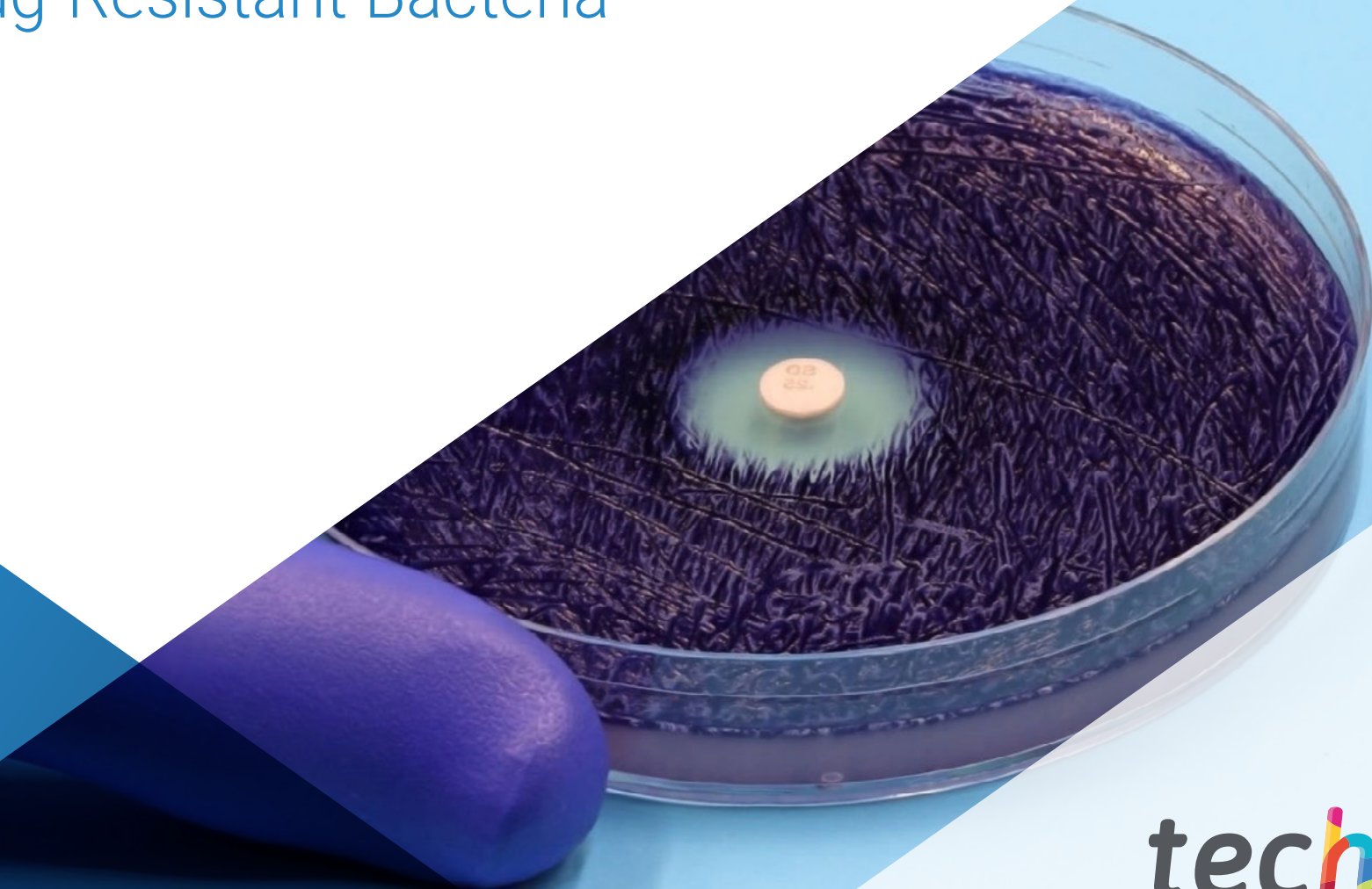


# Postgraduate Certificate

## Emerging Strategies Against Multidrug-Resistant Bacteria





## Postgraduate Certificate Emerging Strategies Against Multidrug-Resistant Bacteria

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

Website: [www.techtute.com/us/medicine/postgraduate-certificate/emerging-strategies-against-multidrug-resistant-bacteria](http://www.techtute.com/us/medicine/postgraduate-certificate/emerging-strategies-against-multidrug-resistant-bacteria)

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# 01

# Introduction

Antibiotic resistance represents one of the greatest challenges to modern medicine, affecting both patients and healthcare systems globally. Infections caused by Multidrug-Resistant Bacteria are not only difficult to treat, but also result in prolonged hospital stays and high healthcare costs. Faced with this crisis, it is urgent that physicians incorporate Emerging Strategies to address this problem into their practice. To contribute to this issue, TECH has created a revolutionary university program focused on the latest research in this field, from the use of bacteriophages to antimicrobial stewardship policies. Moreover, it is delivered in a convenient and flexible 100% online format.



A microscopic view of several dark, spherical bacteria with a textured, almost crystalline surface, arranged in a vertical line on a light-colored background. The bacteria are the primary focus of the left side of the slide.

“

*With this Relearning-based Postgraduate Certificate, you will manage complex clinical cases of Multidrug-Resistant Bacterial infections and develop personalized treatment plans"*

A recent report conducted by the Centers for Disease Control and Prevention reflects that more than 2.8 million antibiotic-resistant bacterial infections occur each year, resulting in more than 35,000 deaths. In response to this global threat, the scientific community has developed a number of innovative techniques ranging from basic research to clinical implementation. Faced with this, clinicians are tasked with effectively managing these strategies to combat bacterial resistance and achieve better results.

In this context, TECH presents a cutting-edge Postgraduate Certificate on Emerging Strategies Against Multidrug-Resistant Bacteria. The academic itinerary will delve into CRISPR-Cas9 gene editing, taking into account key aspects such as the molecular mechanism of action. In this same line, the agenda will address how Temporal Collateral Sensitization contributes to reduce the emergence of resistance by making it difficult for bacteria to develop simultaneous resistance to multiple antibiotics. At the same time, the program will highlight the importance of vaccines to combat a wide range of pathologies caused by bacteria. In addition, graduates will gain advanced skills to effectively manage the most sophisticated bioinformatics tools to combat Multi-drug Resistant Bacteria.

On the other hand, this university program has a 100% online mode, easily accessible from any device with Internet connection and without predetermined schedules. In this same line, TECH is based on the avant-garde teaching method of Relearning, so that doctors can go deeper into the contents without resorting to techniques that involve extra effort, such as memorization. The only thing professionals will only need to have an electronic device with Internet access, in order to enter the Virtual Campus and access the most complete didactic materials on the market. In this way, they will acquire both the knowledge and the necessary skills to optimize their practice and experience a remarkable leap in quality in their professional careers.

This **Postgraduate Certificate in Emerging Strategies Against Multidrug-Resistant Bacteria** 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



*You will be able to access the contents from any fixed or portable device with an Internet connection, even from your mobile phone"*

“

*You will learn more about High Throughput Sequencing, being able to accurately identify genetic mutations responsible for hereditary diseases"*

The program's teaching staff includes professionals from the sector who contribute their work experience to this specializing 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.

*Want to delve into the most sophisticated strategies to prevent the spread of Multidrug-Resistant Bacteria infections in healthcare settings? Get it with this program.*

*Study from the comfort of your home and update your knowledge online with TECH, the world's largest digital university!.*

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15  
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# 02

# Objectives

Through this university program, practitioners will have a high level of knowledge about the genetics of bacteria and how resistance genes are transferred. Graduates will also acquire advanced skills in both performing and interpreting laboratory tests that contribute to the identification of these bacteria and determine their antibiotic sensitivity profile. In turn, professionals will be qualified to manage complex clinical cases and develop highly individualized treatment plans.





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*You will select and administer the most effective treatments considering bacterial resistance”*



## General Objectives

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- ♦ 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 on 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 in 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 Objective

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- Examine in depth the mechanism of different molecular techniques for use against multiresistant bacteria, including CRISPR-Cas9 gene editing, its molecular mechanism of action and its potential applications

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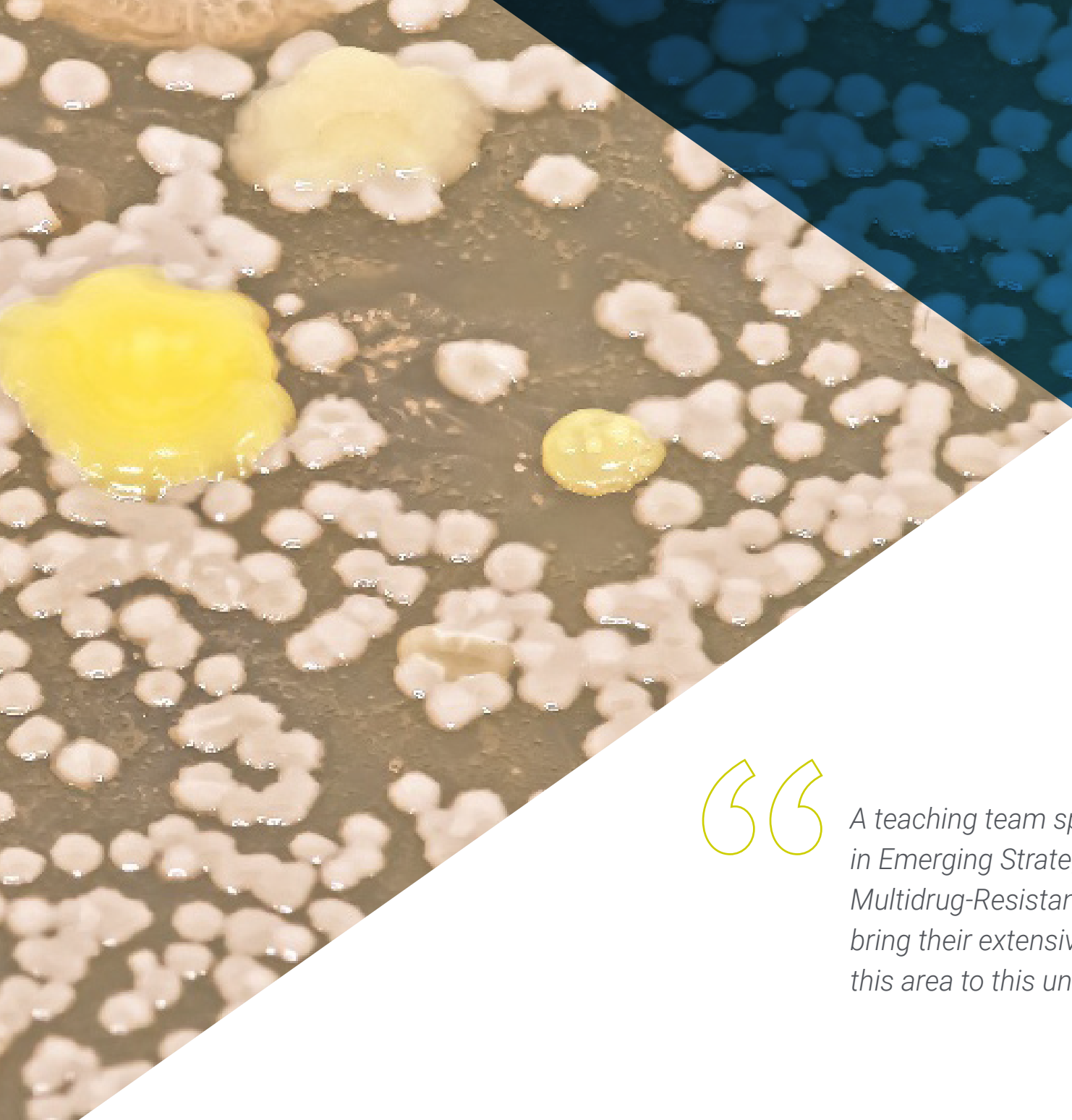
*The syllabus will include a number of real case studies and exercises to bring the development of the program closer to everyday clinical practice”*

03

# Course Management

TECH's main premise is to offer the most comprehensive and up-to-date university programs in the academic market. In order to achieve this, it carries out a meticulous process to constitute its teaching staff. Thanks to this, the present Postgraduate Certificate has the collaboration of authentic references in Emerging Strategies Against Multidrug-Resistant Bacteria. These specialists have an extensive professional background, having worked in health institutions of international prestige. In this way, graduates will be brought into an immersive experience that will optimize their medical practice and improve their job prospects considerably.





“

*A teaching team specializing in Emerging Strategies Against Multidrug-Resistant Bacteria will bring their extensive knowledge of this area to this university program"*

## Management



### Dr. Ramos Vivas, José

- Director of the Banco Santander-Universidad Europea del Atlántico Chair in Innovation
- 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 and Member of the Spanish Network of Research in Infectious Pathology



## Professors

### Dr. Ocaña Fuentes, Aurelio

- ◆ Director of Research at the Bureau Veritas University Center, Camilo José Cela University
- ◆ Research Fellow at the Neurobehavioral Institute, Miami
- ◆ Researcher in the Area of Food Technology, Nutrition and Dietetics, Department of Applied Physical Chemistry, Autonomous University of Madrid
- ◆ Researcher in the Area of Human Physiology, Epidemiology and Public Health, Department of Health Sciences, Rey Juan Carlos University
- ◆ Researcher of the Training Plan for Research Personnel of the University of Alcalá
- ◆ D. in Health Sciences from the Rey Juan Carlos University
- ◆ Master's Degree in Research, Epidemiology and Public Health
- ◆ Diploma in Advanced Studies from Rey Juan Carlos University
- ◆ Degree in Chemical Sciences, specializing in Biochemistry, from the Complutense University of Madrid



*Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"*

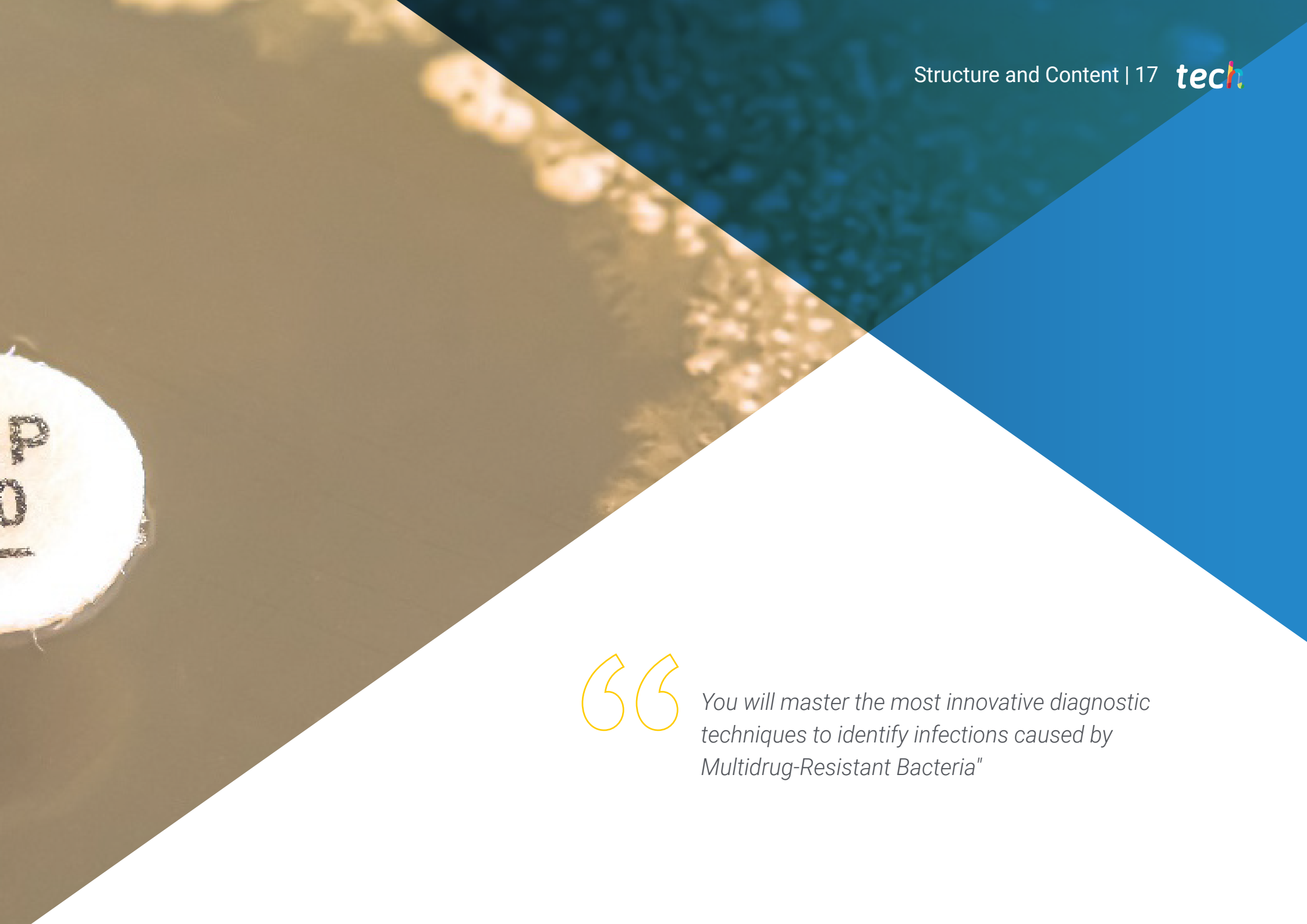
# 04

## Structure and Content

Through this university program, doctors will have a holistic understanding of the biological and genetic mechanisms that allow bacteria to maintain resistance to antibiotics. The syllabus will explore CRISPR-Cas9 gene editing in depth, enabling graduates to modify pathogens to develop better treatments for infectious diseases. Likewise, the syllabus will delve into aspects ranging from the engineering of probiotic bacteria or antibacterial vaccines to phage therapy. Therefore, professionals will gain advanced skills to develop effective clinical management strategies for infected patients.







“

*You will master the most innovative diagnostic techniques to identify infections caused by Multidrug-Resistant Bacteria"*

## Module 1. Emerging Strategies for Multidrug-Resistant Bacteria

- 1.1. CRISPR-Cas9 Gene Editing
  - 1.1.1. Molecular Mechanism of Action
  - 1.1.2. Applications
    - 1.1.2.1. CRISPR-Cas9 as a Therapeutic Tool
    - 1.1.2.2. Engineering of Probiotic Bacteria
    - 1.1.2.3. Rapid Detection of Resistance
    - 1.1.2.4. Elimination of Resistance Plasmids
    - 1.1.2.5. Development of New Antibiotics
    - 1.1.2.6. Safety and Stability
  - 1.1.3. Limitations and Challenges
- 1.2. Temporary Collateral Sensitization (SCT)
  - 1.2.1. Molecular Mechanism
  - 1.2.2. Advantages and Applications of SCT
  - 1.2.3. Limitations and Challenges
- 1.3. Gene Silencing
  - 1.3.1. Molecular Mechanism
  - 1.3.2. RNA Interference
  - 1.3.3. Antisense Oligonucleotides
  - 1.3.4. Benefits and Applications of Gene Silencing
  - 1.3.5. Limitations
- 1.4. High-Throughput Sequencing
  - 1.4.1. Stages of High-Throughput Sequencing
  - 1.4.2. Bioinformatics Tools for Combating Multidrug-Resistant Bacteria
  - 1.4.3. Challenges
- 1.5. Nanoparticles
  - 1.5.1. Mechanisms of Action against Bacteria
  - 1.5.2. Clinical Applications
  - 1.5.3. Limitations and Challenges





- 1.6. Engineering of Probiotic Bacteria
  - 1.6.1. Production of Antimicrobial Molecules
  - 1.6.2. Bacterial Antagonism
  - 1.6.3. Modulation of the Immune System
  - 1.6.4. Clinical Applications
    - 1.6.4.1. Prevention of Nosocomial Infections
    - 1.6.4.2. Reducing the Incidence of Respiratory Infections
    - 1.6.4.3. Adjunctive Therapy in the Treatment of Urinary Tract Infections
    - 1.6.4.4. Prevention of Resistant Skin Infections
  - 1.6.5. Limitations and Challenges
- 1.7. Antibacterial Vaccines
  - 1.7.1. Types of Vaccines against Diseases Caused by Bacteria
  - 1.7.2. Vaccines in Development against Major Multidrug-Resistant Bacteria
  - 1.7.3. Challenges and Considerations
- 1.8. Bacteriophages
  - 1.8.1. Mechanism of Action
  - 1.8.2. Lytic Cycle of Bacteriophages
  - 1.8.3. Lysogenic Cycle of Bacteriophages
- 1.9. Phage Therapy
  - 1.9.1. Isolation and Transport of Bacteriophages
  - 1.9.2. Purification and Handling of Bacteriophages in the Laboratory
  - 1.9.3. Phenotypic and Genetic Characterisation of Bacteriophages
  - 1.9.4. Preclinical and Clinical Trials
  - 1.9.5. Compassionate Use of Phages and Success Stories
- 1.10. Antibiotic Combination Therapy
  - 1.10.1. Mechanisms of Action
  - 1.10.2. Efficacy and Risks
  - 1.10.3. Challenges and Constraints
  - 1.10.4. Combined Antibiotic and Phage Therapy

05

# Methodology

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

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



“

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

## At TECH we use the Case Method

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

*With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.*



According to Dr. 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, trying to recreate the real conditions in the physician's professional practice.

“

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

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

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



## Relearning Methodology

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

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

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





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

With this methodology, more than 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

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

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

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



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



#### Study Material

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

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



#### Surgical Techniques and Procedures on Video

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



#### Interactive Summaries

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

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



#### Additional Reading

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





#### Expert-Led Case Studies and Case Analysis

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



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



#### Classes

There is scientific evidence on the usefulness of learning by observing experts. The system known as Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



#### Quick Action Guides

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



# 06 Certificate

The Postgraduate Certificate in Emerging Strategies Against Multidrug-Resistant Bacteria guarantees, in addition to the most accurate 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 diploma in Emerging Strategies Against Multidrug-Resistant Bacteria** 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 Emerging Strategies Against Multidrug-Resistant Bacteria**

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.



**Postgraduate Certificate**  
Emerging Strategies  
Against Multidrug-Resistant  
Bacteria

- » Modality: online
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- » Schedule: at your own pace
- » Exams: online

# Postgraduate Certificate

Emerging Strategies Against  
Multidrug-Resistant Bacteria

