

# Postgraduate Certificate

## Practical Applications of Artificial Intelligence in Clinical Research



## Postgraduate Certificate Practical Applications of Artificial Intelligence in Clinical Research

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Credits: 6 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/pk/artificial-intelligence/postgraduate-certificate/practical-applications-artificial-intelligence-clinical-research](http://www.techtute.com/pk/artificial-intelligence/postgraduate-certificate/practical-applications-artificial-intelligence-clinical-research)

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# 01

# Introduction

Artificial Intelligence (AI) has multiple practical applications in Clinical Research, which are transforming the way studies are conducted and medical challenges are addressed. For example, this system analyzes medical images to identify early signs of disease. This favors early detection of pathologies, as well as the application of the most opportune treatment. In turn, Machine Learning is able to predict clinical outcomes ranging from the probability of hospital readmission to the response to therapies. In this way, they help physicians plan procedures and manage patient care. Given its importance, TECH is developing a university program that will address the implementation of Artificial Intelligence to Clinical Research.





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*Through an extensive library of the most innovative multimedia resources, you will be able to integrate wearable devices and remote monitoring into clinical studies"*

Artificial Intelligence mechanisms play an important role in tailoring drug doses and combinations in healthcare. These tools can help healthcare professionals make more informed and accurate decisions as to how much medication a patient should receive and whether different drugs need to be combined. One example of this is that Machine Learning employs individual user data such as weight, age or kidney function to calculate the optimal administration of products. This ensures that the amount administered is appropriate for the particular users, thus maximizing their efficacy.

Given this reality, TECH implements a Postgraduate Certificate that will address genomic sequencing technologies and data analysis with Artificial Intelligence. The curriculum will develop intelligent systems for anomaly detection in medical images. In this way, the agenda will delve into the optimization of laboratory workflows, using predictive algorithms for therapies based on genetic profiles. In addition, the materials will examine the development of *wearable* devices with Artificial Intelligence for continuous health monitoring and the implementation of remote tracking systems for clinical trials.

It is worth noting that the program will provide professionals with a theoretical foundation, but will also allow them to adequately deal with practical situations. The only thing they will need is an electronic device with Internet access to access the Virtual Campus (cell phone, computer or even a *tablet*). In addition, this program is backed by the extensive experience of TECH's outstanding faculty, and is supported by an innovative and cutting-edge pedagogical methodology. This is *Relearning*, which consists of the repetition of essential concepts to achieve more effective knowledge acquisition.

This **Postgraduate Certificate in Practical Applications of Artificial Intelligence in Clinical Research** contains the most complete and up-to-date program on the market.

The most important features include:

- ♦ Development of practical cases presented by experts in Application of AI Technologies in Clinical Practice
- ♦ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ♦ Practical exercises where 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 address topics such as sustainability in biomedical research, future trends and innovation in Machine Learning applied to Clinical Research"*

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*You will develop skills in Artificial Intelligence and address clinical problems with data-driven solutions, all through a 100% online program"*

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.

*Get ready to lead the revolution in healthcare and contribute to the significant advancement of personalized medicine.*

*You will achieve your objectives thanks to TECH's didactic tools, including explanatory videos and interactive summaries.*



# 02 Objectives

The top priority of this university program is to provide clinicians with a deep and practical understanding of how Artificial Intelligence is transforming Clinical Research. Graduates will acquire a range of skills to optimize and personalize their treatments. To do so, they will focus on specific areas such as medical image analysis and the development of individualized therapies. In addition, professionals will be qualified to overcome challenges and take advantage of emerging opportunities in a field that is advancing by leaps and bounds.







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*Thanks to this comprehensive program, you will improve your patients' quality of life by providing more effective and personalized medical care"*



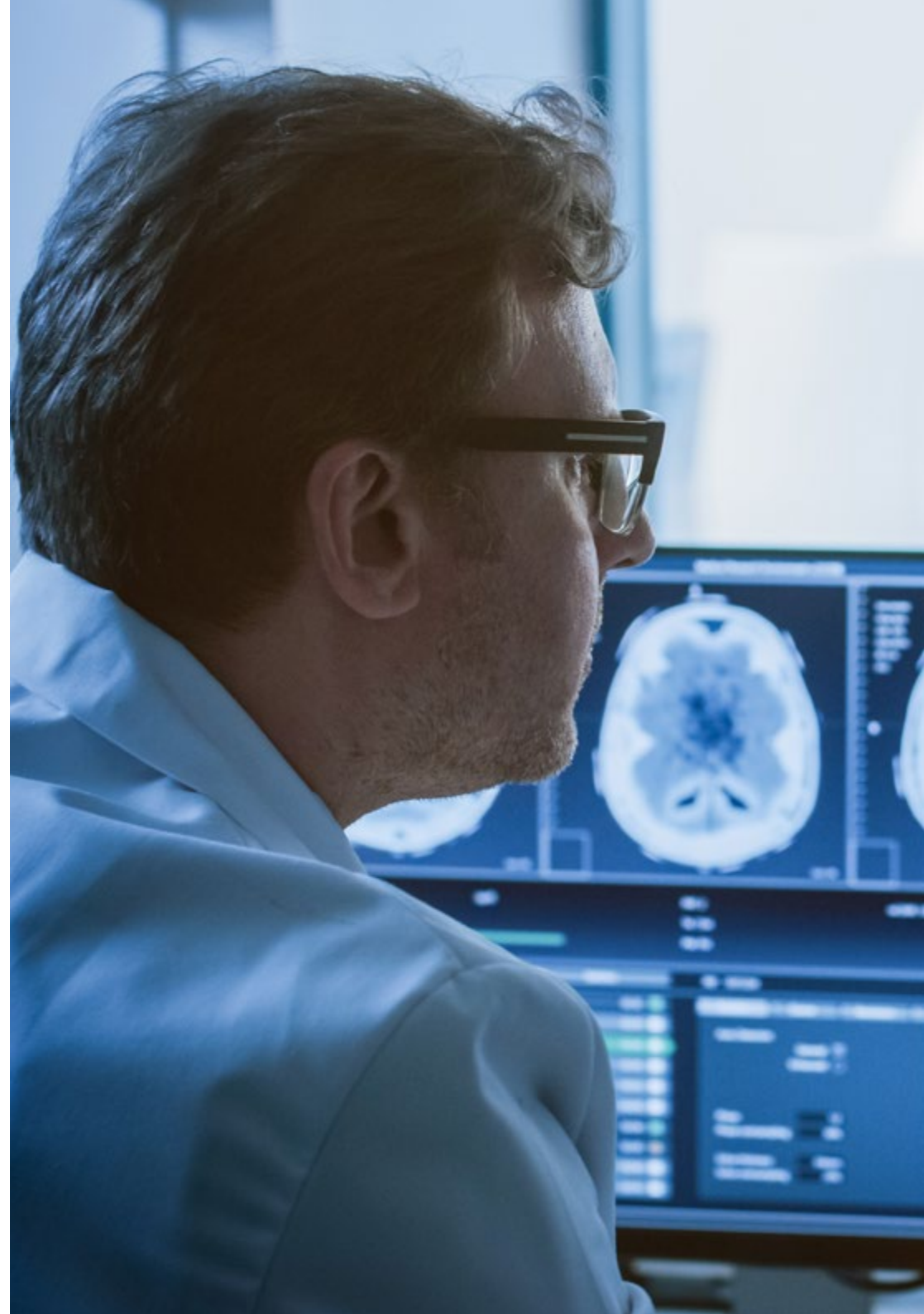
## General Objectives

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- ♦ Understand and apply genomic sequencing technologies, data analysis with AI and use of AI in biomedical imaging
- ♦ Acquire expertise in key areas such as personalization of therapies, precision medicine, AI-assisted diagnostics and clinical trial management
- ♦ Develop skills to address contemporary challenges in the biomedical field, including the efficient management of clinical trials and the application of AI in immunology



*You will delve into the role of Machine Learning in the development of vaccines and treatments, as well as in the optimization of immunology-related processes"*





## Specific Objectives

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- ◆ Acquire expertise in key areas such as personalization of therapies, precision medicine, AI-assisted diagnostics, clinical trial management and vaccine development
- ◆ Incorporate robotics and automation in clinical laboratories to optimize processes and improve the quality of results
- ◆ Explore the impact of AI in microbiome, microbiology, *wearables* and remote monitoring in clinical studies
- ◆ Address contemporary challenges in the biomedical field, such as efficient management of clinical trials, development of AI-assisted treatments, and application of AI in immunology and immune response studies
- ◆ Innovate in AI-assisted diagnostics to improve early detection and diagnostic accuracy in clinical and biomedical research settings

# 03

# Course Management

This Postgraduate Certificate has been designed by a team of highly qualified teachers, specialists in Practical Applications of Artificial Intelligence in Clinical Research, with years of experience behind them. Thanks to their experience in pioneering hospitals in the sector, these experts will share with the graduate the latest in healthcare techniques and tools to optimize their procedures. In this way, TECH offers physicians a groundbreaking program, from which they will develop solid knowledge and cutting-edge skills, in line with the most recent demands of this field of specialization.



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*An experienced teaching group will guide you throughout the learning process and will resolve any doubts that may arise"*

## Management



### **Dr. Peralta Martín-Palomino, Arturo**

- ♦ CEO and CTO at Prometheus Global Solutions
- ♦ CTO at Korporate Technologies
- ♦ CTO at AI Shephers GmbH
- ♦ Consultant and Strategic Business Advisor at Alliance Medical
- ♦ Director of Design and Development at DocPath
- ♦ Ph.D. in Psychology from the University of Castilla - La Mancha
- ♦ Ph.D. in Economics, Business and Finance from the Camilo José Cela University
- ♦ Ph.D. in Psychology from University of Castilla – La Mancha
- ♦ Máster in Executive MBA por la Universidad Isabel I
- ♦ Master's Degree in Sales and Marketing Management, Isabel I University
- ♦ Expert Master's Degree in Big Data by Hadoop Training
- ♦ Master's Degree in Advanced Information Technologies from the University of Castilla - la Mancha
- ♦ Member of: SMILE Research Group



### Mr. Popescu Radu, Daniel Vasile

- ♦ Pharmacology, Nutrition and Diet Specialist
- ♦ Freelance Producer of Didactic and Scientific Contents
- ♦ Nutritionist and Community Dietitian
- ♦ Community Pharmacist
- ♦ Researcher
- ♦ Master's Degree in Nutrition and Health at the Universidad Oberta de Catalunya
- ♦ Master's Degree in Psychopharmacology, University of Valencia
- ♦ Pharmacist by the Complutense University of Madrid
- ♦ Nutritionist-Dietician by the European University Miguel de Cervantes

## Professors

### Dr. Carrasco González, Ramón Alberto

- ♦ Computer Science and Artificial Intelligence Specialist
- ♦ Researcher
- ♦ Head of *Business Intelligence* (Marketing) at Caja General de Ahorros de Granada and Banco Mare Nostrum
- ♦ Head of Information Systems (*Data Warehousing and Business Intelligence*) at Caja General de Ahorros de Granada and Banco Mare Nostrum
- ♦ Ph.D. in Artificial Intelligence, University of Granada
- ♦ Computer Engineer from the University of Granada

# 04

## Structure and Content

This program will focus on biomedical image analysis, emphasizing how Artificial Intelligence improves both interpretation and diagnosis using medical images. The program will delve into robotics in clinical laboratories, urging graduates to optimize research processes. The curriculum will also delve into automation to personalize therapies based on individual circumstances. Moreover, the curriculum will offer a variety of concrete applications in vaccine development, assisted immunological analysis and integration of *wearable* devices for remote monitoring in clinical studies.







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*The program has no fixed schedule and the curriculum is available from day one. Set your own learning pace!”*

## Module 1. Practical Application of AI in Clinical Research

- 1.1. Genomic Sequencing Technologies and Data Analysis with AI
  - 1.1.1. Use of AI for Rapid and Accurate Analysis of Genetic Sequences
  - 1.1.2. Implementation of Automatic Learning Algorithms in the Interpretation of Genomic Data
  - 1.1.3. AI Tools to Identify Genetic Variants and Mutations
  - 1.1.4. Application of AI in Genomic Correlation with Diseases and Traits
- 1.2. AI in Biomedical Image Analysis
  - 1.2.1. Development of AI Systems for the Detection of Anomalies in Medical Imaging
  - 1.2.2. Use of Deep Learning in the interpretation of X-rays, MRI and CT scans
  - 1.2.3. AI Tools for Improving Accuracy in Diagnostic Imaging
  - 1.2.4. Implementation of AI in the Classification and Segmentation of Biomedical Images
- 1.3. Robotics and Automation in Clinical Laboratories
  - 1.3.1. Use of Robots for the Automation of Tests and Processes in Laboratories
  - 1.3.2. Implementation of Automated Systems for the Management of Biological Samples
  - 1.3.3. Development of Robotic Technologies to Improve Efficiency and Accuracy in Clinical Analyses
  - 1.3.4. Application of AI in the Optimization of Laboratory Workflows
- 1.4. AI in the Personalization of Therapies and Precision Medicine
  - 1.4.1. Development of AI Models for the Personalization of Medical Treatments
  - 1.4.2. Use of Predictive Algorithms in the Selection of Therapies Based on Genetic Profiles
  - 1.4.3. AI Tools in Dose Adaptation and Drug Combinations
  - 1.4.4. Application of AI in the Identification of Effective Treatments for Specific Groups
- 1.5. Innovations in AI-assisted Diagnosis
  - 1.5.1. Implementation of AI Systems for Rapid and Accurate Diagnostics
  - 1.5.2. Use of AI in Early Disease Identification through Data Analysis
  - 1.5.3. Development of AI Tools for Clinical Test Interpretation
  - 1.5.4. Application of AI in Combining Clinical and Biomedical Data for Comprehensive Diagnostics





- 1.6. Applications of AI in Microbiome and Microbiology Studies
  - 1.6.1. Use of AI in the Analysis and Mapping of the Human Microbiome
  - 1.6.2. Implementation of Algorithms to Study the Relationship Between the Microbiome and Disease
  - 1.6.3. AI Tools in the Identification of Patterns in Microbiological Studies
  - 1.6.4. Application of AI in Microbiome-based Therapeutics Research
- 1.7. *Wearables* and Remote Monitoring in Clinical Studies
  - 1.7.1. Development of Wearable Devices with AI for Continuous Health Monitoring
  - 1.7.2. Use of AI in the Interpretation of Data Collected by *Wearable* Devices
  - 1.7.3. Implementation of Remote Monitoring Systems in Clinical Trials
  - 1.7.4. Application of AI in the Prediction of Clinical Events through Wearable Data
- 1.8. AI in Clinical Trial Management
  - 1.8.1. Use of AI Systems to Optimize Clinical Trials Management
  - 1.8.2. Implementation of AI in Participant Selection and Follow-Up
  - 1.8.3. AI Tools for the Analysis of Clinical Trial Data and Results
  - 1.8.4. Application of AI in Improving Trial Efficiency and Reducing Trial Costs
- 1.9. AI-assisted Development of Vaccines and Treatments
  - 1.9.1. Use of AI in Accelerating Vaccine Development
  - 1.9.2. Implementation of Predictive Models in the Identification of Potential Treatments
  - 1.9.3. AI Tools for Simulating Vaccine and Drug Responses
  - 1.9.4. Application of AI in the Personalization of Vaccines and Therapies
- 1.10. AI Applications in Immunology and Immune Response Studies
  - 1.10.1. Development of AI Models for Understanding Immunological Mechanisms
  - 1.10.2. Use of AI in the Identification of Patterns in Immune Responses
  - 1.10.3. Implementation of AI in the Investigation of Autoimmune Disorders
  - 1.10.4. Application of AI in the Design of Personalized Immunotherapies

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.





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

## 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 has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. 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 course, students 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 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 Practical Applications of Artificial Intelligence in Clinical Research guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.





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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This program will allow you to obtain your **Postgraduate Certificate in Practical Applications of Artificial Intelligence in Clinical Research** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Practical Applications of Artificial Intelligence in Clinical Research**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



\*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.



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