

# Hybrid Professional Master's Degree

Nutritional Genomics  
and Precision Nutrition



## Hybrid Professional Master's Degree

### Nutritional Genomics and Precision Nutrition

Modality: Hybrid (Online + Clinical Internship)

Duration: 12 months

Certificate: TECH Global University

60 + 5 créditos ECTS

Website: [www.techtute.com/us/medicina/master-semipresencial/master-semipresencial-nutricion-genomica-precision](http://www.techtute.com/us/medicina/master-semipresencial/master-semipresencial-nutricion-genomica-precision)

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# 01

# Introduction

The sequencing of human DNA has allowed the development of Precision Medicine, which has opened the door to areas such as Genomic Nutrition, capable of preventing pathologies such as Hypertension in a much more precise way. For this reason, specialists must remain updated on the innovations of this discipline, which is why TECH provides them with an innovative study modality that brings together the theoretical and practical knowledge of this specialty. Firstly, it has an online learning stage, from a study platform with various resources that support the assimilation of concepts. This is followed by a 3-week clinical and face-to-face stay in a hospital facility of the highest prestige and rigor.



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*In a theoretical and practical way, this Hybrid Professional Master's Degree in Genomic and Precision Nutrition will provide you with the knowledge and skills necessary to update your professional practice immediately"*

Genomic and Precision Nutrition has experienced considerable growth in recent years as a result of countless scientific and technological advances. The most recent research in this field has allowed the emergence of much more effective nutritional supplements, as well as the development of intervention and prevention strategies for pathologies such as Hypertension or Diabetes type II, whose first diagnosis can be made from the interaction of certain genes with specific nutrients.

Also, dietary programs are increasingly personalized and adjusted to the organism of each individual. To be able to apply all these advantages, the specialist must have the most up-to-date knowledge and skills. However, this is not an easy task since in the market there is a prevalence of academic programs with a high theoretical load that obviate the practical implications of this health discipline.

In this context, TECH sets itself apart with the offer of its Hybrid Professional Master's Degree. This mode of study dedicates 1,500 hours to theoretical learning of the main advances in Genomic and Precision Nutrition. The teaching process takes place on an innovative platform, 100% online and interactive, where multimedia resources, such as videos and infographics, of great didactic value, prevail. At the same time, it implements innovative methodologies, such as *Relearning*, which allow the rapid and flexible assimilation of the most complex concepts and topics.

After completing this theoretical phase, TECH has arranged a period of clinical practice. This educational moment is composed of a face-to-face and immersive stay, lasting 120 hours, in a renowned hospital institution. The centers chosen for this stage of studies are equipped with the most advanced technologies and a team of experts of excellence. In this way, the specialist will broaden his or her experience and will be able to apply the most modern protocols on real patients.

Furthermore, for the correct application of these techniques, they will be supported by an assistant tutor. The physician will be inserted in the most complex healthcare dynamics in 8-hour shifts, for a total of 3 weeks. At the end of this process, they will be ready to apply the main innovations of this disciplinary field to their daily practice.

This **Hybrid Professional Master's Degree in Nutritional Genomics and Precision Nutrition** contains the most complete and up-to-date scientific program on the market. The most important features include:

- Development of more than 100 clinical cases presented by professionals in Genomic and Precision Nutrition with excellent professionalism.
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice.
- Comprehensive systematized action plans for the main pathologies Presentation of practical workshops on diagnostic and therapeutic techniques
- An algorithm-based interactive learning system for decision-making in the clinical situations presented throughout the course.
- Practical clinical guides on approaching different pathologies
- 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
- Furthermore, you will be able to carry out a clinical internship in one of the best hospital centers



*Make the most of this opportunity to surround yourself with expert professionals and learn from their work methodology”*

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*For 3 weeks, take the most complete clinical practice on the market and update yourself in a direct and immersive way on how to establish the most adequate diet for patients with genetic indicators of suffering from Diabetes type II or Hypertension"*

In this proposal for a Hybrid Professional Master's Degree, of a professionalizing nature and hybrid learning modality, the program is aimed at updating medical professionals who require a high level of qualification. The contents are based on the latest scientific evidence, and oriented in an educational way to integrate theoretical knowledge into practice, and the theoretical-practical elements will facilitate knowledge update and decision-making in patient management.

Thanks to its multimedia content put together with the latest educational technology, they will allow the medical professional to obtain situated and contextual learning, that is to say, a simulated environment that will provide immersive learning programmed to train in real situations. This program is designed around Problem-Based Learning, whereby the physician must try to solve the different professional practice situations that arise during the course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Get up to date with those pathologies and conditions of human life on which Genomic and Precision Nutrition can have an impact with the best results thanks to this Hybrid Professional Master's Degree.*

*In the practical, clinical and face-to-face stay of this degree you will learn the latest methods to predict specific food pathologies in the face of new nutrients or foods included in their diets.*



# 02

## Why Study this Hybrid Professional Master's Degree?

In the medical sciences, it is not enough to handle the most profound and modern theoretical concepts. Correct clinical work demands the most select practical skills. For this reason, TECH has integrated this Hybrid Professional Master's program where, in an exceptional way, learning from an online platform and a face-to-face and immersive stay for the development of new skills are united. From this didactic experience, lasting 1,620 hours, the health professional will acquire first level competencies and in their daily practice will handle the most innovative concepts and tools on the market that have revolutionized the field of Genomic and Precision Nutrition.





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*With TECH, you will update your knowledge about assessing individual response to nutrition and dietary patterns in order to promote health and disease prevention"*

### 1. Update from the latest technology available

Clinical research and the laboratory in Genomic and Precision Nutrition has been especially benefited in recent years by the continuous scientific and technological evolution. The specialist will have access to all these innovative tools through this program and at the end of the training, will know very well how to apply them for the benefit of the diagnosis and treatment of their patients.

### 2. Gain in-depth knowledge from the experience of top specialists

Throughout the theoretical and practical period of this degree, the specialist will have the advice and personalized guidance of great experts. In the first stage, they will have in their hands a prestigious faculty, who will closely follow their doubts and clarify concepts of interest. In the second half of the program, the figure of the assistant tutor will be in charge of closely monitoring their academic progress.

### 3. Enter first-class clinical environments

TECH has carefully selected the centers available for the clinical practices of this Hybrid Professional Master's Degree. Therefore, the centers that are part of this academic modality have the most specialized and modern technological resources, as well as a staff of prestigious experts. Thus, the physician will be able to check the most current requirements of Genomic and Precision Nutrition and will incorporate new work methodologies to their daily practice.



#### 4. Combine the best theory with state-of-the-art practice

The excessive theoretical load that prevails in many programs on Genomic and Precision Nutrition discourages many experts from getting an update on the subject. For this reason, TECH inserts into the pedagogical market an academic modality where the practice of this discipline is perfectly integrated to the learning through a 100% face-to-face, intensive and immersive stay.

#### 5. Expand the boundaries of knowledge

The clinical practice stage, included in this Hybrid Professional Master's Degree, can be carried out in prestigious institutions located in different geographical locations. Thus, the specialist will have the opportunity to choose the center that best suits his location and will have access to the best experts from different cities and continents. A learning opportunity that is only within reach of TECH, the largest digital university in the world.

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*You will have full practical immersion  
at the center of your choice”*

# 03 Objectives

This program has been designed for medical professionals to update their theoretical knowledge and practical skills in the field of Genomic and Precision Nutrition. Therefore, throughout its very complete syllabus, you will have the opportunity to review current considerations on its ethical implications, modern criteria on how certain foods affect the development of metabolic diseases, among others. At the same time, the student will apply the most innovative tools of this discipline by means of a rigorous classroom and practical stay in a renowned hospital institution. In this way, the specialist will incorporate the best clinical skills and tools to their healthcare work.



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*The most up-to-date knowledge of Genomic and Precision Nutrition will be put in your hands and you will also learn how to incorporate it into your daily professional activity”*



## General Objective

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- As general goals of this degree, TECH aspires that its graduates acquire deep theoretical knowledge about human genetics and Genomic and Precision Nutrition. From the understanding of different pathologies and life conditions caused by inadequate nutrition, the specialist will also be able to delve into the most modern clinical practices that prevent or curb these conditions. Thus, by completing the study of this Hybrid Professional Master's Degree, the health professional will be able to evaluate the individual response to nutrition and dietary patterns in order to promote health and disease prevention



*You will get, through TECH, the most updated competences to adapt personalized dietary and lifestyle habits according to genetic polymorphisms of your patients"*





## Specific Objectives

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### Module 1. Introduction to Nutritional Genomics and Precision Nutrition

- ♦ Present definitions necessary to follow the thread of the following modules
- ♦ Explain relevant points of human DNA, nutritional epidemiology, scientific method
- ♦ Analyze key studies in Genomic Nutrition

### Module 2. Laboratory Techniques for Nutritional Genomics

- ♦ Understand the techniques used in Nutritional Genomics Studies
- ♦ Acquire the latest advances in omics and bioinformatics techniques

### Module 3. Biostatistics for Genomic Nutrition

- ♦ Acquire the knowledge required to correctly design experimental studies in the areas of Nutrigenomics and Nutrigenetics
- ♦ Delve into statistical models for clinical studies in humans

### Module 4. Nutrigenetics I

- ♦ Acquire the latest knowledge on population genetics.
- ♦ Understand how the basis for the interaction between Genetic Variability and Diet is generated
- ♦ Introducing the advanced Circadian Control System and Central and Peripheral Clocks

### Module 5. Nutrigenetics II: key polymorphisms

- ♦ Present the Key Polymorphisms to date related to Human Nutrition and Metabolic Processes that the Professional needs to know about
- ♦ Analyze the Key Studies that support these Polymorphisms and the debate, where it exists

### Module 6. Nutrigenetics III

- ♦ Present the Key Polymorphisms to date related to Complex Diseases that depend on Nutritional Habits
- ♦ Introduce new leading concepts in Nutrigenetics research

### Module 7. Nutrigenomics

- ♦ Delve into the differences between Nutrigenetics and Nutrigenomics
- ♦ Present and Analyze Genes related to Metabolic Processes affected by Nutrition.

### Module 8. Metabolomics-Proteomics

- ♦ Know the Principles of Metabolomics and Proteomics
- ♦ Delve into the Microbiota as a Tool for Preventive and Personalized Nutrition

### Module 9. Epigenetics

- ♦ Explore the fundamentals of the relationship between epigenetics and nutrition
- ♦ Present and Analyze how MicroRNAs are Involved in Genomic Nutrition

### Module 10. Current Market State

- ♦ Present and Analyze Key Aspects for the Application of Genomic Nutrition in Society
- ♦ Reflect and Analyze Past and Present Cases and Anticipate Future Market Developments in the Field of Genomic Nutrition

# 04 Competencies

Upon completion of this Hybrid Professional Master's Degree, the physician will have incorporated into their daily professional practice the practical skills and theoretical knowledge necessary to apply the latest advances in Genomic and Precision Nutrition. Based on this new knowledge, they will become an elite specialist, respected for their profound knowledge of this health discipline.





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*Get up to date on how to approach the microbiota as a tool for preventive and personalized nutrition through the innovative contents of this degree"*



## General Skills

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- Conduct individual reflection work on new data on Nutrigenetics and Precision Nutrition
- Study and evaluate current controversial issues on this subject
- Evaluate and use in clinical practice commercially available tools for Nutritional Genomics and Precision Nutrition

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*The skills acquired through this degree will be ideal to broaden your professional practice based on the most current scientific and technological evidence”*





## Specific Skills

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- ♦ Differentiate between Nutrigenetics and Nutrigenomics
- ♦ Possess original knowledge within the broader context of Nutrition
- ♦ Apply critical, logical and scientific thinking to nutritional recommendations
- ♦ Understand the global context of Nutritional Genomics and Precision Nutrition
- ♦ Master in depth all the fields of Genomic and Precision Nutrition, its history and future applications
- ♦ Acquire the latest advances in nutritional research
- ♦ Know the strategies used in research to identify the loci and genetic variants studied by Nutrigenetics
- ♦ Manage the advances in genomic nutrition and what skills are necessary to keep constantly updated
- ♦ Formulate new hypotheses and work in an interdisciplinary manner
- ♦ Integrate knowledge and deal with the complexity of data, evaluate relevant literature to incorporate scientific advances into your own professional field
- ♦ Understand how Nutrigenetics and Nutrigenomics is translated and applied to clinical use in today's society
- ♦ Apply knowledge of Nutritional Genomics for health promotion
- ♦ Know the theory of basic laboratory techniques used in genomic nutrition
- ♦ Master the basis of statistical analyses used in nutritional genomics
- ♦ Examine the state of the current market in the field of genomic nutrition and its trends
- ♦ Understand the process of discovering new Genetic Nutrition data and the process of evaluating it prior to use
- ♦ Delve into the analysis of different types of studies in genetic epidemiology in order to be able to perform an adequate interpretation of the articles published in this field and identify the limitations of each type of study

05

# Course Management

This Hybrid Professional Master's Degree has a highly prestigious faculty. Its members have been chosen by TECH after a thorough search that has taken into account their successful health care work and their scientific and research trajectory. The teachers have taken on the challenge of designing a broad spectrum theoretical program that includes the main advances in Genomic and Precision Nutrition. Thus, they have managed to develop an innovative syllabus that brings together the latest perspectives related to laboratory tools, ethical foundations and other principles where this specialty has advanced exponentially in recent years.



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*Get a first level update, in relation to the advances in Genomic Nutrition and Genetics, together with the best faculty in the educational market”*

## International Guest Director

Dr. Caroline Stokes is a specialist in **Psychology** and **Nutrition**, with a doctorate and a habilitation in **Medical Nutrition**. After a distinguished career in this field, she leads the **Food and Health Research** group at the Humboldt University of Berlin. This team collaborates with the Department of Molecular Toxicology at the German Institute of Human Nutrition Potsdam-Rehbrücke. Previously, he has worked at the Medical School of Saarland University in Germany, the Cambridge Medical Research Council and the UK National Health Service.

One of her goals is to discover more about the fundamental role that **Nutrition** plays in improving the overall health of the population. To this end, he has focused on elucidating the effects of fat-soluble vitamins such as **A, D, E and K**, the **amino acid methionine**, lipids such as **omega-3 fatty acids** and **probiotics** for both the prevention and treatment of diseases, particularly those related to hepatology, neuropsychiatry and aging.

Her other lines of research have focused on plant-based diets for the prevention and treatment of diseases, including liver and psychiatric diseases. He has also studied the spectrum of **vitamin D** metabolites in health and disease. She has also participated in projects to analyze new sources of vitamin D in plants and to compare the **luminal** and **mucosal microbiome**.

In addition, Dr. Caroline Stokes has published a long list of scientific papers. Some of her areas of expertise are **Weight Loss**, **Microbiota** and **Probiotics**, among others. The outstanding results of her research and her constant commitment to her work have led her to win the **National Health Service Journal Award for the Nutrition and Mental Health Program** in the UK.



## Dr. Stokes, Caroline

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- ♦ Head of the Food and Health Research Group at the Humboldt University of Berlin, Germany
- ♦ Researcher at the German Institute of Human Nutrition Potsdam-Rehbruecke
- ♦ Professor of Food and Health at the Humboldt University of Berlin
- ♦ Scientist in Clinical Nutrition at the University of Saarland
- ♦ Nutrition Consultant at Pfizer
- ♦ PhD in Nutrition at the University of Saarland
- ♦ Postgraduate Diploma in Dietetics at King's College London, University of London
- ♦ Master's Degree in Human Nutrition from the University of Sheffield

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*Thanks to TECH, you will be able to learn with the best professionals in the world”*

## Management



### Dr. Konstantinidou, Valentini

- ♦ Dietitian-Nutritionist Specialist in Nutrigenetics and Nutrigenomics
- ♦ Founder of DNANutricoach
- ♦ Creator of the Food Coaching method to change eating habits.
- ♦ Lecturer in Nutrigenetics
- ♦ Doctor in Biomedicine
- ♦ Dietitian- Nutritionist
- ♦ Food Technologist
- ♦ Accredited Life Coach of the British body IPAC&M
- ♦ Member of: American Society for Nutrition

## Professors

### Dr. García-Masedo Fernández, Sarela

- ♦ Pharmacist Specialist in Clinical Microbiology and Parasitology
- ♦ Area Specialist in the Microbiology Department of the Puerta de Hierro Majadahonda University Hospital
- ♦ Resident Intern Pharmacist at the Microbiology and Parasitology Laboratory of the Puerta de Hierro University Hospital
- ♦ Pharmacist at the Sexta Avenida Pharmacy
- ♦ PhD in Microbiology Autonomous University
- ♦ Degree in Pharmacy. Autonomous University
- ♦ Supervised internship at the University of Oporto at San Juan del Puerto Hospital
- ♦ Member of: Spanish Society of Clinical Microbiology and Infectious Diseases, Madrid College of Pharmacists



**Mr. Anglada, Roger**

- ◆ Research Support Technician at the Genomics Service of UPF
- ◆ Senior Research Support Technician at the Genomics Service of Pompeu Fabra University.
- ◆ Senior Technician in Analysis and Control. Narcís Monturiol HSI, Barcelona
- ◆ Graduate in Multimedia, Catalunya Open University

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*TECH has chosen the best teachers for this Hybrid Professional Master's Degree, based on their excellent knowledge of the main innovations in the field of Genomic and Precision Nutrition"*

# 06

## Educational Plan

The syllabus of this degree comprehensively covers the main scientific advances in relation to Genomic and Precision Nutrition. Its academic modules include the distinctive analysis between Nutrigenetics and Nutrigenomics. It also examines the main laboratory tools that currently facilitate this type of research protocol. On the other hand, it also addresses the ethical considerations that are implemented in this field of medicine. The specialist will have 1,500 hours to study all these contents from a 100% online platform, accessible on any device connected to the Internet. In addition, they will not have to worry about timetables or pre-set evaluations.





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*Relearning and multimedia resources, such as videos and infographics, will assist you during the online study of the theoretical framework of this very complete academic program"*

## Module 1. Introduction to Nutritional Genomics and Precision Nutrition

- 1.1. Human Genome
  - 1.1.1. DNA Discovery
  - 1.1.2. Year 2001
  - 1.1.3. Human Genome Project
- 1.2. Variations of Interest in Nutrition
  - 1.2.1. Genomic Variations and the Search for Disease Genes
  - 1.2.2. Environment vs. Genetic Factor and Heritability
  - 1.2.3. Differences between SNPs, Mutations and CNVs
- 1.3. The Genome of Rare and Complex Diseases
  - 1.3.1. Examples of Rare Diseases
  - 1.3.2. Examples of Complex Diseases
  - 1.3.3. Genotype and Phenotype
- 1.4. Precision Medicine
  - 1.4.1. Influence of Genetics and Environmental Factors in Complex Diseases
  - 1.4.2. Need for Precision The problem of Missing Heritability Concept of Interaction
- 1.5. Precision Nutrition vs. Community Nutrition
  - 1.5.1. The Principles of Nutritional Epidemiology
  - 1.5.2. Current Bases of Nutritional Research
  - 1.5.3. Experimental Designs in Precision Nutrition
- 1.6. Levels of Scientific Evidence
  - 1.6.1. Epidemiological Pyramid
  - 1.6.2. Regulation
  - 1.6.3. Official Guides
- 1.7. Consortia and Major Studies in Human Nutrition and Genomic Nutrition
  - 1.7.1. *Precision4Health* Project
  - 1.7.2. *Framingham*
  - 1.7.3. PREDIMED.
  - 1.7.4. CORDIOPREV

- 1.8. Current European Studies

- 1.8.1. PREDIMED Plus
- 1.8.2. NU-AGE
- 1.8.3. FOOD4me
- 1.8.4. EPIC

## Module 2. Laboratory Techniques for Nutritional Genomics

- 2.1. Molecular Biology Laboratory
  - 2.1.1. Basic Instructions
  - 2.1.2. Basic Material
  - 2.1.3. Accreditations Required in the U.S.
- 2.2. DNA Extraction
  - 2.2.1. From Saliva
  - 2.2.2. From Blood
  - 2.2.3. From Other Fabrics
- 2.3. *Real-Time* PCR
  - 2.3.1. Introduction - History of the Method
  - 2.3.2. Basic Protocols Used
  - 2.3.3. Most Used Equipment
- 2.4. Sequencing
  - 2.4.1. Introduction - History of the Method
  - 2.4.2. Basic Protocols Used
  - 2.4.3. Most Used Equipment
- 2.5. *High-throughput*
  - 2.5.1. Introduction - History of the Method
  - 2.5.2. Examples of Human Studies
- 2.6. Gene Expression - Genomics - Transcriptomics
  - 2.6.1. Introduction - History of the Method
  - 2.6.2. *Microarrays*
  - 2.6.3. Microfluidic Cards
  - 2.6.4. Examples of Human Studies

- 2.7. Omics Technologies and their Biomarkers
  - 2.7.1. Epigenomics
  - 2.7.2. Proteomics
  - 2.7.3. Metabolomics
  - 2.7.4. Metagenomics
- 2.8. Bioinformatics Analysis
  - 2.8.1. Pre- and Post-Computing Bioinformatics Programs and Tools
  - 2.8.2. *GO terms, Clustering of DNA microarray data*
  - 2.8.3. *Functional enrichment, GEPAS, Babelomics*

### Module 3. Biostatistics for Genomic Nutrition

- 3.1. Biostatistics
  - 3.1.1. Human Studies Methodology
  - 3.1.2. Introduction to Experimental Design
  - 3.1.3. Clinical studies
- 3.2. Statistical Aspects of a Protocol
  - 3.2.1. Introduction, Objectives, Description of Variables
  - 3.2.2. Quantitative Variables
  - 3.2.3. Qualitative Variables
- 3.3. Design of Clinical Studies in Humans, Methodological Guidelines
  - 3.3.1. Designs with 2 treatments 2x2
  - 3.3.2. Designs with 3 treatments 3x3
  - 3.3.3. Parallel, *Cross-Over*, Adaptive Design
  - 3.3.4. Sample Size Determination and Power Analysis
- 3.4. Evaluation of Treatment Effect
  - 3.4.1. For Parallel Design, for Repeated Measurements, for *Cross-Over* Design
  - 3.4.2. Randomization of the Order of Treatment Assignment
  - 3.4.3. *Carry-Over Effect (Wash Out)*

- 3.5. Descriptive Statistics, Hypothesis Testing, Risk Calculation
  - 3.5.1. Consort, Populations
  - 3.5.2. Study Populations
  - 3.5.3. Group control
  - 3.5.4. Subgroup Analysis Types of Studies
- 3.6. Statistical Errors
  - 3.6.1. Measurement Errors
  - 3.6.2. Random Error
  - 3.6.3. Systematic Error
- 3.7. Statistical Bias
  - 3.7.1. Selection Bias
  - 3.7.2. Observation Bias
  - 3.7.3. Sesgo de asignación
- 3.8. Statistical Modeling
  - 3.8.1. Continuous Variable Models
  - 3.8.2. Categorical Variables Models
  - 3.8.3. Linear Mixed Models
  - 3.8.4. *Missing data*, Flow of Participants, Presentation of Results
  - 3.8.5. Adjustment for Baseline Values, Transformation of Response Variable: Differences, Ratios, Logarithms, *Carry-Over* Evaluation
- 3.9. Statistical Modeling with Covariate
  - 3.9.1. ANCOVA
  - 3.9.2. Logistic Regression for Binary and Count Variables
  - 3.9.3. Multivariate Analysis
- 3.10. Statistical Programs
  - 3.10.1. The R
  - 3.10.2. SPSS

## Module 4. Nutrigenetics I

- 4.1. Nutrigenetics Authorities and Organizations
  - 4.1.1. NuGo
  - 4.1.2. ISSN
  - 4.1.3. Evaluation Committees
- 4.2. GWAS I Studies
  - 4.2.1. Population Genetics - Design and Use
  - 4.2.2. Hardy-Weinberg Law
  - 4.2.3. Linkage Imbalance
- 4.3. GWAS II
  - 4.3.1. Allelic and Genotypic Frequencies
  - 4.3.2. Gene-Disease Association Studies
  - 4.3.3. Association Models ( Dominant, Recessive, Co-dominant)
  - 4.3.4. Genetic Scores
- 4.4. The Discovery of Nutrition-Related SNPs
  - 4.4.1. Key Studies-Design
  - 4.4.2. Main Results
- 4.5. The discovery of SNPs associated with nutrition-related (*diet-dependent*) diseases
  - 4.5.1. Cardiovascular Diseases.
  - 4.5.2. Diabetes Mellitus Type II
  - 4.5.3. Metabolic Syndrome
- 4.6. Main Obesity-Related GWAS
  - 4.6.1. Strengths and Weaknesses
  - 4.6.2. The FTO Example
- 4.7. Circadian Control of Intake
  - 4.7.1. Gut-Brain Axis
  - 4.7.2. Molecular and Neurological Basis of the Brain-Gut Connection

- 4.8. Chronobiology and Nutrition
  - 4.8.1. Central Clock
  - 4.8.2. Peripheral Clocks
  - 4.8.3. Circadian Rhythm Hormones
  - 4.8.4. Intake Control (Leptin and Ghrelin)
- 4.9. SNPs Related to Circadian Rhythms
  - 4.9.1. Regulatory Mechanisms of Satiety
  - 4.9.2. Hormones and Intake Control
  - 4.9.3. Possible Pathways Involved

## Module 5. Nutrigenetics II: the key polymorphisms

- 5.1. Obesity-Related SNPs
  - 5.1.1. The Tale of the Obese Monkey
  - 5.1.2. Appetite Hormones
  - 5.1.3. Thermogenesis
- 5.2. Vitamin-Related SNPs
  - 5.2.1. Vitamin D
  - 5.2.2. B Complex Vitamins
  - 5.2.3. Vitamin E
- 5.3. Exercise-Related SNPs
  - 5.3.1. Strength vs. Competition.
  - 5.3.2. Sports Performance
  - 5.3.3. Injury Prevention/Recovery
- 5.4. Oxidative Stress/Detoxification-related SNPs
  - 5.4.1. Genes Encoding Enzymes
  - 5.4.2. Anti-Inflammatory Processes
  - 5.4.3. Phase I+II of Detoxification
- 5.5. SNP related to Addictions
  - 5.5.1. Caffeine
  - 5.5.2. Alcohol
  - 5.5.3. Salt

- 5.6. SNP related to Flavor
  - 5.6.1. Sweet Taste
  - 5.6.2. Salty Taste
  - 5.6.3. Bitter Taste
  - 5.6.4. Acid Taste
- 5.7. SNP vs. Allergies vs. Intolerances
  - 5.7.1. Lactose
  - 5.7.2. Gluten
  - 5.7.3. Fructose
- 5.8. PESA Study

## Module 6. Nutrigenetics III

- 6.1. SNPs predisposing to complex nutrition-related diseases. *Genetic Risk Scores (GRS)*
- 6.2. Type II Diabetes
- 6.3. Hypertension
- 6.4. Arteriosclerosis
- 6.5. Hyperlipidemia
- 6.6. Cancer
- 6.7. The Exposome Concept
- 6.8. Metabolic Flexibility Concept
- 6.9. Current Studies-Challenges for the Future

## Module 7. Nutrigenomics

- 7.1. Differences and Similarities with Nutrigenetics
- 7.2. Bioactive Components of Diet on Gene Expression
- 7.3. The Effect of Micro and Macro Nutrients on Gene Expression
- 7.4. The Effect of Dietary Patterns on Gene Expression
  - 7.4.1. The Mediterranean Diet Example
- 7.5. Main Studies in Gene Expression
- 7.6. Genes Related to Inflammation
- 7.7. Genes Related to Insulin Sensitivity
- 7.8. Genes related to Lipid Metabolism and Adipose Tissue Differentiation
- 7.9. Genes Related to Arteriosclerosis
- 7.10. Genes Related to the Myoskeletal System

## Module 8. Metabolomics-Proteomics

- 8.1. Proteomics
  - 8.1.1. Principles of Proteomics
  - 8.1.2. The Flow of Proteomics Analysis
- 8.2. Metabolomics
  - 8.2.1. Principles of Metabolomics
  - 8.2.2. Targeted Metabolomics
  - 8.2.3. Non-Targeted Metabolomics
- 8.3. The Microbiome/Microbiota
  - 8.3.1. Microbiome Data
  - 8.3.2. Human Microbiota Composition
  - 8.3.3. Enterotypes and Diet
- 8.4. Main Metabolomic Profiles
  - 8.4.1 Application to disease diagnosis
  - 8.4.2. Microbiota and Metabolic Syndrome
  - 8.4.3. Microbiota and Cardiovascular Diseases Effect of the Oral and Intestinal Microbiota
- 8.5. Microbiota and Neurodegenerative Diseases
  - 8.5.1. Alzheimer's Disease
  - 8.5.2. Parkinson's Disease
  - 8.5.3. ALS
- 8.6. Microbiota and Neuropsychiatric Diseases
  - 8.6.1. Schizophrenia.
  - 8.6.2. Anxiety, Depression, Autism
- 8.7. Microbiota and Obesity
  - 8.7.1. Enterotypes
  - 8.7.2. Current Studies and State of Knowledge

## Module 9. Epigenetics

- 9.1. History of Epigenetics - The Way I Eat and Inheritance for My Grandchildren
- 9.2. Epigenetics vs. Epigenomics
- 9.3. Methylation
  - 9.3.1. Examples of Folate and Choline, Genistein
  - 9.3.2. Examples of Zinc, Selenium, Vitamin A, Protein Restriction
- 9.4. Histone Modification
  - 9.4.1. Examples of Butyrate, Isothiocyanates, Folate and Choline
  - 9.4.2. Examples of Retinoic Acid, Protein Restriction
- 9.5. MicroRNA
  - 9.5.1. Biogenesis of MicroRNAs in Humans
  - 9.5.2. Mechanisms of Action-Regulating Processes
- 9.6. Nutrimiomics
  - 9.6.1. Diet-Modulated MicroRNAs
  - 9.6.2. MicroRNAs involved in Metabolism
- 9.7. Role of MicroRNAs in Diseases
  - 9.7.1. MicroRNA in Tumorigenesis
  - 9.7.2. MicroRNAs in Obesity, Diabetes and Cardiovascular Diseases
- 9.8. Gene Variants that Generate or Destroy Binding Sites for MicroRNAs
  - 9.8.1. Main Studies
  - 9.8.2. Results in Human Diseases
- 9.9. MicroRNA Detection and Purification Methods
  - 9.9.1. Circulating MicroRNAs
  - 9.9.2. Basic Methods Used





**Module 10. Current Market State**

- 10.1. Legal Aspects
- 10.2. DTC (*Direct-to-consumer*). Tests
  - 10.2.1. Pros and Cons
  - 10.2.2. Myths of Early DTCs
- 10.3. Quality Criteria for a Nutrigenetic Test
  - 10.3.1. SNP Selection
  - 10.3.2. Interpretation of Results
  - 10.3.3. Laboratory Accreditations
- 10.4. Health Professionals
  - 10.4.1. Training Needs
  - 10.4.2. Criteria of Professionals Applying Genomic Nutrition
- 10.5. Nutrigenomics in the Media
- 10.6. Integration of Evidence for Personalized Nutritional Counseling
- 10.7. Critical Analysis of the Current Situation
- 10.8. Discussion Work
- 10.9. Conclusions, use of Nutritional Genomics and Precision Nutrition as Prevention

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*The contents of this Hybrid Professional Master's Degree will be at your fingertips, from any mobile device connected to the Internet, thanks to TECH's 100% online platform"*

07

# Clinical Internship

At the end of the online period of this Hybrid Professional Master's Degree, the physician will have the opportunity to complete their training in Genomic and Precision Nutrition with a first level clinical practice. This period of face-to-face learning is ideal to expand their skills by applying directly, to real patients, the knowledge developed in the previous phase.



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*Acquire the best competencies for the management of the most updated and necessary technology in the Genomic Nutrition laboratory from a prestigious hospital center"*

The aforementioned stage of studies corresponds to a face-to-face and immersive stay in a hospital institution, recognized for its involvement in the analysis and applications of Genomic and Precision Nutrition. The specialist's presence in this facility will last for 3 weeks, in 8-hour days, from Monday to Friday. During this time, he will have the opportunity to handle the most innovative technologies for this health discipline and will broaden his vision of how to use them for the benefit of his patients. The latter is possible thanks to the fact that, from the first day, the professional will acquire skills in a direct way, offering care to real cases with different pathologies.

At the same time, the physician will be accompanied at all times by an assistant tutor. This educational figure will be in charge of assisting in their incorporation into care dynamics of varying complexity and, in addition, measuring their academic progress. They will also have the opportunity to exchange doubts, concepts and approaches of interest about their daily work with renowned experts.

The practical part will be carried out with the active participation of the student performing the activities and procedures of each area of competence (learning to learn and learning to do), with the accompaniment and guidance of professors and other fellow trainees who facilitate teamwork and multidisciplinary integration as transversal competencies for medical practice (learning to be and learning to relate).

The procedures described below will form the basis of the practical part of the





internship, and their implementation is subject to both the suitability of the patients and the availability of the center and its workload, with the proposed activities being as follows:

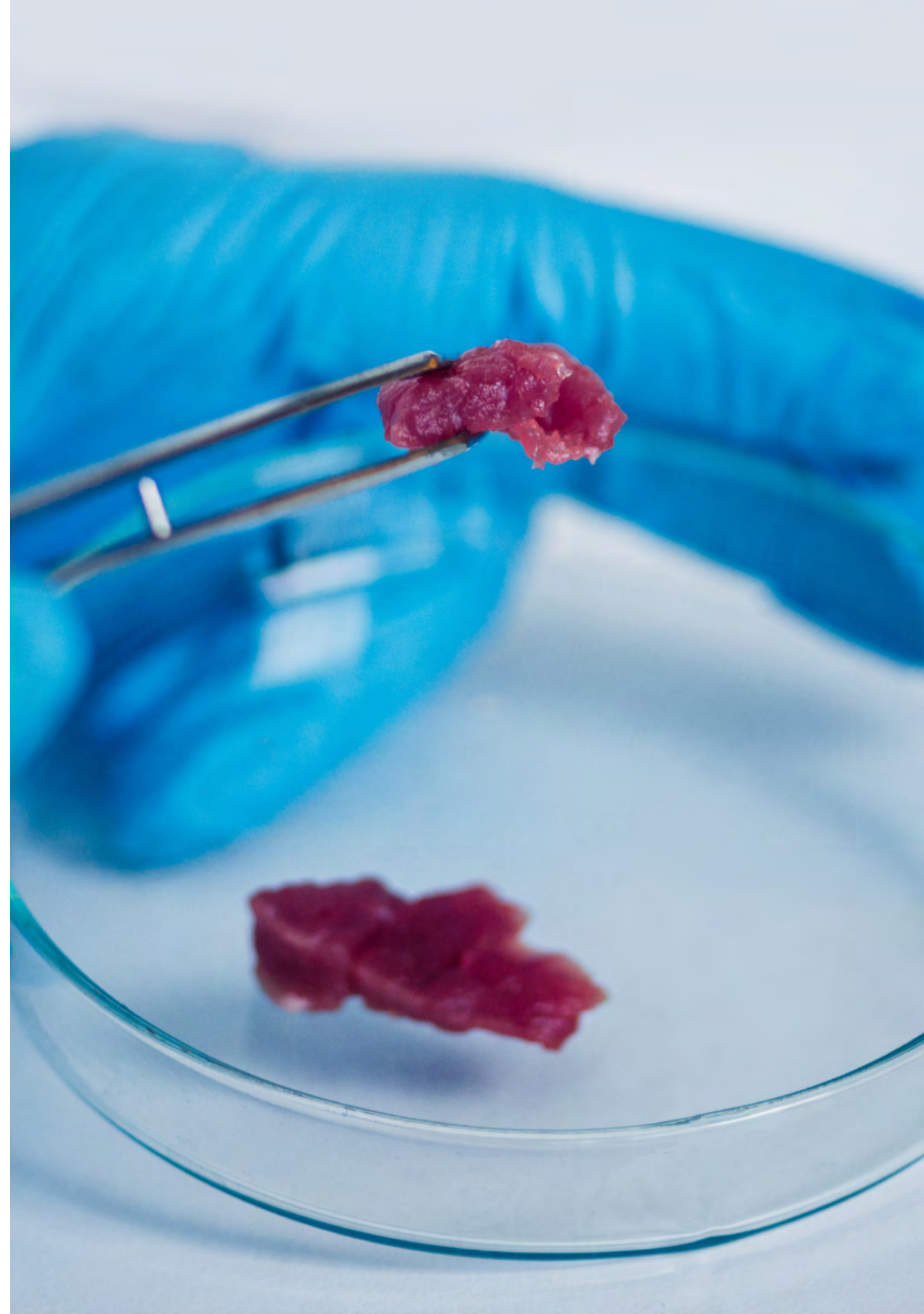
Module	Practical Activity
<b>More advanced laboratory techniques for Genomic and Precision Nutrition</b>	Extract and sequence DNA from patients with severe metabolic conditions or nutrient absorption problems to assess their causes
	Introducing omics technologies and their biomarkers to study the metabolic behavior of patients with nutritional requirements
	Use Microfluidic Cards to cannulate and address DNA microarrays in search of gene or genomic expression of a nutritional condition
	Correctly interpret and analyze biostatistical results collected in the genetic analysis of patients with special nutritional requirements for more accurate medical decision making
<b>New perspectives of Nutrigenomics</b>	Provoke the interaction of specific genes with different nutritional elements
	Generate and monitor changes in cellular metabolism and metabolic profiles, oriented to prevent, alleviate and/or improve the prognosis of different diseases in which the nutritional factor constitutes an important element in their etiopathogenesis
	Develop individualized dietary recommendations in order to increase the efficacy of nutritional plans
<b>Nutrigenetics and its main advances</b>	Examine the specific polymorphisms that anticipate the possible obesity of the patient and to act on them
	Identify the genes that express a conditioning towards addictions and address them through individualized strategies for each patient
	Recognize the genetic polymorphisms related to Type II Diabetes and establish patient-specific diet and lifestyle habits against the disease
	Verify the genes that show evidence of food allergy or intolerance and to influence the patient to consciously avoid food intake
<b>Advanced products that favor Precision Nutrition</b>	Indicate patients with vitamin deficiencies antioxidant supplements based on algae, which demonstrate biological algae, which demonstrates similar biological functions to vitamin E
	Understand how specific foods have changed the patient's gene expression as in the case of higher salt intake in patients with early onset of Hypertension
	Rapidly detect new nutrients with similar benefits to other nutrients that are frequently ingested
	Predict responses to new nutrients or foods in patients with specific dietary pathologies

## Civil Liability Insurance

This institution's main concern is to guarantee the safety of the trainees and other collaborating agents involved in the internship process at the company. Among the measures dedicated to achieve this is the response to any incident that may occur during the entire teaching-learning process.

To this end, this entity commits to purchasing a civil liability insurance policy to cover any eventuality that may arise during the course of the internship at the center.

This liability policy for interns will have broad coverage and will be taken out prior to the start of the internship program period. That way professionals will not have to worry in case of having to face an unexpected situation and will be covered until the end of the internship program at the center.



## General Conditions of the Internship Program

The general terms and conditions of the internship agreement for the program are as follows:

**1. TUTOR:** During the Hybrid Professional Master's Degree, students will be assigned with two tutors who will accompany them throughout the process, answering any doubts and questions that may arise. On the one hand, there will be a professional tutor belonging to the internship center who will have the purpose of guiding and supporting the student at all times. On the other hand, they will also be assigned with an academic tutor whose mission will be to coordinate and help the students during the whole process, solving doubts and facilitating everything they may need. In this way, the student will be accompanied and will be able to discuss any doubts that may arise, both clinical and academic.

**2. DURATION:** The internship program will have a duration of three continuous weeks, in 8-hour days, 5 days a week. The days of attendance and the schedule will be the responsibility of the center and the professional will be informed well in advance so that they can make the appropriate arrangements.

**3. ABSENCE:** If the students does not show up on the start date of the Hybrid Professional Master's Degree, they will lose the right to it, without the possibility of reimbursement or change of dates. Absence for more than two days from the internship, without justification or a medical reason, will result in the professional's withdrawal from the internship, therefore, automatic termination of the internship. Any problems that may arise during the course of the internship must be urgently reported to the academic tutor.

**4. CERTIFICATION:** Professionals who pass the Hybrid Professional Master's Degree will receive a certificate accrediting their stay at the center.

**5. EMPLOYMENT RELATIONSHIP:** the Hybrid Professional Master's Degree shall not constitute an employment relationship of any kind.

**6. PRIOR EDUCATION:** Some centers may require a certificate of prior education for the Hybrid Professional Master's Degree. In these cases, it will be necessary to submit it to the TECH internship department so that the assignment of the chosen center can be confirmed.

**7. DOES NOT INCLUDE:** The Hybrid Professional Master's Degree will not include any element not described in the present conditions. Therefore, it does not include accommodation, transportation to the city where the internship takes place, visas or any other items not listed

However, students may consult with their academic tutor for any questions or recommendations in this regard. The academic tutor will provide the student with all the necessary information to facilitate the procedures in any case.

08

# Where Can I Do the Clinical Internship?

For the development of a clinical practice of excellence, TECH has chosen the most prestigious hospital centers in the field of Genomic and Precision Nutrition. In its selection, it has taken into account the technological and therapeutic resources and the results achieved by the experts of that institution in the academic discipline in question. Based on this careful review, it now offers physicians a unique educational experience, characterized by face-to-face attendance, immersive acquisition of skills and competencies and the utmost pedagogical rigor.






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*Study with TECH and you will have access to a large-scale professional practice, in renowned hospital institutions located in different parts of the world”*



The student will be able to complete the practical part of this Hybrid Professional Master's Degree at the following centers:



**Medicine**

### Hospital HM Regla

Country	City
Spain	León


Management: Calle Cardenal Landázuri, 2,  
24003, León

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

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**Related internship programs:**

- Update on Psychiatric Treatment in Minor Patients



**Medicine**

### Hospital HM Nou Delfos

Country	City
Spain	Barcelona


Management: Avinguda de Vallcarca, 151,  
08023 Barcelona

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

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**Related internship programs:**

- Aesthetic Medicine
- Clinical Nutrition in Medicine



**Medicine**

### Hospital HM Nuevo Belén

Country	City
Spain	Madrid

Management: Calle José Silva, 7, 28043, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

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**Related internship programs:**

- General and Digestive System Surgery
- Clinical Nutrition in Medicine



**Medicine**

### Policlínico HM Distrito Telefónica

Country	City
Spain	Madrid


Management: Ronda de la Comunicación,  
28050, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

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**Related internship programs:**

- Optical Technologies and Clinical Optometry
- General and Digestive System Surgery



**Medicine**

### Policlínico HM Gabinete Velázquez

Country	City
Spain	Madrid


Management: C. de Jorge Juan, 19, 1° 28001,  
28001, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

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**Related internship programs:**

- Clinical Nutrition in Medicine
- Aesthetic Plastic Surgery



**Medicine**

### Policlínico HM Las Tablas

Country	City
Spain	Madrid

Management: C. de la Sierra de Atapuerca, 5,  
28050, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

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**Related internship programs:**

- Nursing in the Traumatology Department



### Policlínico HM Moraleja

Country	City
Spain	Madrid

Management: P.º de Alcobendas, 10, 28109, Alcobendas, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

**Related internship programs:**

- Rehabilitation Medicine in Acquired Brain Injury Management



### Policlínico HM Sanchinarro

Country	City
Spain	Madrid

Management: Av. de Manóteras, 10, 28050, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

**Related internship programs:**

09

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



# 10 Certificate

This Hybrid Professional Master's Degree in Nutritional Genomics and Precision Nutrition guarantees students, in addition to the most rigorous and up-to-date education, access to a Hybrid Professional Master's Degree diploma issued by TECH Global University



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

This program will allow you to obtain your **Hybrid Professional Master's Degree diploma in Nutritional Genomics and Precision Nutrition** endorsed by **TECH Global University**, the world's largest online university.

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

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

Title: **Hybrid Professional Master's Degree in Nutritional Genomics and Precision Nutrition**

Course Modality: **Hybrid (Online + Clinical Internship)**

Duration: **12 months**

Certificate: **TECH Global University**

Recognition: **60 + 5 ECTS Credits**



\*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.



**Hybrid Professional Master's Degree**  
Nutritional Genomics  
and Precision Nutrition

Modality: Hybrid (Online + Clinical Internship)

Duration: 12 months

Certificate: TECH Global University

60 + 5 créditos ECTS

# Hybrid Professional Master's Degree

Nutritional Genomics  
and Precision Nutrition