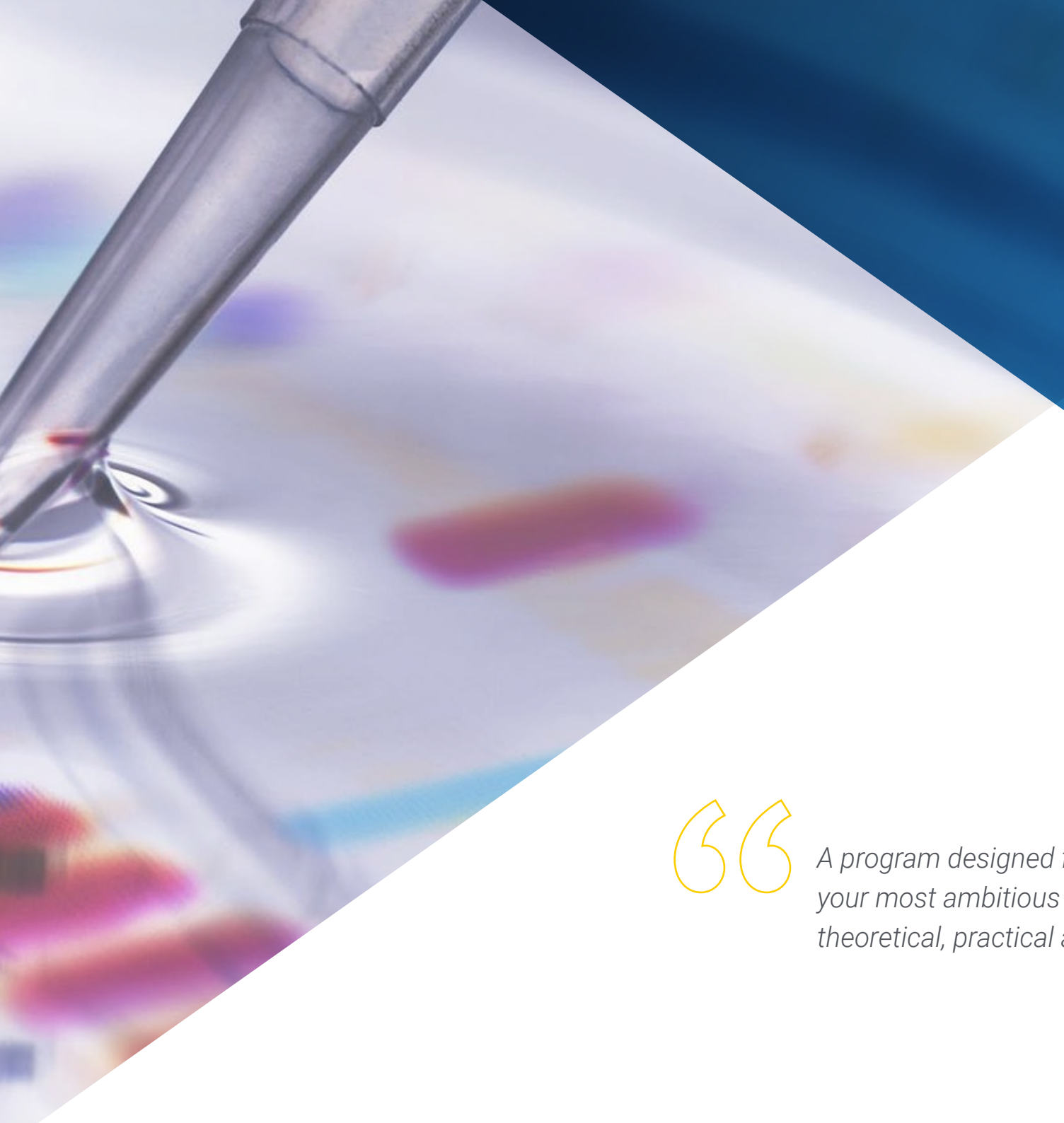
Its multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersive education designed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve different professional practice situations that are presented throughout the academic course. This will be done with the help of an innovative system of interactive videos made by renowned experts.

02

Objectives

Physiotherapy specialists had been demanding for a long time the existence of a degree that would allow them to combine their professional activity with the course of a program through which they could update their knowledge in relation to the analysis of Biomedical Images. Based on this, and as a sign of the commitment of this university to the growth of all its graduates, TECH has developed a multidisciplinary and intensive program with which they will be able to update themselves on the latest in E-Healthin a guaranteed manner and through a comfortable and flexible 100% online format.



A program designed for you to reach even your most ambitious goals through the best theoretical, practical and additional material"

General Objectives

- Develop key concepts of medicine that serve as a vehicle to understand clinical medicine
- Determine the major diseases affecting the human body classified by apparatus or systems, structuring each module into a clear outline of pathophysiology, diagnosis, and treatment
- Determine how to obtain metrics and tools for healthcare management
- Understand the basics of basic and translational scientific methodology
- Examine the ethical and best practice principles governing the different types of research in health sciences
- Identify and generate the means of funding, assessing and disseminating scientific research
- Identify the real clinical applications of the various techniques
- Develop the key concepts of computational science and theory
- Determine the applications of computation and its implication in bioinformatics
- Provide the necessary resources to practically apply all the concepts in the modules
- Develop the fundamental concepts of databases
- Determine the importance of medical databases
- Delve into the most important techniques in research
- Identify the opportunities offered by the IoT in the field of e-Health
- Provide specialized knowledge of the technologies and methodologies used in the design, development and assessment of telemedicine systems
- Determine the different types and applications of telemedicine
- Delve into the most common ethical aspects and regulatory frameworks of telemedicine
- Analyze the use of medical devices
- Develop the key concepts of entrepreneurship and innovation in e-Health
- Determine what a business model is and the types that exist
- Collect e-Health success stories and mistakes to avoid
- Apply the knowledge gained to your own business idea

If mastering the latest trends related to massive data processing is one of your objectives, this University Expert will give you the keys to achieve it"

Specific Objectives

Module 1. Techniques, Recognition and Intervention using Biomedical Imaging

- Examine the fundamentals of medical imaging technologies
- Develop expertise in radiology, clinical applications and physical fundamentals
- Analyze ultrasound, clinical applications and physical fundamentals
- Delve into tomography, computed and emission tomography, clinical applications and physical fundamentals
- Determine how to manage magnetic resonance imaging, clinical applications and physical fundamentals
- Generate advanced knowledge of nuclear medicine, differences between PET and SPECT, clinical applications and physical fundamentals
- Discriminate noise in the image, reasons for it and image processing techniques to reduce it
- Present image segmentation technologies and explain their usefulness
- Gain a deeper understanding of the direct relationship between surgical interventions and imaging techniques
- Establish the possibilities offered by Artificial Intelligence in the recognition of patterns in medical images, thus delving into innovation in the sector

Module 2. Big Data in Medicine: Massive Medical Data Processing

- Develop specialized knowledge on mass procurement techniques of data in Biomedicine
- Analyze the importance of data preprocessing in Big Data
- Determine the differences between the data derived from different massive data collection techniques, as well as their special characteristics in terms of pre-processing and handling
- Provide ways of interpreting results from massive data analysis
- Examine the applications and future trends in the field of Big Data in biomedical research and public health

Module 3. Applications of Artificial Intelligence and the Internet of Things (IoT) in Telemedicine

- Propose communication protocols in different scenarios in the healthcare field
- Analyze IoT communication, as well as its application areas in e-Health
- Substantiate the complexity of artificial intelligence models in its use in healthcare
- Identify the optimization brought by parallelization in GPU-accelerated applications and its use in healthcare
- Present all the Cloud technologies available to implement e-Health and the IoT products, both in computing and communication

03

Course Management

TECH considers it essential to include in its qualifications teaching cadres versed in the area in which the program will be based. That is why, for this Postgraduate Diploma, a team of professionals from the field of Biomedical Engineering and Bioinformatics has been selected. It is a group of specialists who have worked intensively for months to create a highly beneficial academic experience for the graduate to update. In addition, they will be at your disposal in the event that any type of doubt arises during the course of it.

If necessary, you can arrange specific tutorials with the teaching team to solve any doubts that may arise during the course of this academic experience"

Management

Ms. Sirera Pérez, Ángela

- Biomedical Engineer expert in Nuclear Medicine and exoskeleton design
- Designer of specific parts for 3D printing at Technadi
- Technician in the Nuclear Medicine area of the University Clinic of Navarra
- Degree in Biomedical Engineering from the University of Navarra
- MBA and Leadership in Healthcare and Medical Technology Companies

Professors

Ms. Muñoz Gutiérrez, Rebeca

- Data Scientist at INDITEX
- Firmware Engineer for Clue Technologies
- Graduate in Health Engineering, specializing in Biomedical Engineering, University of Malaga and University of Seville
- Master's Degree in Intelligent Avionics, Clue Technologies, in collaboration with the University of Málaga
- NVIDIA: Fundamentals of Accelerated Computing with CUDA C/C
- NVIDIA: Accelerating CUDA C++ Applications with Multiple GPUs

04

Structure and Content

The success of TECH lies in the offer of educational experiences in which the study load has been considerably reduced without sacrificing one iota of quality and exhaustiveness. This is possible thanks to the use of the most avant-garde pedagogical methodology, as well as the inclusion of varied additional material in all its programs of hours. Based on this, the graduate does not have to invest extra hours in memorizing, but attends a natural, progressive, multidisciplinary and intensive update of their knowledge, also favoring the durability of the information in their mind for much longer.

Thanks to the use of the Relearning methodology in the development of this program, you will not have to invest long and tedious hours of memorization"

Module 1. Techniques, Recognition and Intervention using Biomedical Imaging

1.1. Medical Imaging
- 1.1.1. Modalities in Medical Imaging
- 1.1.2. Objectives in Medical Imaging Systems
- 1.1.3. Medical Imaging Storage Systems

1.2. Radiology
- 1.2.1. Imaging Method
- 1.2.2. Radiology Interpretation
- 1.2.3. Clinical Applications

1.3. Computed Tomography (CT)
- 1.3.1. Principle of Operation
- 1.3.2. Image Generation and Acquisition
- 1.3.3. Computerized Tomography. Typology
- 1.3.4. Clinical Applications

1.4. Magnetic Resonance Imaging (MRI)
- 1.4.1. Principle of Operation
- 1.4.2. Image Generation and Acquisition
- 1.4.3. Clinical Applications

1.5. Ultrasound: Ultrasound and Doppler Sonography
- 1.5.1. Principle of Operation
- 1.5.2. Image Generation and Acquisition
- 1.5.3. Typology
- 1.5.4. Clinical Applications

1.6. Nuclear Medicine
- 1.6.1. Physiological Basis in Nuclear Studies. Radiopharmaceuticals and Nuclear Medicine
- 1.6.2. Image Generation and Acquisition
- 1.6.3. Types of Tests
  - 1.6.3.1. Gammagraphy.
  - 1.6.3.2. SPECT
  - 1.6.3.3. PET:
  - 1.6.3.4. Clinical Applications

1.7. Image-Guided Interventions
- 1.7.1. Interventional Radiology
- 1.7.2. Interventional Radiology Objectives
- 1.7.3. Procedures
- 1.7.4. Advantages and Disadvantages.

1.8. Image Quality
- 1.8.1. Technique
- 1.8.2. Contrast
- 1.8.3. Resolution
- 1.8.4. Noise
- 1.8.5. Distortion and Artifacts

1.9. Medical Imaging Tests. Biomedicine
- 1.9.1. Creating 3D Images
- 1.9.2. Biomodels
  - 1.9.2.1. DICOM Standard
  - 1.9.2.2. Clinical Applications

1.10. Radiological Protection
- 1.10.1. European Legislation Applicable to Radiology Services
- 1.10.2. Safety and Action Protocols
- 1.10.3. Radiological Waste Management
- 1.10.4. Radiological Protection
- 1.10.5. Care and Characteristics of Rooms

Module 2. *Big Data* in Medicine: Massive Medical Data Processing

2.1. Big Data in Biomedical Research
- 2.1.1. Data Generation in Biomedicine
- 2.1.2. High-Throughput Technology
- 2.1.3. Uses of High-Throughput Data. Hypotheses in the Age of Big Data

2.2. Data Pre-Processing in Big Data
- 2.2.1. Data Pre-Processing
- 2.2.2. Methods and Approaches
- 2.2.3. Problems with Data Pre-Processing in Big Data

2.3. Structural Genomics
- 2.3.1. Sequencing the Human Genome
- 2.3.2. Sequencing vs. Chips
- 2.3.3. Variant Discovery

2.4. Functional Genomics
- 2.4.1. Functional Notation
- 2.4.2. Mutation Risk Predictors
- 2.4.3. Association Studies in Genomics

2.5. Transcriptomics
- 2.5.1. Techniques to Obtain Massive Data in Transcriptomics: RNA-seq
- 2.5.2. Data Normalization in Transcriptomics
- 2.5.3. Differential Expression Studies

2.6. Interactomics and Epigenomics
- 2.6.1. The Role of Cromatine in Gene Expression
- 2.6.2. High-Throughput Studies in Interactomics
- 2.6.3. High-Throughput Studies in Epigenetics

2.7. Proteomics
- 2.7.1. Analysis of Mass Spectrometry Data
- 2.7.2. Post-Translational Modifications Study
- 2.7.3. Quantitative Proteomics

2.8. Enrichment and Clustering Techniques
- 2.8.1. Contextualizing Results
- 2.8.2. Clustering Algorithms in Omics Techniques
- 2.8.3. Repositories for Enrichment: Gene Ontology and KEGG

2.9. Applying Big Data to Public Health
- 2.9.1. Discovery of New Biomarkers and Therapeutic Targets
- 2.9.2. Risk Predictors
- 2.9.3. Personalized Medicine

2.10. Big Data Applied to Medicine
- 2.10.1. Potential for Diagnostic and Preventive Assistance
- 2.10.2. Use of Machine Learning Algorithms in Public Health
- 2.10.3. The Problem of Privacy

Module 3. Applications of Artificial Intelligence and the Internet of Things (IoT) in Telemedicine

3.1. E-Health Platforms. Personalizing Healthcare Services
- 3.1.1. E-Health Platform
- 3.1.2. Resources for E-Health Platforms
- 3.1.3. Digital Europe Program. Digital Europe-4-Health and Horizon Europe

3.2. Artificial Intelligence in Healthcare I: New Solutions in Computer Applications
- 3.3.1. Remote Analysis of Results
- 3.3.2. Chatbox
- 3.3.3. Prevention and Real-Time Monitoring
- 3.3.4. Preventive and Personalized Medicine in Oncology

3.3. Artificial Intelligence in Healthcare II: Monitoring and Ethical Challenges
- 3.3.1. Monitoring Patients with Reduced Mobility
- 3.3.2. Cardiac Monitoring, Diabetes, Asthma
- 3.3.3. Health and Wellness Apps
  - 3.3.3.1. Heart Rate Monitors
  - 3.3.3.2. Blood Pressure Bracelets
- 3.3.4. Ethical Use of AI in the Medical Field. Data Protection

3.4. Artificial Intelligence Algorithms for Image Processing
- 3.4.1. Artificial Intelligence Algorithms for Image Handling
- 3.4.2. Image Diagnosis and Monitoring in Telemedicine
  - 3.4.2.1. Melanoma Diagnosis
- 3.4.3. Limitations and Challenges in Image Processing in Telemedicine

3.5. Application Acceleration using Graphics Processing Units (GPU) in Medicine
- 3.5.1. Program Parallelization
- 3.5.2. GPU Operations
- 3.5.3. Application Acceleration using GPU in Medicine

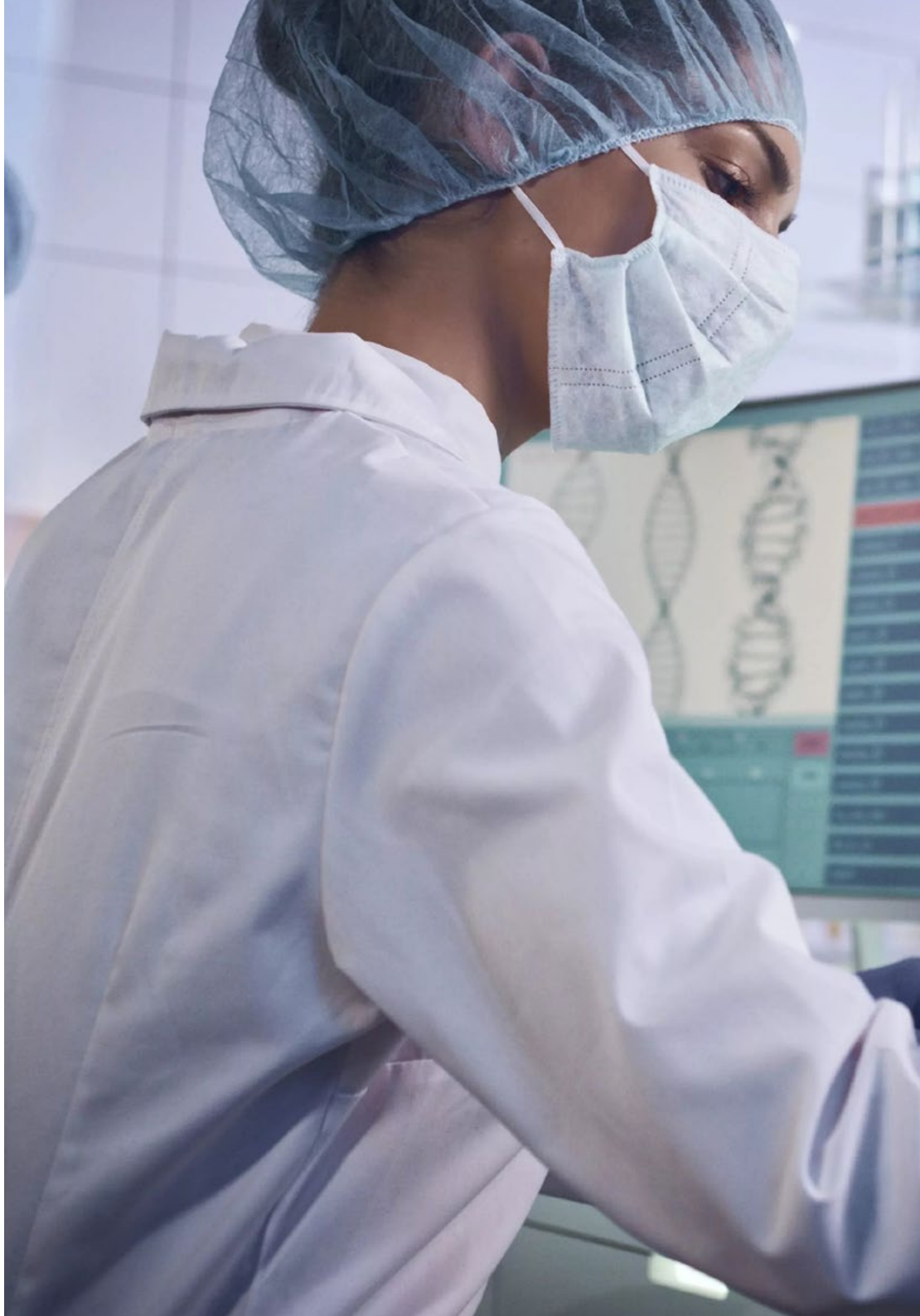
3.6. Natural Language Processing (NLP) in Telemedicine
- 3.6.1. Text Processing in the Medical Field. Methodology
- 3.6.2. Natural Language Processing in Therapy and Medical Records
- 3.6.3. Limitations and Challenges in Natural Language Processing in Telemedicine

3.7. The Internet of Things (IoT) in Telemedicine. Applications
- 3.7.1. Monitoring Vital Signs. Wearables
  - 3.7.1.1. Blood Pressure, Temperature, and Heart Rate
- 3.7.2. The IoT and Cloud Technology
  - 3.7.2.1. Data Transmission to the Cloud
- 3.7.3. Self-Service Terminals

3.8. IoT in Patient Monitoring and Care
- 3.8.1. IoT Applications for Emergency Detection
- 3.8.2. The Internet of Things in Patient Rehabilitation
- 3.8.3. Artificial Intelligence Support in Victim Recognition and Rescue

3.9. Nano-Robots. Typology
- 3.9.1. Nanotechnology
- 3.9.2. Types of Nano-Robots
  - 3.9.2.1. Assemblers. Applications
  - 3.9.2.2. Self-Replicating. Applications

3.10. Artificial Intelligence in COVID-19 Control
- 3.10.1. COVID-19 and Telemedicine
- 3.10.2. Management and Communication of Breakthroughs and Outbreaks
- 3.10.3. Outbreak Prediction in Artificial Intelligence



If what you are looking for is a renewal of your clinical practice, you should not think about it anymore. Will you join the Physiotherapy progress?"

05

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

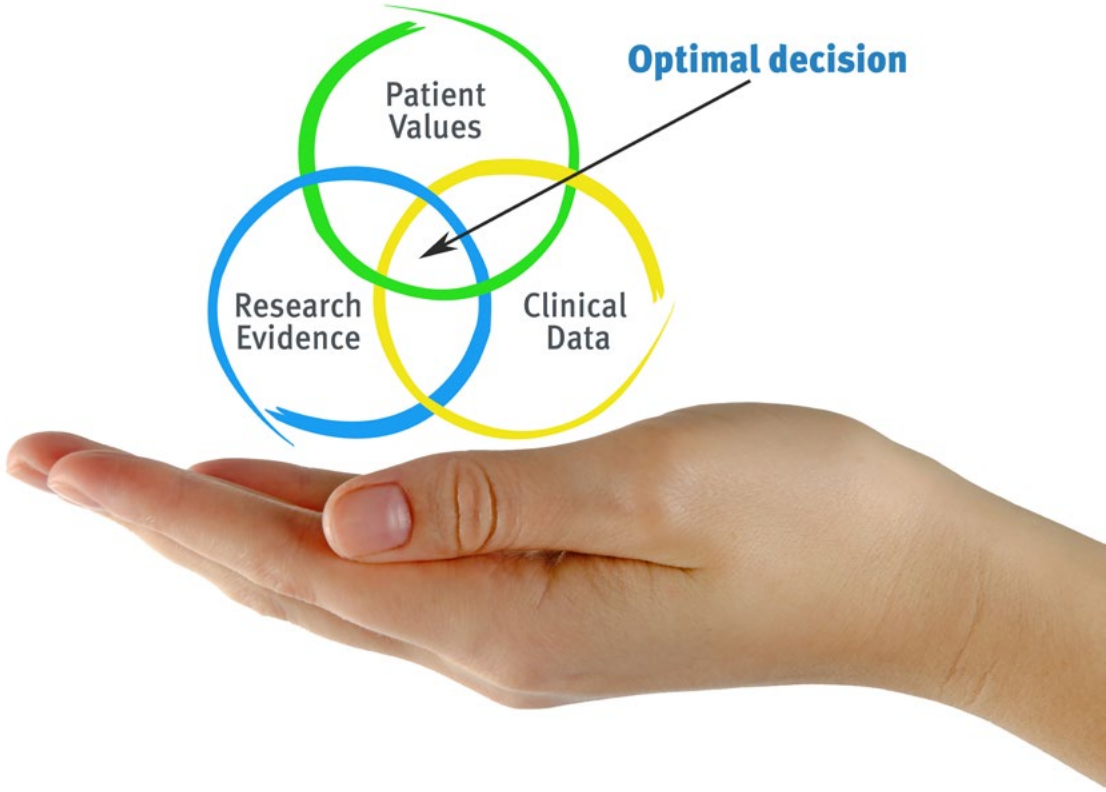
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

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. Physiotherapists/kinesiologists 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 of professional physiotherapy 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:

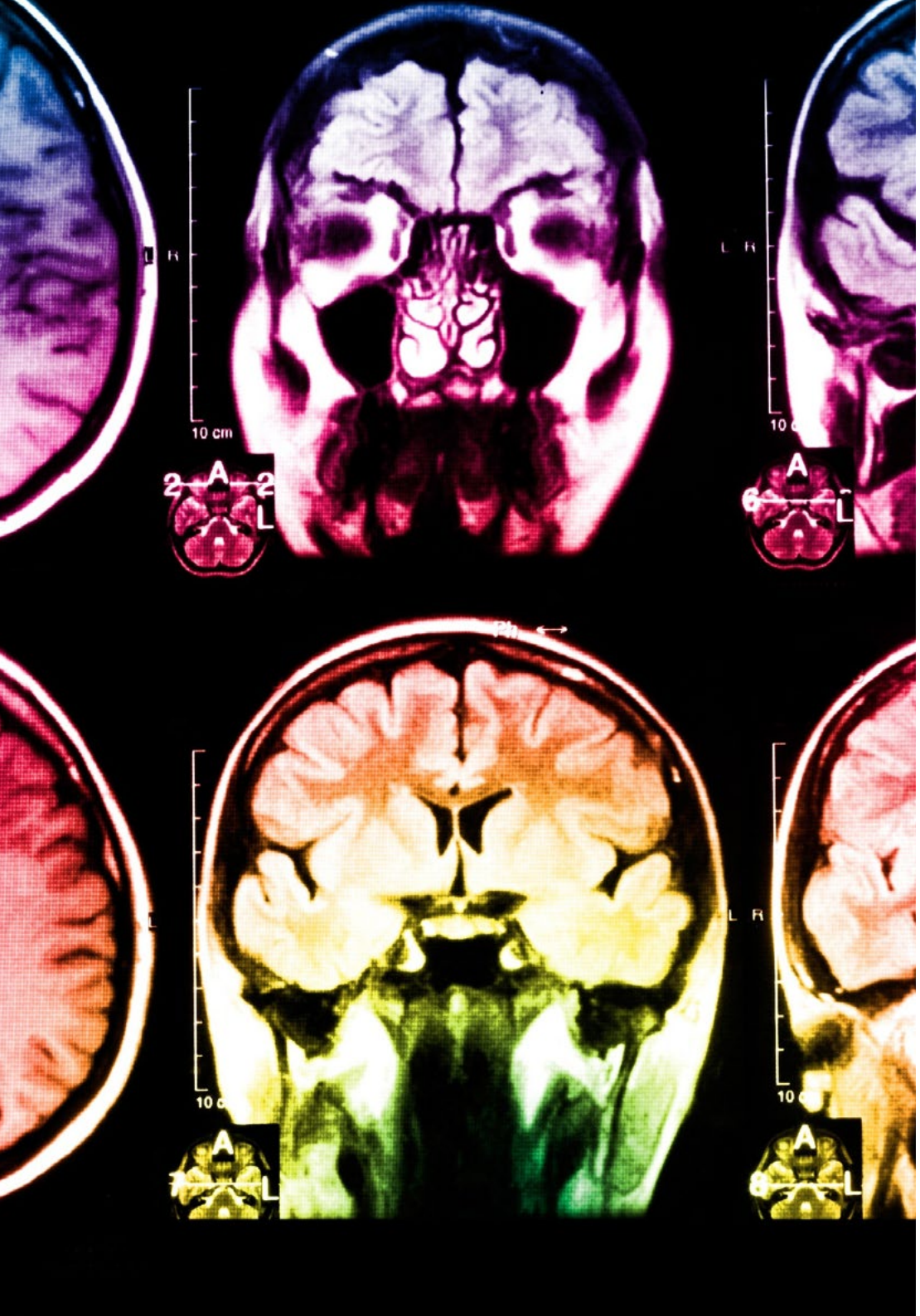
1. Physiotherapists/kinesiologists who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their knowledge.
2. The learning process has a clear focus on practical skills that allow the physiotherapist/kinesiologist to better integrate 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.

The physiotherapist/kinesiologist 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 trained more than 65,000 physiotherapists/kinesiologists with unprecedented success in all clinical specialties, regardless of the 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 training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for 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 our 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.

Physiotherapy Techniques and Procedures on Video

TECH brings students closer to the latest techniques, the latest educational advances and to the forefront of current Physiotherapy techniques and procedures. 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.

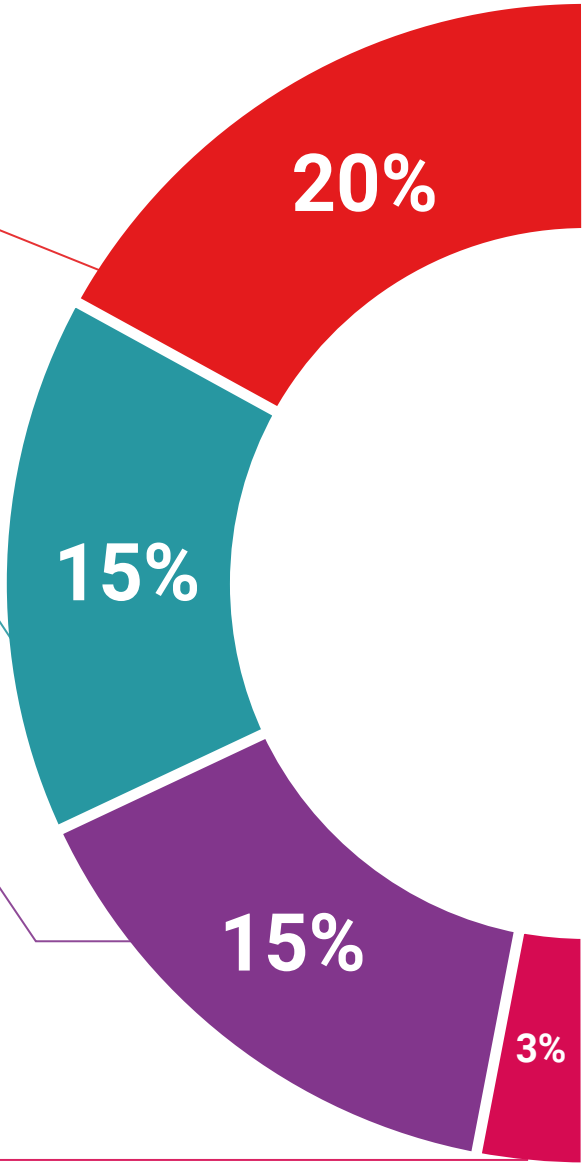
Interactive Summaries

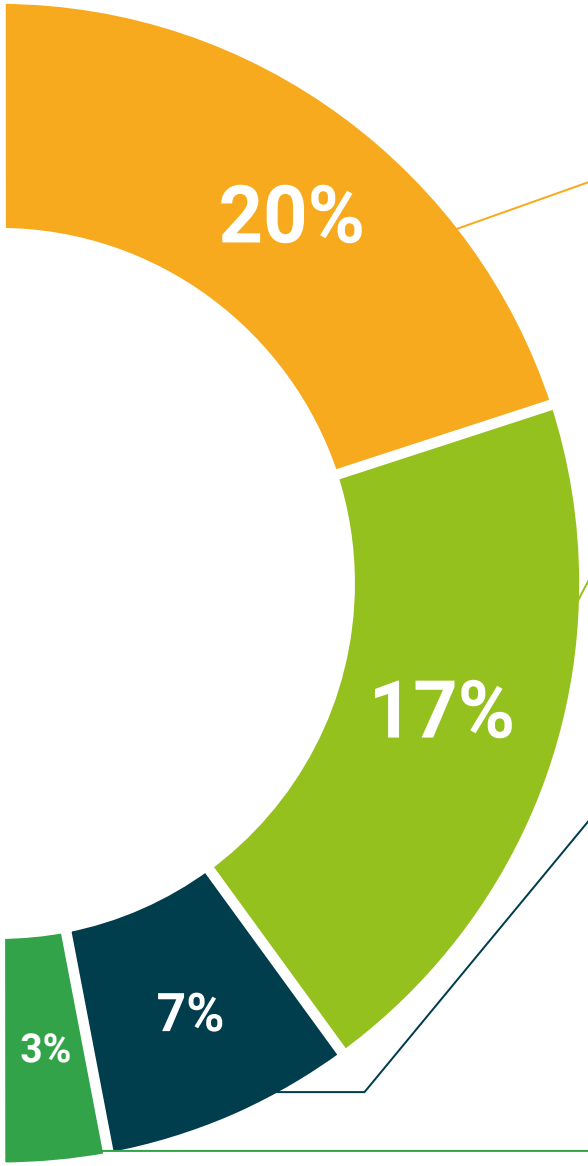
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This unique multimedia content presentation training system 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 Biomedical Image Analysis and Big Data in E-Health 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"

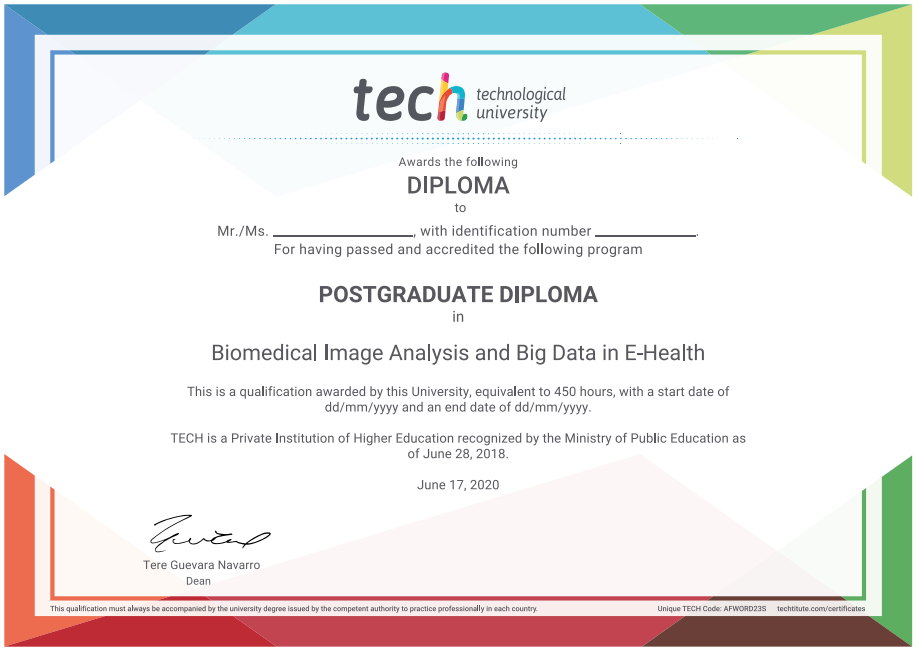
This **Postgraduate Diploma in Biomedical Image Analysis and Big Data in E-Health** contains the most complete and up-to-date scientific program on the market.

After the student has passed the evaluations, they will receive their corresponding **Posgraduate Certificate** 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 Biomedical Image Analysis and Big Data in E-Health**

Official Nº of Hours: **450 h.**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Awards the following

DIPLOMA

to

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

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Biomedical Image Analysis and Big Data in E-Health

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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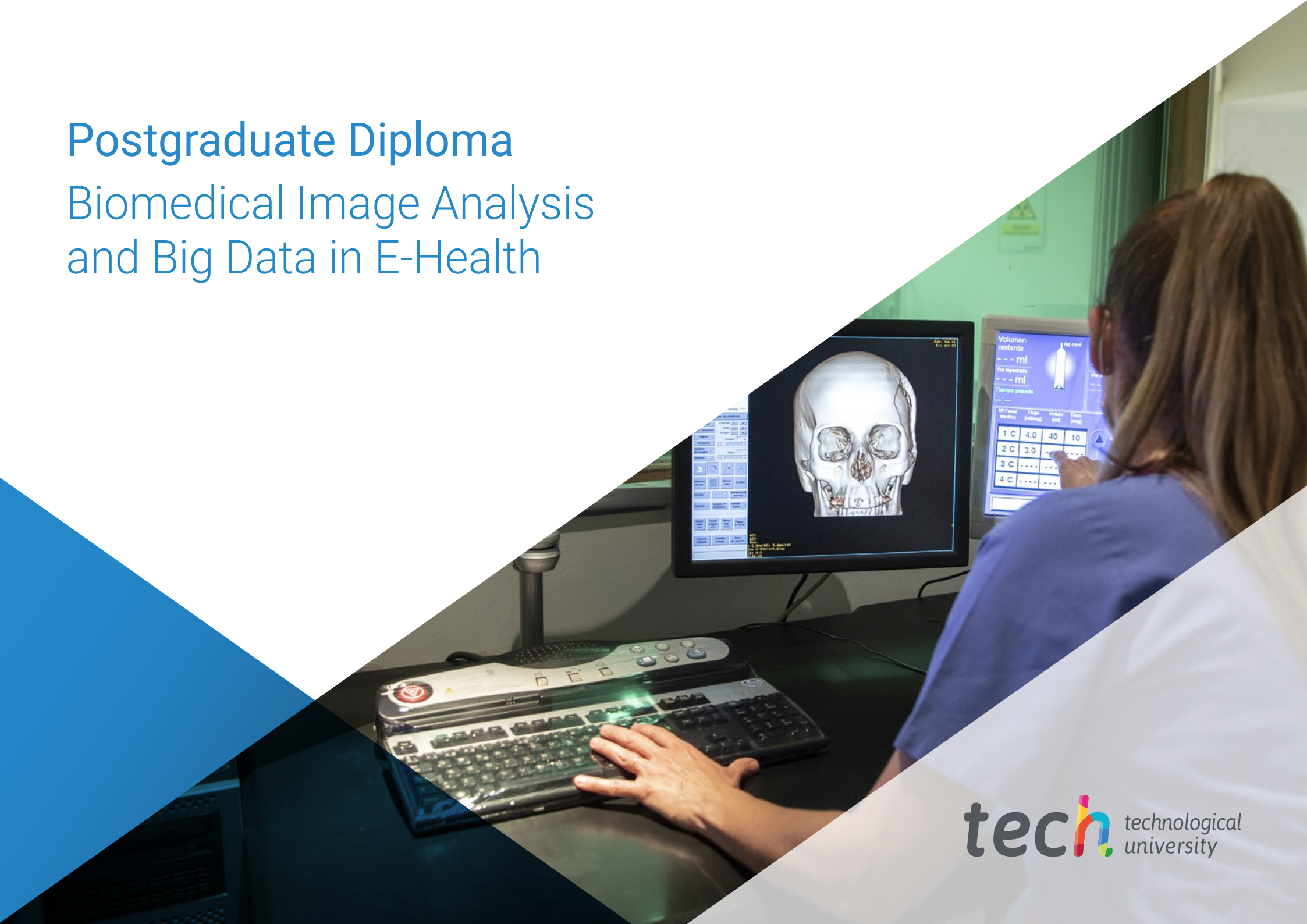

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