

Postgraduate Certificate

Artificial Intelligence in Clinical
Microbiology and Infectious
Diseases for Nursing



Postgraduate Certificate Artificial Intelligence in Clinical Microbiology and Infectious Diseases for Nursing

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

Website: www.techtute.com/us/nursing/postgraduate-certificate/artificial-intelligence-clinical-microbiology-infectious-diseases-nursing

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01

Introduction

Artificial Intelligence is revolutionizing Clinical Microbiology and the management of Infectious Diseases, offering new tools to face challenges such as antimicrobial resistance and the rapid spread of emerging pathogens. Faced with this situation, Nursing personnel need to acquire advanced competencies to effectively use technological tools such as Deep Learning, Big Data or Machine Learning to significantly improve the diagnosis, treatment or prevention of infections. To help them with this task, TECH presents a cutting-edge university program focused on Machine Learning applications in the field of Clinical Microbiology. In addition, it is taught in a flexible 100% online mode to adapt to the schedules of busy professionals.



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With this Postgraduate Certificate, based on Relearning, you will manage Artificial Intelligence to quickly identify pathogens and their resistance profiles"

A recent report by the United Nations predicts that antimicrobial-resistant infections will cost the global economy up to \$100 trillion over the next few years. In the face of this, Artificial Intelligence emerges as a powerful tool to address challenges such as antimicrobial resistance and the rapid spread of emerging pathogens. In this regard, nurses have a crucial role to play in the adoption and application of these technologies. Therefore, these experts must have a comprehensive knowledge of the use of these tools in order to improve the approach to infectious pathologies.

In this scenario, TECH launches a revolutionary Postgraduate Certificate in Artificial Intelligence in Clinical Microbiology and Infectious Diseases for Nursing. The academic itinerary will delve into the emerging areas interrelated with this technology, among which data science and Big Data stand out. In this sense, the agenda will delve into how Machine Learning tools can be used to optimize epidemiological surveillance and develop antimicrobial therapies that improve the quality of life of patients. It is worth noting that the program will include a disruptive topic on the future of Artificial Intelligence in Microbiology.

On the other hand, the methodology of this program reinforces its innovative character. TECH offers a 100% online educational environment, adapted to the needs of busy nurses seeking to advance their careers. It also relies on the Relearning methodology, based on the repetition of key concepts to fix knowledge and facilitate learning. In this way, the combination of flexibility and a robust pedagogical approach makes it highly accessible. In addition, professionals will have access to a rich library of multimedia resources in different audiovisual formats (such as interactive summaries, explanatory videos and infographics).

This **Postgraduate Certificate in Artificial Intelligence in Clinical Microbiology and Infectious Diseases for Nursing** 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 Microbiology, Medicine and Parasitology
- ♦ The graphic, schematic and eminently practical contents with which it is conceived gather scientific and practical information on those disciplines that are indispensable 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



This program will allow you to learn fluently, steadily and effectively. You will take a leap in quality in your career as a Nurse!"

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You will delve into the most innovative techniques of Machine Learning for the identification of bacteria”

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 course. For this purpose, students will be assisted by an innovative interactive video system created by renowned and experienced experts.

Are you looking to acquire skills to design infection prevention protocols that integrate Artificial Intelligence technologies? Achieve it with this program.

You will be able to take this program 100% online, adapting it to your needs and making it easier for you to take it while you develop your full-time healthcare activity.

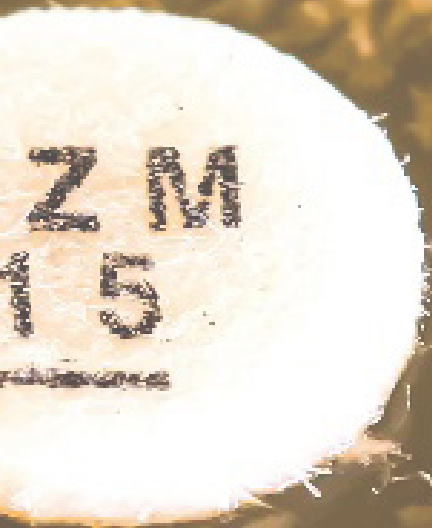


02

Objectives

Thanks to this Postgraduate Certificate, nurses will have a comprehensive understanding of the applications of Artificial Intelligence in Clinical Microbiology and Infectious Diseases. In this same line, graduates will acquire advanced competences to use these tools to improve accuracy and speed in the diagnosis of infections. In addition, professionals will be able to personalize antimicrobial treatments based on analyses provided by Machine Learning, reducing antibiotic resistance.





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You will acquire the necessary skills to integrate Artificial Intelligence tools into your daily clinical practice and optimize the treatment of infections”



General Objectives

- ♦ Understand how bacterial resistance evolves as new antibiotics are introduced into clinical practice
- ♦ Understand the colonization and infection of patients in Intensive Care Units (ICUs), the different types and risk factors associated with infection
- ♦ Evaluate the impact of Nosocomial Infections in the critically ill patient, including the importance of risk factors and their impact on length of stay in the ICU
- ♦ Analyze the effectiveness of infection prevention strategies, including the use of quality indicators, evaluation tools and continuous improvement tools
- ♦ Understand the pathogenesis of Gram-negative Infections, including the factors related to these bacteria and patients themselves
- ♦ Examine the main infections by Gram Positive Bacteria, including their natural habitat, Nosocomial Infections and community-acquired infections
- ♦ Determine the clinical significance, resistance mechanisms and treatment options for different Gram-positive Bacteria
- ♦ Substantiate the importance of Proteomics and Genomics in the Microbiology laboratory including recent advances and technical and bioinformatics challenges
- ♦ Acquire knowledge on the dissemination of resistant bacteria in food production
- ♦ Study the presence of multidrug-resistant bacteria in the environment and wildlife, as well as to understand their potential impact on public health
- ♦ Acquire expertise on innovative antimicrobial molecules, including antimicrobial peptides and bacteriocins, bacteriophage enzymes and nanoparticles
- ♦ Develop expertise in the discovery methods for new antimicrobial molecules
- ♦ Gain specialized knowledge on Artificial Intelligence (AI) in Microbiology, including current expectations, emerging areas and its cross-cutting nature
- ♦ Understand the role that AI will play in Clinical Microbiology, including the technical lines and challenges for its implementation and deployment in laboratories



Specific Objectives

- Analyze the fundamentals of AI in Microbiology, including its history and evolution, technologies that can be used in Microbiology and research objectives
- Include AI algorithms and models for protein structure prediction, identification and understanding of resistance mechanisms, and analysis of genomic Big Data
- Apply AI in machine learning techniques for bacterial identification and its practical implementation in clinical and Microbiology research laboratories
- Explore synergy strategies with AI between Microbiology and Public Health, including infectious outbreak management, epidemiological surveillance, and personalized treatments



The degree will include real case studies and exercises to bring the development of the program closer to the usual clinical practice"

03

Course Management

TECH's philosophy is based on making the most complete university programs available to anyone in the academic market. For this reason, it carries out a rigorous process to form their respective teaching staff. Thanks to this, the present Postgraduate Certificate counts with the participation of references in the field of Artificial Intelligence in Clinical Microbiology and Infectious Diseases. These experts have designed several didactic materials that are characterized by their high quality. Undoubtedly, an immersive experience that will contribute to optimize the daily practice of nurses and improve their job prospects.



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The teaching team of this Postgraduate Certificate is made up of experts highly specialized in Artificial Intelligence in Clinical Microbiology and Infectious Diseases”

Management



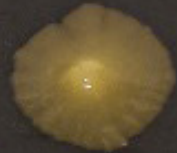
Dr. Ramos Vivas, José

- ♦ Researcher at the Center for Innovation and Technology of Cantabria (CITICAN)
- ♦ Academic of Microbiology and Parasitology at the European University of the Atlantic
- ♦ Founder and former director of the Cellular Microbiology Laboratory of the Valdecilla Research Institute (IDIVAL)
- ♦ PhD in Biology from the University of León
- ♦ Doctor in Sciences from the University of Las Palmas de Gran Canaria
- ♦ Degree in Biology from the University of Santiago de Compostela
- ♦ Master's Degree in Molecular Biology and Biomedicine from the University of Cantabria
- ♦ Member of CIBERINFEC (MICINN-ISCIII), Member of the Spanish Society of Microbiology, Member of the Spanish Network of Research in Infectious Pathology

Professors

Dr. Breñosa Martínez, José Manuel

- ♦ Academic of Artificial Intelligence at the European University of the Atlantic (UNEAT), Cantabria
- ♦ Project Manager at the Cantabria Centre for Industrial Research and Technology (CITICAN)
- ♦ Programmer and Simulation Developer at Ingemotions, Cantabria
- ♦ Researcher at the Centre for Automation and Robotics (CAR: UPM-CSIC), Madrid
- ♦ PhD in Automatics and Robotics at the Polytechnic University of Madrid
- ♦ Master's Degree in Automatics and Robotics at the Polytechnic University of Madrid
- ♦ Degree in Industrial Engineering at the Polytechnic University of Madrid



04

Structure and Content

Through this Postgraduate Certificate, the nursing staff will have a high level of knowledge about the applications of Artificial Intelligence in Clinical Microbiology. The syllabus will delve into the advantages of tools such as Machine Learning, Deep Learning and Big Data to treat infectious diseases. Likewise, the study plan will delve into how algorithms can be used to predict protein structures and understand resistance mechanisms. In addition, the program will provide graduates with the most innovative strategies of Machine Learning to manage infectious outbreaks and develop personalized treatments.





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You will be qualified to implement epidemiological surveillance systems that use Artificial Intelligence to monitor and predict infection outbreaks"

Module 1. Artificial Intelligence in Clinical Microbiology and Infectious Diseases

- 1.1. Artificial Intelligence (AI) in Clinical Microbiology and Infectious Diseases
 - 1.1.1. Current Expectations of AI in Clinical Microbiology
 - 1.1.2. Emerging Areas Interrelated to AI
 - 1.1.3. Transversality of AI
- 1.2. Artificial Intelligence (AI) Techniques and other Complementary Technologies applied to Clinical Microbiology and Infectious Diseases
 - 1.2.1. AI Logic and Models
 - 1.2.2. Technologies for AI
 - 1.2.2.1. *Machine Learning*
 - 1.2.2.2. *Deep Learning*
 - 1.2.2.3. Data Science and Big Data
- 1.3. Artificial Intelligence (AI) in Microbiology
 - 1.3.1. AI in Microbiology: History and Evolution
 - 1.3.2. AI Technologies that can be Used in Microbiology
 - 1.3.3. Research Objectives of AI in Microbiology
 - 1.3.3.1. Understanding Bacterial Diversity
 - 1.3.3.2. Exploring Bacterial Physiology
 - 1.3.3.3. Investigation of Bacterial Pathogenicity
 - 1.3.3.4. Epidemiological Surveillance
 - 1.3.3.5. Development of Antimicrobial Therapies
 - 1.3.3.6. Microbiology in Industry and Biotechnology
- 1.4. Classification and Identification of Bacteria using Artificial Intelligence (AI)
 - 1.4.1. Machine Learning Techniques for Bacterial Identification
 - 1.4.2. Taxonomy of Multi-Resistant Bacteria using AI
 - 1.4.3. Practical Implementation of AI in Clinical and Research Laboratories in Microbiology
- 1.5. Bacterial Protein Decoding
 - 1.5.1. AI Algorithms and Models for Protein Structure Prediction
 - 1.5.2. Applications in the Identification and Understanding of Resistance Mechanisms
 - 1.5.3. Practical Application AlphaFold and Rosetta





- 1.6. Decoding the Genome of Multi-Resistant Bacteria
 - 1.6.1. Identification of Resistance Genes
 - 1.6.2. Genomic Big Data Analysis: AI-Assisted Sequencing of Bacterial Genomes
 - 1.6.3. Practical Application Identification of Resistance Genes
- 1.7. Artificial Intelligence (AI) Strategies in Microbiology and Public Health
 - 1.7.1. Infectious Outbreak Management
 - 1.7.2. Epidemiological Surveillance
 - 1.7.3. AI for Personalized Treatments
- 1.8. Artificial Intelligence (AI) to Combat Antibiotic Resistance in Bacteria
 - 1.8.1. Optimizing Antibiotic Use
 - 1.8.2. Predictive Models for the Evolution of Antimicrobial Resistance
 - 1.8.3. Targeted Therapy Based on Development of New Antibiotics by IA
- 1.9. Future of Artificial Intelligence in Microbiology
 - 1.9.1. Synergies between Microbiology and IA
 - 1.9.2. Lines of AI Implementation in Microbiology
 - 1.9.3. Long-Term Vision of the Impact of AI in the Fight against Multi-Drug Resistant Bacteria
- 1.10. Technical and Ethical Challenges in the Implementation of Artificial Intelligence (AI) in Microbiology
 - 1.10.1. Legal Considerations
 - 1.10.2. Ethical and Liability Considerations
 - 1.10.3. Barriers to AI Implementation
 - 1.10.3.1. Technical Barriers
 - 1.10.3.2. Social Barriers
 - 1.10.3.3. Economic Barriers
 - 1.10.3.4. Cybersecurity



The Virtual Campus will be available to you 24 hours a day, and you can access it at the time that suits you best." Enroll now!"

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.



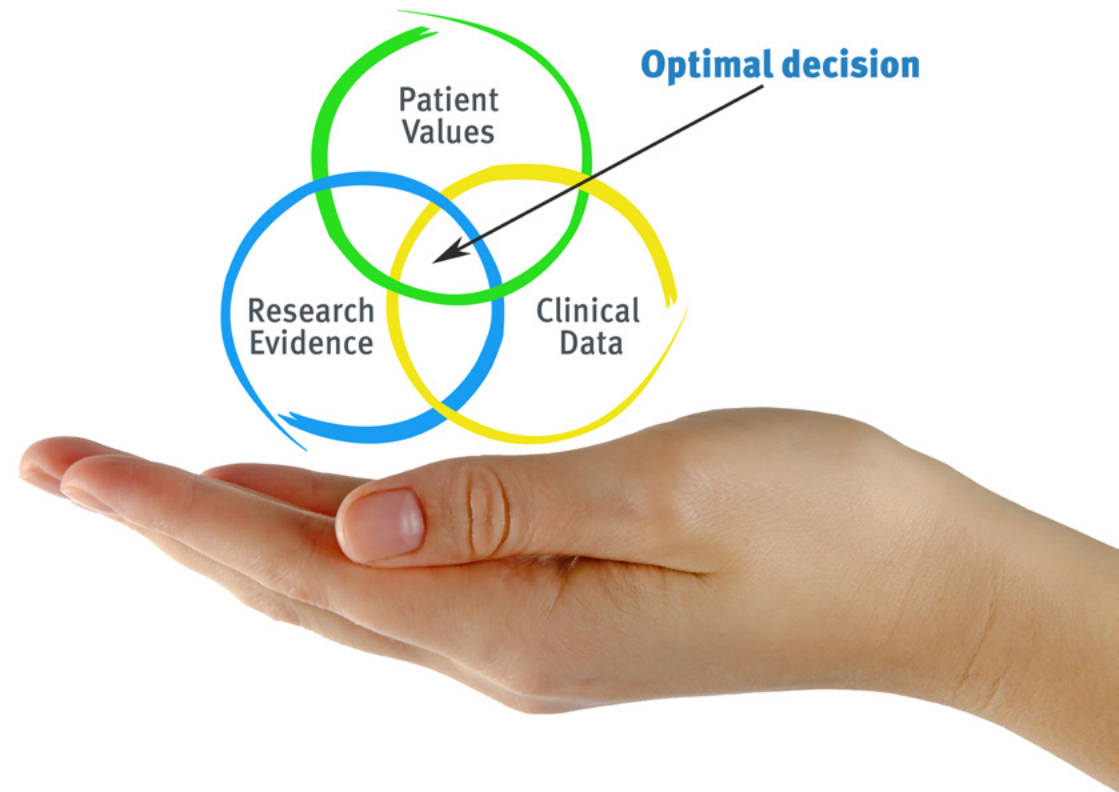
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Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

At TECH Nursing School we use the Case Method

In a given situation, what should a professional do? Throughout the program, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Nurses learn better, faster, and more sustainably over time.

With TECH, nurses can experience a learning methodology that is shaking the foundations of traditional universities around the world.



According to Dr. Gervas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, in an attempt to recreate the real conditions in professional nursing practice.

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Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method”

The effectiveness of the method is justified by four fundamental achievements:

1. Nurses who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their knowledge.
2. The learning process has a clear focus on practical skills that allow the nursing professional to better integrate knowledge acquisition into the hospital setting or primary care.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

This university is the first in the world to combine case studies with a 100% online learning system based on repetition combining a minimum of 8 different elements in each lesson, which is a real revolution compared to the simple study and analysis of cases.



The nurse will learn through real cases and by solving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.

At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology we have trained more than 175,000 nurses with unprecedented success in all specialties regardless of practical workload. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

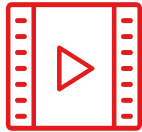
Relearning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.

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

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.



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



Study Material

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

These contents are then adapted in audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high-quality pieces in each and every one of the materials that are made available to the student.



Nursing Techniques and Procedures on Video

We introduce you to the latest techniques, to the latest educational advances, to the forefront of current medical techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch them as many times as you want.



Interactive Summaries

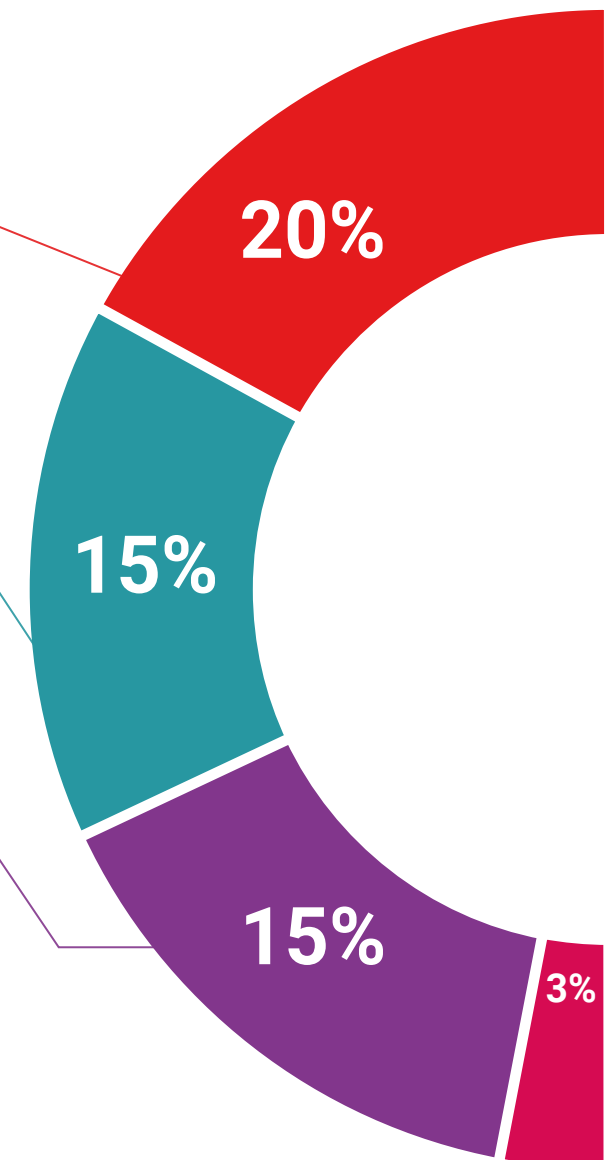
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

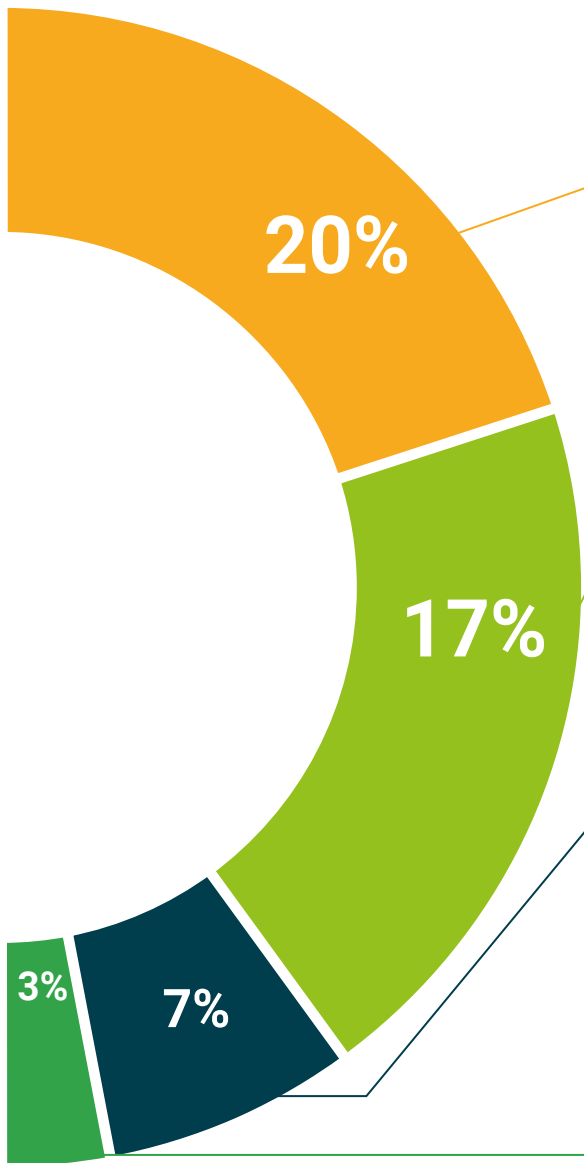
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



Additional Reading

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





Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.



Testing & Retesting

The student's knowledge is periodically assessed and re-assessed throughout the program, through evaluative and self-evaluative activities and exercises: in this way, students can check how they are doing in terms of achieving their goals.



Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.



06

Certificate

The Postgraduate Certificate in Artificial Intelligence in Clinical Microbiology and Infectious Diseases for Nursing 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 private qualification will allow you to obtain a **Postgraduate Certificate in Artificial Intelligence in Clinical Microbiology and Infectious Diseases for Nursing** 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.

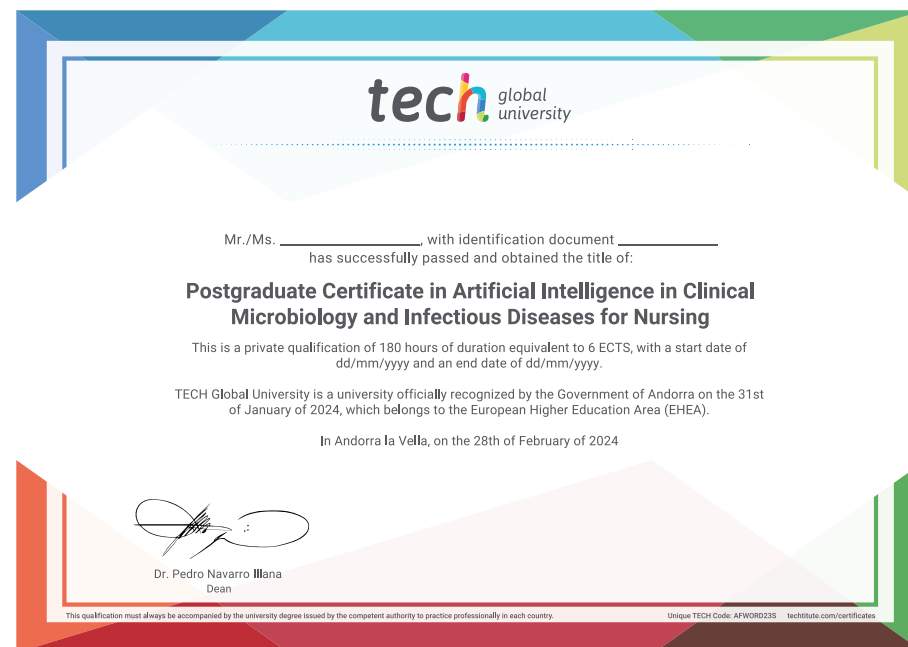
This **TECH Global University** private qualification is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Artificial Intelligence in Clinical Microbiology and Infectious Diseases for Nursing**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



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



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