

# Professional Master's Degree

## Human Microbiota





## Professional Master's Degree Human Microbiota

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Credits: 60 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/pharmacy/professional-master-degree/master-human-microbiota](http://www.techtute.com/us/pharmacy/professional-master-degree/master-human-microbiota)

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# 01

# Introduction

In recent years, studies carried out on the human microbiota have made enormous progress in favor of human health. Among them is the intense work carried out by laboratories for the creation and improvement of probiotics and prebiotics. The lines of research in this field have opened multiple possibilities for the prevention and intervention of diseases, which obliges the pharmaceutical professional to be aware of the most recent advances. This 100% online program provides the most up-to-date knowledge about the intestinal and oral microbiota and the recovery of the microbiota in patients suffering from genitourinary tract infections. All of this, in addition, through content prepared by professionals specialized in Microbiology, Pharmacy and Nutrition, renowned in this field.





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*This Professional Master's Degree provides you with the most recent information in the field of Human Microbiota so that you do not lose sight of all the advances achieved"*

From the epigenetic-microbiota interaction, the recovery of the intestinal flora with probiotics and prebiotics, to the most recent debate on fecal transplantation, the great relevance of the human microbiota has been the focus of scientific studies. Likewise, the multiple possibilities it offers for prevention and intervention in patients with different pathologies makes understandable the arduous work that is being developed in reference research centers and laboratories.

The information, however, is not only in the scientific circle, but even the population itself has found special interest in knowing the benefits of maintaining an adequate flora, as well as the use of prebiotics and probiotics. In this scenario, the pharmaceutical professional must keep abreast of recent advances in Human Microbiota. This is why TECH has brought together in this Professional Master's Degree the best professionals in this field, with the main purpose of offering students an update of their knowledge in this area.

To this end, students will be provided a syllabus that will give them the necessary tools to learn about the most recent advances in understanding the functioning of the human organism, the clinical applications of probiotics and prebiotics in cardiovascular disorders, urology, gynecology and immunology. Likewise, the clinical cases elaborated by the specialists and to which the students will have access, will allow them to obtain a much more direct and close vision of their application in different pathologies.

Thus, with this Professional Master's Degree, pharmacists will be able to be up to date through an education taught exclusively online. In addition, students will be able to conveniently access the syllabus hosted on the virtual campus whenever and wherever they wish. The pharmacist only needs an electronic device with an internet connection to connect to the platform and view the content. The professionals are, therefore, faced with a quality, flexible education that is compatible with their work and/or personal responsibilities.

This **Professional Master's Degree in Human Microbiota** contains the most complete and up-to-date scientific program on the market. Its most notable features are:

- ◆ Clinical cases presented by experts in Human Microbiota
- ◆ Its graphic, schematic and practical contents, with which they are conceived, gather scientific and assistance information on those disciplines that are essential for professional practice
- ◆ New diagnostic-therapeutic developments on assessment, diagnosis, and intervention in problems or disorders related to the Microbiota
- ◆ Contains practical exercises, where the process of self-assessment can be carried out to improve learning
- ◆ An algorithm-based interactive learning system for decision-making in the clinical situations presented throughout the course
- ◆ With special emphasis on evidence-based medicine and research methodologies in Human Microbiota
- ◆ All of this will be complemented by 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



*Multimedia content and clinical cases will give you a comprehensive and direct overview of the progress in the use of probiotics in patients with mental illness"*

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*Access the latest and most current knowledge on the clinical application of probiotics in patients with cardiovascular disorders”*

The program includes, in its teaching staff, professionals belonging to the field of medicine and pharmacy, who bring to this training the experience of their work, as well as recognized 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 training 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 Professional will be assisted by an innovative Interactive Video System, developed by Renowned and Experienced Experts in Pharmacy

*You have at your disposal the best teaching team in microbiota. They will provide you with the latest information on advances in pediatric intestinal microbiota.*

*You have an advanced syllabus that you can access 24 hours a day from your computer. A simple method to keep up to date in Human Microbiota.*





# 02 Objectives

The theoretical-practical approach of this Professional Master's Degree will provide the pharmacist with the most recent and advanced information on the human microbiota and its clinical application in patients suffering from skin pathologies, infections or food intolerances. The innovative multimedia material that makes up this online program will also facilitate the achievement of these goals in a much more agile and dynamic way. Likewise, the teaching staff will guide the students at all times during the 12 months of this educational program.







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*This Professional Master's Degree offers you the most up-to-date knowledge on fecal transplantation and the lines of research in this field”*



## General Objectives

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- ♦ Offer a complete and wide vision of the current situation in the area of the Human Microbiota, in its widest sense, the importance of the balance of this Microbiota as a direct effect on our health, with the multiple factors that influence it positively and negatively
- ♦ Back up with scientific evidence how nowadays a privileged position is being given to the Microbiota and its interaction with many non-digestive pathologies, of autoimmune nature or its relationship with the deregulation of the immune system, the prevention of diseases, and as support to other treatments in the daily practice of pharmacy
- ♦ Promote work strategies based on the integral approach of the patient as a reference model, not only focusing on the symptomatology of the specific pathology, but also looking at its interaction with the Microbiota and how it may be influencing it
- ♦ Encourage professional stimulation through continuing education and research
- ♦ Update and clarify general and key terms for a full understanding of the subject such as Microbiome, Metagenomics, Microbiota, Symbiosis, Dysbiosis
- ♦ Study the microbial communities that coexist in symbiosis with humans, learning more about their structure and functions, and how these communities can be altered due to factors such as diet, lifestyle, etc.
- ♦ Delve into the knowledge of the Intestinal Microbiota as the main axis of the Human Microbiota and its interrelation with the rest of the body, its study methods, and its applications in clinical practice to maintain a good state of health
- ♦ Understand the relationship between intestinal pathologies: SIBO, irritable bowel syndrome IBS, Crohn's disease, etc., and intestinal dysbiosis





- ◆ Learn how to manage the different intestinal infections caused by viruses, bacteria, parasites, fungi modulating the altered Intestinal Microbiota
- ◆ Delve into the bidirectional relationship between Microbiota and Neuroimmunological System and study in depth the intestine-microbiota-brain axis and all the pathologies that are generated in its imbalance
- ◆ Acquire an in-depth knowledge of all the oral and respiratory structure and the ecosystems that live in them, seeing how an alteration of these ecosystems has a direct relationship with many associated pathologies
- ◆ Study the mechanisms by virtue of which Probiotics are postulated as preventive in the formation of dental caries and periodontal diseases
- ◆ Know how a negative modulation in our Microbiota can favor the appearance of food intolerances and allergies
- ◆ Delve into how drugs designed for humans can have a negative impact on the gut microbiota, in addition to the known impact of antibiotics
- ◆ Know in depth the safety profile of Probiotics, since, although their use has spread in recent years thanks to their proven efficacy, both for the treatment and prevention of certain diseases, this does not exempt them from generating adverse effects and potential risks





## Specific Objectives

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### Module 1. Microbiota. Microbiome. Metagenomics

- ♦ Update and clarify general and key terms for a full understanding of the subject such as Microbiome, Metagenomics, Microbiota, Symbiosis, Dysbiosis
- ♦ Deepen knowledge of how drugs designed for humans can have a negative impact on the gut microbiota, in addition to the known impact of antibiotics

### Module 2. Gut Microbiota I. Intestinal homeostasis

- ♦ Study the microbial communities that coexist in symbiosis with humans, learning more about their structure and functions and how these communities can be altered due to factors such as diet, lifestyle, etc.
- ♦ Understand the relationship between intestinal pathologies: Small intestinal bacterial overgrowth (SIBO), irritable bowel syndrome (IBS), Crohn's disease and intestinal dysbiosis

### Module 3. Gut Microbiota II. Intestinal Dysbiosis

- ♦ Delve into the knowledge of the Intestinal Microbiota as the main axis of the Human Microbiota and its interrelation with the rest of the body, its study methods, and its applications in clinical practice to maintain a good state of health
- ♦ Learn how to manage the different intestinal infections caused by viruses, bacteria, parasites, fungi affecting the intestinal microbiota

### Module 4. Microbiota in Neonatology and Pediatrics

- ♦ Delve into the most influential factors of the intestinal microbiota of the mother, both in childbirth and in the gestation period itself
- ♦ Delve in the clinical applications of probiotics and prebiotics in the pediatric patient

### Module 5. Oral Microbiota and Respiratory Tract

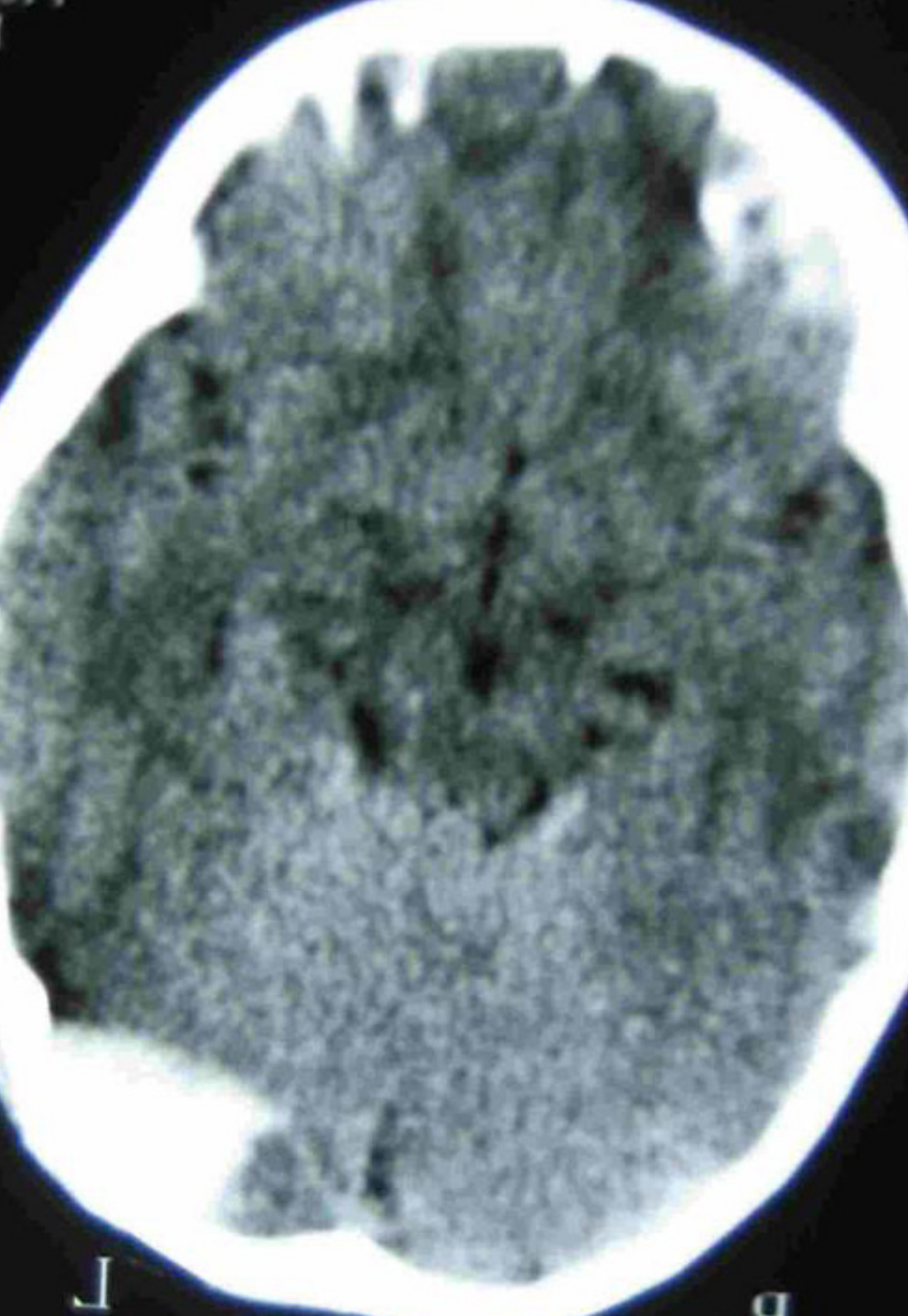
- ♦ Study the mechanisms by virtue of which Probiotics are postulated as preventive in the formation of dental caries and periodontal diseases
- ♦ Acquire an in-depth knowledge of all the oral and respiratory structure and the ecosystems that live in them, seeing how an alteration of these ecosystems has a direct relationship with many associated pathologies

### Module 6. Microbiota and Immune System

- ♦ Delve into the bidirectional relationship between Microbiota and Neuroimmunological System and study in depth the intestine-microbiota-brain axis and all the pathologies that are generated in its imbalance
- ♦ Analyze the role of nutrition and lifestyle and their interaction with the immune system and Microbiota

### Module 7. Skin Microbiota

- ♦ Study the factors that regulate the type of bacterial flora in the skin
- ♦ Know the methods of approach to triggered skin diseases



#### **Module 8. Genitourinary Tract Microbiota**

- ♦ Analyze the main microorganisms causing urinary infections and their relationship with the alteration of the Microbiota in men and women
- ♦ An in-depth look at the role of probiotics in the prevention of the main infections of the genitourinary tract

#### **Module 9. Relationship between Intolerances/Allergies and Microbiota**

- ♦ Know how a negative modulation in our Microbiota can favor the appearance of food intolerances and allergies
- ♦ Delve into Microbiota changes in patients with food exclusion diets such as gluten

#### **Module 10. Probiotics, Prebiotics, Microbiota, and Health**

- ♦ Know in depth the safety profile of Probiotics, since, although their use has spread in recent years thanks to their proven efficacy, both for the treatment and prevention of certain diseases, this does not exempt them from generating adverse effects and potential risks
- ♦ Analyze the various clinical applications of probiotics and prebiotics in areas such as urology, gynecology, gastroenterology and immunology

# 03 Skills

During the development of this Professional Master's Degree, the pharmacist will be able to broaden his or her skills in the identification of the fundamentals on which probiotic and prebiotic therapy is based, as well as being up to date with the latest advances in this field. These competencies will be further enhanced thanks to the clinical case studies developed and provided by the specialized professionals who teach this educational program.







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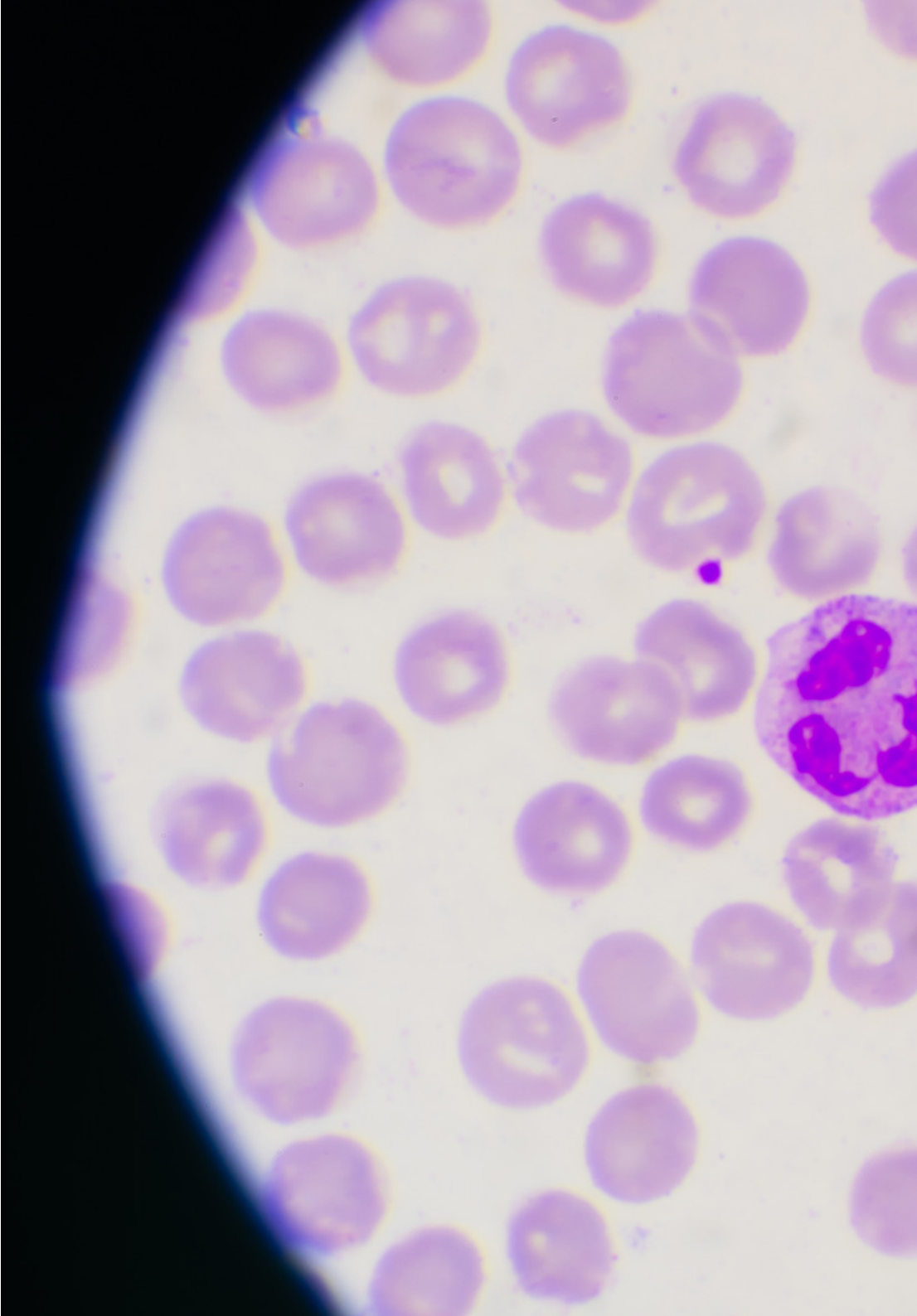
*Thanks to this teaching you will expand your competences on the appropriate use of prebiotics in patients with urinary tract infections"*



## General Skills

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- ♦ Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context
- ♦ Apply acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study
- ♦ Be able to integrate knowledge and face the complexity of making judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments
- ♦ Communicate conclusions, and the ultimate knowledge and rationale behind them, to specialized and non-specialized audiences in a clear and unambiguous way
- ♦ Acquire the learning skills that will enable them to continue studying in a manner that will be largely self-directed or autonomous





## Specific Skills

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- ♦ Give a global vision of the Human Microbiota, so that the professional has a deeper knowledge of this community of microorganisms that coexist with us and the functions they perform in our body
- ♦ Know the type, importance, and functions of the intestinal microbiota in all patients, but particularly in pediatrics, as well as its relationship with digestive and non-digestive diseases
- ♦ Understand how there are many factors that can alter the balance of this human ecosystem, leading us to a state of illness
- ♦ Knowing what factors can help maintain the balance of this ecosystem to maintain a good state of health
- ♦ Update and expand knowledge with special training and interest in Probiotic Therapy, Prebiotic Therapy and the latest advances in this field, such as fecal transplantation, the current situation and future development pathways, as the main tools we have to optimize the functions of the Microbiota and its future projection



*Take the plunge and catch up on the latest news about the factors that influence the balance of the human ecosystem"*



04

# Course Management

TECH has brought together in this program a management and teaching team that is a point of reference in the field of Microbiology and other disciplines involved in its study such as Pharmacy or Nutrition. Their extensive knowledge of Human Microbiota and their wide professional background give students the guarantee of obtaining the most advanced and recent knowledge in this field with this faculty. In addition, the pharmacist will be able to resolve, during the course of this Professional Master's Degree, any doubts that may arise regarding the content of this 100% online program.



A photograph of a pharmacy with shelves of medicine and a person's hands holding a document. The image is partially obscured by a green diagonal overlay on the right side.

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*Access the latest knowledge  
in Human Microbiota from real  
specialists in this field"*

## Guest Directors



### Dr. Sánchez Romero, María Isabel

- ♦ Area Specialist in the Microbiology Department of the Puerta de Hierro University Hospital, Madrid
- ♦ Medical Specialist in Clinical Microbiology and Parasitology
- ♦ Member of the Spanish Society of Infectious Diseases and Clinical Microbiology
- ♦ Technical Secretary of the Madrid Society of Clinical Microbiology
- ♦ Doctor in Medicine and Surgery from the University of Salamanca (2003) with the qualification of outstanding cum laude
- ♦ Degree in Medicine and Surgery from the University of Salamanca



### Dr. Portero, María Francisca

- ♦ Acting Head of the Microbiology Department of the Puerta de Hierro University Hospital, Madrid
- ♦ Specialist in Clinical Microbiology and Parasitology, Puerta de Hierro University Hospital, Madrid
- ♦ Postgraduate in Clinical Management by Gaspar Casal Foundation
- ♦ Doctorate in Medicine from the Autonomous University Madrid
- ♦ Degree in Medicine and Surgery from the Autonomous University of Madrid





### **Dr. Alarcón Caveró, Teresa**

- ♦ Specialist in the Microbiology Department at the La Princesa University Hospital
- ♦ Head of Group 52 of the Research Institute of the La Princesa Hospital
- ♦ Master's Degree in Medical Microbiology from the Complutense University of Madrid
- ♦ Degree in Biological Sciences with a major in Fundamental Biology from the Complutense University of Madrid



### **Dr. Muñoz Algarra, María**

- ♦ Area Specialist in the Microbiology Department of the Puerta de Hierro Majadahonda University Hospital, Madrid
- ♦ Head of Patient Safety of the Microbiology Service in the H.U. Puerto de Hierro Hospital Majadahonda
- ♦ Teaching collaborator at the School of Medicine in the subject of Microbiology at the Autonomous University of Madrid
- ♦ Doctorate in Pharmacy from the Complutense University of Madrid
- ♦ Degree in Pharmacy from the University of Valencia



### Dr. López Dosil, Marcos

- ♦ Specialist Physician of the Microbiology and Parasitology Department of the Hospital de Móstoles
- ♦ Master's Degree in Infectious Diseases and Antimicrobial Treatment from CEU Cardenal Herrera University
- ♦ Master's Degree in Tropical and Health Medicine from the Autonomous University of Madrid
- ♦ Expert in Tropical Medicine from the Autonomous University Madrid
- ♦ Degree in Medicine from the University of Santiago de Compostela



### Dr. Anel Pedroche, Jorge

- ♦ Facultative Area Specialist. Microbiology Department, Puerta de Hierro University Hospital, Majadahonda, Spain
- ♦ Degree in Pharmacy from the Complutense University of Madrid

## Management



### Ms. Fernández Montalvo, María Ángeles

- ♦ Parapharmacy Manager, Nutrition and Natural Medicine Professor
- ♦ Specialist in Food Intolerances and the Study of Intestinal Microbiota
- ♦ Member of the Spanish Society of Probiotics and Prebiotics (SEPyP)
- ♦ Member of the Spanish Society of Dietetics (SEDCA)
- ♦ Member of the Spanish Society of Nutrition (SEÑ)
- ♦ Specialist Degree in Nutrition, Dietetics and Diet Therapy
- ♦ Expert in Microbiological Food Analysis
- ♦ Expert in Nutrition, Food, and Cancer. Prevention and Treatment
- ♦ Expert in Vegetarian, Clinical, and Sports Nutrition
- ♦ Expert in the current use of Nutricosmetics and Nutraceuticals in general
- ♦ Expert in point-of-sale management in Pharmacies and Parapharmacies
- ♦ Diploma in Natural and Orthomolecular Medicine
- ♦ Member of the Spanish Society of Probiotics and Prebiotics (SEPyP)
- ♦ Member of the Spanish Society of Dietetics (SEDCA)
- ♦ Member of the Spanish Society of Nutrition (SEÑ)
- ♦ Degree in Biochemistry from the University of Valencia

## Professors

### Dr. Alonso Arias, Rebeca

- ♦ Specialist Immunology Physician at the Central University Hospital of Asturias
- ♦ Heads the Immunosenescence research group of the Central University Hospital of Asturias Immunology Service
- ♦ 1st National Award for Research in Sports Medicine
- ♦ Degree in Biology from the University of Oviedo
- ♦ Doctorate in Biological Sciences from the Complutense University of Madrid

### Dr. Álvarez García, Verónica

- ♦ Digestive system specialist at the Central Hospital of Asturias (HUCA)
- ♦ Degree in Medicine

### Dr. Bueno García, Eva

- ♦ Pre-doctoral researcher in the research group of Immunosenescence of the Immunology Service of the Central University Hospital of Asturias (HUCA)
- ♦ Master's Degree in Biomedicine and Molecular Oncology from the University of Oviedo
- ♦ Degree in Biology from the University of Oviedo

### Dr. Fernández Madera, Juan

- ♦ Allergy Specialist
- ♦ Degree in Medicine

### Dr. Gabaldon Estevani, Toni

- ♦ Co-Founder and Scientific Advisor (CSO) Microomics SL
- ♦ ICREA Research Professor and Group Leader of the Comparative Genomics Laboratory
- ♦ Dr. in Biology, researcher at Centre for Genomic Regulation | CRG - Bioinformatics and Genomics

### Dr. Gonzalez Rodríguez, Silvia Pilar

- ♦ Medical Subdirector, Research Coordinator and Clinical Chief of the Menopause and Osteoporosis Unit at the Velázquez Medical Cabinet (Madrid)
- ♦ PhD in Medicine and Surgery from the University of Alcalá de Henares. Gynecology Specialist

### Dr. López Martínez, Rocío

- ♦ Resident Internal Biologist of Clinical Immunology at the Central University Hospital of Asturias
- ♦ Degree in Biochemistry from the University of Murcia
- ♦ Professional Master's Degree in Bioinformatics and Biostatistics from the Catalan Open University (UOC) and the University of Barcelona

### Dr. López López, Aranzazu

- ♦ Ph.D. in Biological Sciences
- ♦ Researcher in oral microbiology at FISABIO foundation

### Dr. López Vázquez, Antonio

- ♦ Specialist in Immunology, Central University Hospital of Asturias (HUCA)

### Dr. Lombó Burgos, Felipe

- ♦ Associate Professor at University of Oviedo
- ♦ PhD in Biology and head Professor from the University of Oviedo

### Dr. Losa Domínguez, Fernando

- ♦ Obstetrician-Gynecologist and Maternologist
- ♦ Expert in Menopause certified by the AEEM (Spanish Association for the Study of Menopause)
- ♦ Expert in Gynecoesthetics from the University of Barcelona



**Dr. Méndez García, Celia**

- ♦ Doctorate in Microbiology from the University of Oviedo
- ♦ Research at Novartis Laboratories (Boston)

**Dr. Narbona López, Eduardo**

- ♦ Professor of Pediatrics, University of Granada, Spain
- ♦ Speciality Neonatal Unit, San Cecilio University Hospital

**Dr. Rodríguez Fernández, Carolina**

- ♦ Degree in Biology from the University of Oviedo

**Dr. Rioseras de Bustos, Beatriz**

- ♦ Immunology Resident at HUCA
- ♦ Bachelor's Degree in Biology. University of Oviedo
- ♦ Master's Degree in Neuroscience Research, University of Oviedo
- ♦ Doctorate from the University of Oviedo. "Streptomyces development: regulation and industrial applications."

**Dr. Solís Sánchez, Gonzalo**

- ♦ Neonatologist at the Hospital Universitario Central de Asturias (HUCA)
- ♦ Researcher, Associate Professor of the University of Oviedo

**Dr. Suárez Rodríguez, Marta**

- ♦ Neonatologist of the Central University Hospital of Asturias (HUCA)
- ♦ Researcher and Professor of the Professional Master's Degree in Early Care and the Professional Master's Degree in Critical Care Nursing at the University of Oviedo and other training courses

**Dr. Uberos, José**

- ♦ Neonatal Intensive Care Unit Clinical Assistant, San Cecilio Clinical Hospital
- ♦ Associate Professor of Pediatrics, University of Granada
- ♦ Associate Professor at the Faculty of Medicine at the University of Granada
- ♦ Vocal Bioethics Research Committee of the Province of Granada (Spain)
- ♦ Coeditor of the Signs and Symptoms Journal
- ♦ Professor Antonio Galdo Award. Society of Pediatrics of Eastern Andalusia. For the article entitled: Analysis of nutritional intake in very low birth weight infants and its impact on the severity of bronchopulmonary dysplasia and other comorbidities
- ♦ Editor of the Journal of the Pediatric Society of Eastern Andalusia (Bol. SPAO)
- ♦ Member of the Organizing Committee of the XIV Congress of the Spanish Society of Adolescent Medicine

**Dr. Verdú López, Patricia**

- ♦ Specialty of Allergology at the University Hospital Dr. Negrín in Las Palmas of Gran Canaria
- ♦ Professional Master's Degree in Esthetic and Anti-Aging Medicine at the Complutense University of Madrid
- ♦ Degree in Medicine from the University of Oviedo

05

# Structure and Content

The professional who takes this Professional Master's Degree will obtain the most recent information in the field of human microbiota, thanks to a syllabus that has been prepared by specialists who are currently working in this field. In addition, the progression through this program will be much smoother, thanks to the Relearning system, used by TECH in all its degrees. With it, students also reduce the long hours of study that are so frequent in other teaching methods.



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*The Relearning system applied by TECH will help you reduce the long hours of study so common in other methodologies"*



## Module 1. Microbiota. Microbiome. Metagenomics

- 1.1. Definition and Relationship Between Them
- 1.2. Composition of the Microbiota: Types, Species and Strains
- 1.3. Different Human Microbiota. General Overview of Eubiosis and Dysbiosis
  - 1.3.1. Gastrointestinal Microbiota
  - 1.3.2. Oral Microbiota
  - 1.3.3. Skin Microbiota
  - 1.3.4. Respiratory Tract Microbiota
  - 1.3.5. Urinary Tract Microbiota
  - 1.3.6. Reproductive System Microbiota
- 1.4. Factors that Influence Microbiota Balance and Imbalance
  - 1.4.1. Diet and Lifestyle. Gut-Brain Axis
  - 1.4.2. Antibiotic Therapy
  - 1.4.3. Epigenetic-Microbiota Interaction. Endocrine Disruptors
  - 1.4.4. Probiotics, Prebiotics, Symbiotics. Concepts and Overviews
  - 1.4.5. Fecal Transplant, Latest Advances





## Module 2. Gut Microbiota I. Intestinal homeostasis

- 2.1. Gut Microbiota Studies
  - 2.1.1. Projects MetaHIT, Meta-Biomed, MyNewGut, Human Microbiome Project
- 2.2. Microbiota Composition
  - 2.2.1. Protective Microbiota (Lactobacillus, Bifidobacterium, Bacteroides)
  - 2.2.2. Immunomodulatory Microbiota (Enterococcus faecalis and Escherichia coli)
  - 2.2.3. Mucoprotective or Muconutritive Microbiota (Faecalibacterium prausnitzii and Akkermansia muciniphila)
  - 2.2.4. Microbiota with Proteolytic or Proinflammatory Activities (E. coli Biovare, Clostridium, Proteus, Pseudomonas, Enterobacter, Citrobacter, Klebsiella, Desulfovibrio, Bilophila)
  - 2.2.5. Fungal Microbiota (Candida, Geotrichum)
- 2.3. Digestive System Physiology. Composition of the Microbiota in the Different Parts of the Digestive Tract. Resident Flora and Transient or Colonizing Flora. Sterile Areas in the Digestive Tract
  - 2.3.1. Esophageal Microbiota
    - 2.3.1.1. Healthy Individuals
    - 2.3.1.2. Patients (Gastric Reflux, Barrett's Esophagus, etc.)
  - 2.3.2. Gastric Microbiota
    - 2.3.2.1. Healthy Individuals
    - 2.3.2.2. Patients (Gastric Ulcer, Gastric Cancer, MALT, etc)
  - 2.3.3. Gallbladder Microbiota
    - 2.3.3.1. Healthy Individuals
    - 2.3.3.2. Patients (Cholecystitis, Cholelithiasis, etc.)
  - 2.3.4. Small Intestine Microbiota
    - 2.3.4.1. Healthy Individuals
    - 2.3.4.2. Patients (Inflammatory Bowel Disease, Irritable Bowel Syndrome, etc.)
  - 2.3.5. Colon Microbiota
    - 2.3.5.1. Healthy Individuals. Enterotypes
    - 2.3.5.2. Patients (Inflammatory Bowel Disease, Crohn's Disease, Colon Carcinoma, Appendicitis, etc.

- 2.4. Gut Microbiota Functions: Metabolic. Nutritional and Trophic. Protective and Barrier. Immunological
  - 2.4.1. Interrelationships Between the Intestinal Microbiota and Distant Organs (Brain, Lung, Heart, Liver, Pancreas, etc.)
- 2.5. Intestinal Mucosa and Mucosal Immune System
  - 2.5.1. Anatomy, Characteristics, and Functions (MALT, GALT, and BALT System)
- 2.6. What is Intestinal Homeostasis? Role of Bacteria in Intestinal Homeostasis
  - 2.6.1. Effects on Digestion and Nutrition
  - 2.6.2. Defence Stimulation, Hindering Colonization by Pathogenic Microorganisms
  - 2.6.3. Production of Vitamin B and K
  - 2.6.4. Production of Short Chain Fatty Acids (Butyric, Propionic, Acetic, etc.)
  - 2.6.5. Production of Gases (Methane, Carbon Dioxide, Molecular Hydrogen). Properties and Functions
  - 2.6.6. Lactic Acid

### Module 3. Gut Microbiota II. Intestinal Dysbiosis

- 3.1. What is Intestinal Dysbiosis? Consequences
- 3.2. Intestinal Barrier. Physiology. Function. Intestinal Permeability and Hyperpermeability. Relationship between Intestinal Dysbiosis and Intestinal Hyperpermeability
- 3.3. Relationship of Intestinal Dysbiosis and Other Types of Disorders: Immunological, Metabolic, Neurological and Gastric (Helicobacter Pylori)
- 3.4. Consequences of the Alteration of the Intestinal Ecosystem and its Relationship to Functional Digestive Disorders
  - 3.4.1. Inflammatory Bowel Disease IBD
  - 3.4.2. Chronic Inflammatory Bowel Diseases: Crohn's Disease. Ulcerative Colitis
  - 3.4.3. Irritable Bowel Syndrome (IBS) and Diverticulitis
  - 3.4.4. Intestinal Motility Disorders. Diarrhea. Diarrhea Caused by Clostridium Difficile. Constipation
  - 3.4.5. Digestive Disorders and Nutrient Malabsorption Problems: Carbohydrates, Proteins, and Fats
  - 3.4.6. Markers of Intestinal Inflammation: Calprotectin. Eosinophil Cationic Protein (ECP). Lactoferrin. Lysozyme
  - 3.4.7. Leaky Gut Syndrome. Permeability Markers: Alpha-1 Antitrypsin. Zonulin. Tight Junctions and their Main Function

- 3.5. Alteration of the Intestinal Ecosystem and its Relationship with Intestinal Infections
  - 3.5.1. Viral Intestinal Infections
  - 3.5.2. Bacterial Intestinal Infections
  - 3.5.3. Intestinal Infections due to Parasites
  - 3.5.4. Fungal Intestinal Infections. Intestinal Candidiasis
- 3.6. Composition of the Intestinal Microbiota in the Different Stages of Life
  - 3.6.1. Composition of the Intestinal Microbiota in Adulthood. "Stable Period"
  - 3.6.2. Gut Microbiota Composition in the Elderly "Unstable Stage". Aging and Microbiota
  - 3.6.3. Variation in Gut Microbiota Composition from the Neonatal-Early Childhood Stage to Adolescence. "Unstable Period"
- 3.7. Nutritional Modulation of Intestinal Dysbiosis and Hyperpermeability: Glutamine, Zinc, Vitamins, Probiotics, Prebiotics
- 3.8. Techniques for Quantitative Analysis of Microorganisms in Feces
- 3.9. Current Lines of Research

### Module 4. Microbiota in Neonatology and Pediatrics

- 4.1. Mother-Child Symbiosis
- 4.2. Influencing Factors on the Gut Microbiota of the Mother during Pregnancy and during Birth. Influence of the Type of Delivery on the Microbiota of the New-born
- 4.3. Type and Duration of Breastfeeding, Influence on the Infant's Microbiota
  - 4.3.1. Breast Milk: Composition of the Breast Milk Microbiota. Importance of Breastfeeding in the New-born's Microbiota
  - 4.3.2. Artificial Breastfeeding. Use of Probiotics and Prebiotics in Infant Milk Formulas
- 4.4. Clinical Applications of Probiotics and Prebiotics in Pediatric Patients
  - 4.4.1. Digestive Diseases: Functional Digestive Disorders, Diarrhea, Necrotizing Enterocolitis. Intolerances
  - 4.4.2. Non-digestive Pathologies: Respiratory and ENT, Atopic Diseases, Metabolic Diseases. Allergies
- 4.5. Influence of Antibiotic and other Psychotropic Treatment on the Microbiota of the Infant
- 4.6. Current Lines of Research



**Module 5. Oral Microbiota and Respiratory Tract**

- 5.1. Structure and Oral Ecosystems
  - 5.1.1. Main Ecosystems that are Found in the Oral Cavity. Characteristics and Composition of Each of Them. Nostrils, Nasopharynx and Oropharynx
- 5.2. Alterations of the Oral Microbial Ecosystem: Oral Dysbiosis. Relationship with Different Oral Disease States
  - 5.2.1. Cavities
  - 5.2.2. Halitosis
  - 5.2.3. Periodontal and Gingival Diseases
  - 5.2.4. Peri-Implant Diseases
  - 5.2.5. Other Infectious Diseases: Candida Albicans
- 5.3. Influence of External Agents in Oral Eubiosis and Dysbiosis. Hygiene
- 5.4. Structure of the Respiratory Tract and Composition of the Microbiota and Microbiome
  - 5.4.1. Upper Respiratory Tract (Nasopharynx, Middle Ear, Sinuses, and Tonsils)
  - 5.4.2. Lower Respiratory Tract (Trachea, Lungs, Bronchi, Bronchioles, and Alveoli)
- 5.5. Factors that Regulate the Respiratory Microbiota
  - 5.5.1. Microbial Immigration
  - 5.5.2. Elimination of Microbes and the Reproduction Rates of its Members
- 5.6. Alteration of the Respiratory Tract Microbiota and its Relationship with Different Respiratory Tract Diseases
- 5.7. Therapeutic Manipulation of the Microbiome of the Oral Cavity in Prevention and Treatment of Diseases Related to it
- 5.8. Therapeutic Manipulation of the Microbiome of the Respiratory Tract in Prevention and Treatment of Related Diseases
- 5.9. Current Lines of Research and Clinical Applications

**Module 6. Microbiota and Immune System**

- 6.1. Immune System Physiology: What is Immunity?
  - 6.1.1. Immune System Components
    - 6.1.1.1. Lymphoid Tissue
    - 6.1.1.2. Immune Cells
    - 6.1.1.3. Chemical Systems
- 6.2. Organs Involved in Immunity
  - 6.2.1. Primary Organs
  - 6.2.2. Secondary Organs
- 6.3. Innate, Non-Specific, or Natural Immunity
- 6.4. Acquired, Adaptive, or Specific Immunity
- 6.5. Nutrition and Lifestyle and their Interaction with the Immune System and the Microbiota
- 6.6. Functional Foods and their Effect on the Immune System
  - 6.6.1. Probiotics, Prebiotics, and Symbiotics
  - 6.6.2. Nutraceuticals and Functional Foods
- 6.7. Bidirectional Relationship Between Microbiota and the Neuroimmunoendocrine System
- 6.8. Microbiota, Immunity, and Nervous System Disorders: Anxiety, Depression, Autism, Schizophrenia, or Alzheimer's Disease
- 6.9. The Gut-Microbiota-Brain Axis
- 6.10. Current Lines of Research
- 6.11. Microbiota, Immunity, and Nervous System Disorders: Anxiety, Depression, Autism, Schizophrenia, or Alzheimer's Disease
- 6.12. The Gut-Microbiota-Brain Axis
- 6.13. Current Lines of Research

## Module 7. Skin Microbiota

- 7.1. Skin Physiology
  - 7.1.1. Structure of the Skin: Epidermis, Dermis, and Hypodermis
  - 7.1.2. Functions of the Skin
  - 7.1.3. Microbial Composition of the Skin
- 7.2. Factors that Regulate the Type of Bacterial Flora in the Skin
  - 7.2.1. Sweat Glands, Sebaceous Glands, Desquamation
  - 7.2.2. Factors that Alter the Ecology of the Skin and its Microbiota
- 7.3. Skin Immune System
  - 7.3.1. Epidermis; Essential Element of our Defences
  - 7.3.2. Elements of the Cutaneous Immune System: Cytosines, Keratinocytes, Dendritic Cells, Lymphocytes, Antimicrobial Peptides
  - 7.3.3. Influence of the Skin Microbiota on the Skin Immune System. Staphylococcus Epidermidis, Staphylococcus Aureus
- 7.4. Alteration of the Normal Skin Microbiota (Dysbiosis)
  - 7.4.1. Impaired Barrier Function
- 7.5. Triggered Skin Diseases
  - 7.5.1. Psoriasis (Streptococcus Pyogenes)
  - 7.5.2. Acne Vulgaris
  - 7.5.3. Atopic Dermatitis
  - 7.5.4. Rosacea
- 7.6. Influence of the use of Probiotics in the Prevention and Treatment of Different Skin Diseases
- 7.7. Current Lines of Research

## Module 8. Genitourinary Tract Microbiota

- 8.1. Genitourinary Tract Physiology and Microbial Composition
  - 8.1.1. In Men
  - 8.1.2. In Women
- 8.2. Microorganisms Causing Urinary Tract Infections: Uropathogens. Relationship with the Alteration of the Microbiota in Men and Women
  - 8.2.1. Enteric Bacteria, Generally Gram-Negative Aerobic Bacteria: E. Coli, Enterobacteria. Klebsiella or Proteus Mirabilis or Pseudomonas Aeruginosa
  - 8.2.2 Gram-Positive Bacteria: Staphylococcus Saprophyticus, etc.
- 8.3. Vaginal Microbiota and its Modification with Age
  - 8.3.1. Infant Age
  - 8.3.2. Fertile Age
  - 8.3.3. Adult Age (Menopause)
- 8.4. Alteration of the Vaginal Homeostasis and its Relationship with Infectious Pathologies
  - 8.4.1. Vaginitis
    - 8.4.1.1. Clamidiasis
    - 8.4.1.2. Bacterial Vaginosis
    - 8.4.1.3. Vaginal Candidiasis
    - 8.4.1.4. Vaginitis Trichomoniasis
    - 8.4.1.5. Viral Vaginitis
  - 8.4.2. Non-Infectious Vaginitis
- 8.5. Probiotics in the Prevention of the Main Genitourinary Tract Infections: UTI (Cystitis/ Urethritis), Prostatitis, Pyelonephritis, Vaginal infections, and infertility
- 8.6. Current Lines of Research

**Module 9. Relationship between Intolerances/Allergies and Microbiota**

- 9.1. Microbiota changes in Patients on Food Exclusion Diets
  - 9.1.1. Eosinophilic Esophagitis (EoE)
- 9.2. Microbiota Changes in Patients on Food Exclusion Diets: Intolerance to Dairy
  - 9.2.1. Lactose Intolerance
  - 9.2.2. Intolerant to Lactic Proteins: Caseins, Albumins, etc.
  - 9.2.3. People Allergic to Milk
- 9.3. Microbiota Changes in Patients on Food Exclusion Diets: Gluten
  - 9.3.1. Alteration of the Intestinal Microbiota in Patients with Gluten Intolerance
  - 9.3.2. Alteration of the Intestinal Microbiota in Celiac Patients
  - 9.3.3. Role of Probiotics and Prebiotics in the Recovery of the Microbiota in Gluten Intolerant and Celiac Patients
- 9.4. Microbiota and Biogenic Amines
- 9.5. Current Lines of Research

**Module 10. Probiotics, Prebiotics, Microbiota, and Health**

- 10.1. Probiotics: Definition, History, Mechanisms of Action
- 10.2. Prebiotics: Definition, Types of Prebiotics (Starch, Inulin, FOS Oligosaccharides), Mechanisms of Action
- 10.3. Clinical Applications of Probiotics and Prebiotics in Gastroenterology
- 10.4. Clinical Applications of Endocrinology and Cardiovascular Disorders
- 10.5. Clinical Applications of Probiotics and Prebiotics in Urology
- 10.6. Clinical Applications of Probiotics and Prebiotics in Gynecology
- 10.7. Clinical Applications of Probiotics and Prebiotics in Immunology: Autoimmunity, Pulmonology, Vaccines
- 10.8. Clinical Applications of Probiotics and Prebiotics in Nutritional Diseases. Obesity and Eating Disorders. Metabolism, Malnutrition, and Malabsorption of Nutrients
- 10.9. Clinical Applications of Probiotics and Prebiotics in Neurological Diseases. Mental Health. Old Age
- 10.10. Clinical Applications of Probiotics and Prebiotics in Critically Ill Patients. Cancer
- 10.11. Dairy Products as a Natural Source of Probiotics and Prebiotics. Fermented Milk.
- 10.12. Safety and Legislation in the Use of Probiotics



*You are looking at a Professional Master's Degree that gives you the latest knowledge on the clinical applications of probiotics in cancer patients"*



06

# 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.



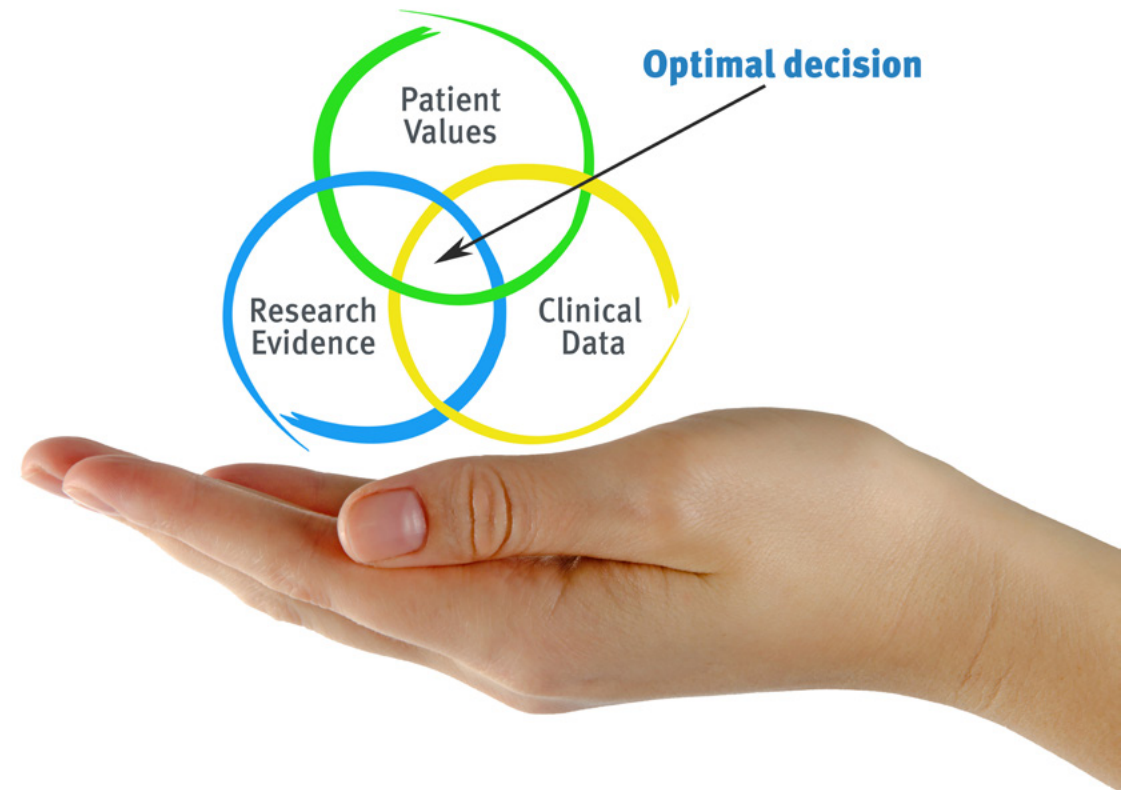


*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## At TECH we use the Case Method

What should a professional do in a given situation? Throughout the program, students will be confronted with multiple simulated clinical cases based on real patients, in which they will have to investigate, establish hypotheses and ultimately, resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Pharmacists learn better, more quickly 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, attempting to recreate the actual conditions in a pharmacist's professional 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. Pharmacists who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their 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.

Our 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, which represent a real revolution with respect to simply studying and analyzing cases.

*Pharmacists 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, more than 115,000 pharmacists have been trained with unprecedented success in all clinical specialties, regardless of the surgical load. This pedagogical methodology is developed in a highly demanding environment, with a university student body with a high socioeconomic 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 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 created specifically for the course by specialist pharmacists who will be teaching the course, so that the didactic development is highly specific and accurate.

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.



### Video Techniques and Procedures

TECH introduces students to the latest techniques, to the latest educational advances, to the forefront of current pharmaceutical care procedures. All of this, first hand, and explained and detailed with precision to contribute to assimilation and a better 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, we will present you with real case developments in which the expert will guide you through 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.





07

# Certificate

The Professional Master's Degree in Human Microbiota guarantees you, in addition to the most rigorous and updated training, access to a Professional Master's Degree issued by TECH Global University.





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*Successfully complete this program  
and receive your university degree  
without travel or laborious paperwork”*

This private qualification will allow you to obtain a **Professional Master's Degree diploma in Human Microbiota** 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: **Professional Master's Degree in Human Microbiota**

Modality: **online**

Duration: **12 months**

Accreditation: **60 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.

future  
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education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present quality  
development languages  
classroom



## Professional Master's Degree Human Microbiota

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Credits: 60 ECTS
- » Schedule: at your own pace
- » Exams: online



# Professional Master's Degree

## Human Microbiota