

# Postgraduate Diploma Muscular and Metabolic Physiology



## Postgraduate Diploma Muscular and Metabolic Physiology

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 18 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-muscular-metabolic-physiology](http://www.techtute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-muscular-metabolic-physiology)

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01

# Introduction

In this program the physician will learn how to monitor the athlete and para-athlete throughout the season. Throughout these months of training, the physician will learn advanced skills to detect possible signs of nutritional alterations associated with sports practice.



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*This refresher program will generate a sense of security in the performance of your daily praxis, which will help you grow personally and professionally.”*

This program has been designed to help the medical professional to update his knowledge in Muscular and Metabolic Physiology, so that he can advise and help the athletes in special situations, in the nutritional planning and elaboration of diets to improve their health.

Physicians should update knowledge in nutrition with the aim of establishing the best dietary recommendations, aimed at preventing diseases and promoting optimal health in athletes with special conditions. The meticulous choice of foods, which not only establishes a varied and balanced diet in sufficient quantity but which also is essential for the correct development of the individual.

The physiology of muscle, as well as the biochemistry that regulates the entire metabolic process resulting from physical activity, is the basis of any Sports Nutritionist. This intensive training explains the relationship of the muscle with the rest of the systems involved in physical activity, as well as the relevance of the different macronutrients in the physiological performance of the muscular system.

The **Postgraduate Diploma in Muscular and Metabolic Physiology** contains the most complete and up-to-date scientific program on the market. Its most notable features are:

- ♦ The graphic, schematic and practical contents of the course are designed to provide all the essential information required for professional practice.
- ♦ Exercises where the self-assessment process can be carried out to improve learning.
- ♦ An algorithm-based interactive learning system, designed for decision making for patients with nutritional challenges.
- ♦ 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



*Learn the most suitable diets for each type of athlete and you will be able to give more personalized advice"*

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*This 100% online Postgraduate Diploma will allow you to combine your studies with your professional work, while increasing your knowledge in this field".*

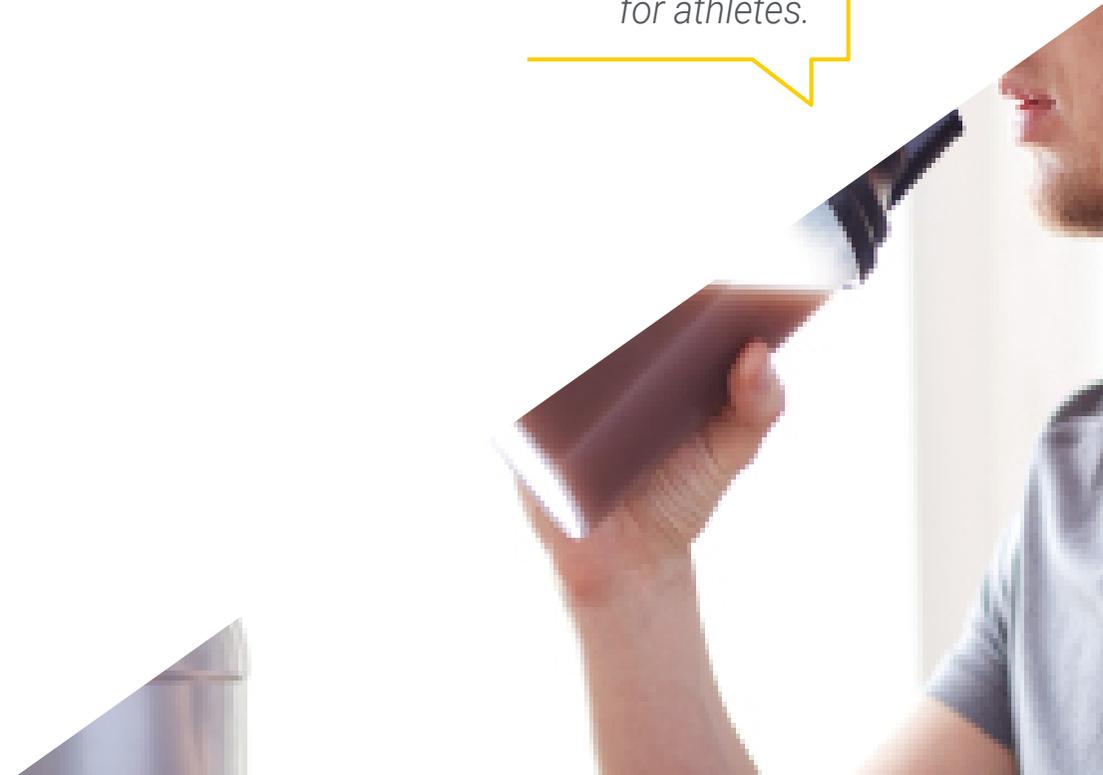
Its teaching staff includes professionals belonging to the field of nutrition, who contribute their work experience to this program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. The professional will be assisted by an innovative interactive video system created by renowned and experienced experts in sports nutrition.

*This Postgraduate Diploma offers training in simulated environments, which provides an immersive learning experience designed to train for real-life situations.*

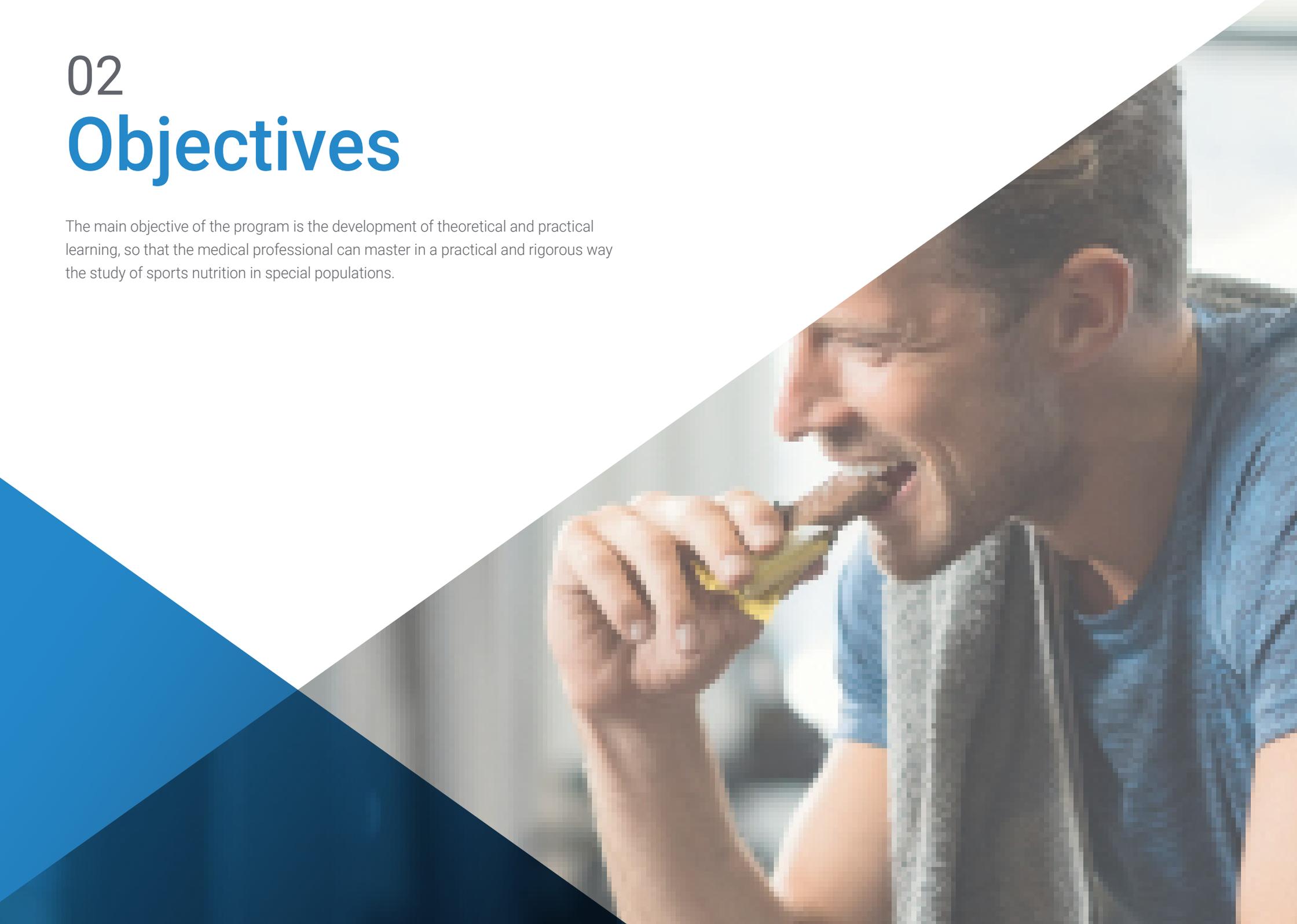
*Immerse yourself in this comprehensive Postgraduate Diploma university and improve your skills in nutritional counseling for athletes.*



# 02

# Objectives

The main objective of the program is the development of theoretical and practical learning, so that the medical professional can master in a practical and rigorous way the study of sports nutrition in special populations.



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*Food and sport must go hand in hand, as it is essential that athletes follow a proper diet to help them improve their performance”*



## General Objectives

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- ♦ Handle advanced knowledge on nutritional planning in professional and non-professional athletes for the healthy performance of physical exercise.
- ♦ Manage advanced knowledge on nutritional planning in professional athletes of various fields in order to achieve maximum sports performance.
- ♦ Learn advanced knowledge about nutritional planning in professional athletes from team sports to achieve the highest sports performance
- ♦ Manage and consolidate the initiative and entrepreneurial spirit to implement projects related to nutrition in physical activity and sport
- ♦ Know how to incorporate the different scientific advances into one' s own professional field.
- ♦ Working in a multidisciplinary environment
- ♦ Understand the context in which the area of their specialty is developed.
- ♦ Manage advanced skills in the detection of possible signs of nutritional changes associated with sports activities.
- ♦ Manage the necessary skills through the teaching-learning process that will allow them to continue training and learning in the field of sports nutrition both through contacts established with teachers and professionals of this training, as well as in an autonomous way.
- ♦ Specialize in the structure of muscle tissue and its role in sports.
- ♦ Know the energetic and nutritional needs of athletes in different pathophysiological situations.
- ♦ Specialize in the energetic and nutritional needs of athletes in the different situations specific to age and gender.
- ♦ Specialize in dietary strategies for the prevention and treatment of injured athlete
- ♦ Specialize in the energetic and nutritional needs of child athletes.
- ♦ Specialize in the energetic and nutritional needs of Paralympic athletes.



## Specific Objectives

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### Module 1. Muscle and Metabolic Physiology Associated with Exercise

- ♦ Gain an in-depth understanding of the structure of skeletal muscle.
- ♦ Understand in depth the functioning of skeletal muscle.
- ♦ Delve into the understanding of the most important changes that occur in athletes.
- ♦ Delve into the mechanisms of energy production according to the type of exercise carried out
- ♦ Further understanding of the interaction between the different energy systems that make up the muscle energy metabolism.

### Module 2. Athlete assessment at different times of the season

- ♦ Analysis of biochemistry to detect nutritional deficits or signs of over-training.
- ♦ Interpretation of the different types of body composition in order to optimize the appropriate weight and fat percentage for the sport being practiced
- ♦ Monitoring of the athlete throughout the season.
- ♦ Planning of seasonal schedules according to individual requirements

### Module 3. Nutrition in Para Athletes

- ♦ Deepen understanding of the differences between the different categories of para-athletes and their physiological-metabolic limitations.
- ♦ Determine the nutritional requirements of the different para-sportsmen in order to establish a specific nutritional plan.
- ♦ Delve into the knowledge necessary to establish interactions between the intake of drugs in these athletes and nutrients to avoid nutrient deficits.
- ♦ Understand the body composition of para-athletes in different sport categories.
- ♦ Apply current scientific evidence on nutritional performance enhancing drugs.

03

# Course Management

Our teachers, made up of experts in Sports Nutrition, are well known in the profession and are professionals with years of teaching experience who have come together to help you boost your career. For this reason, they have developed this Postgraduate Diploma with recent updates on the subject that will allow you to train and increase your skills in this sector.





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*Learn from the best professionals and become a successful professional yourself”*

## International Guest Director

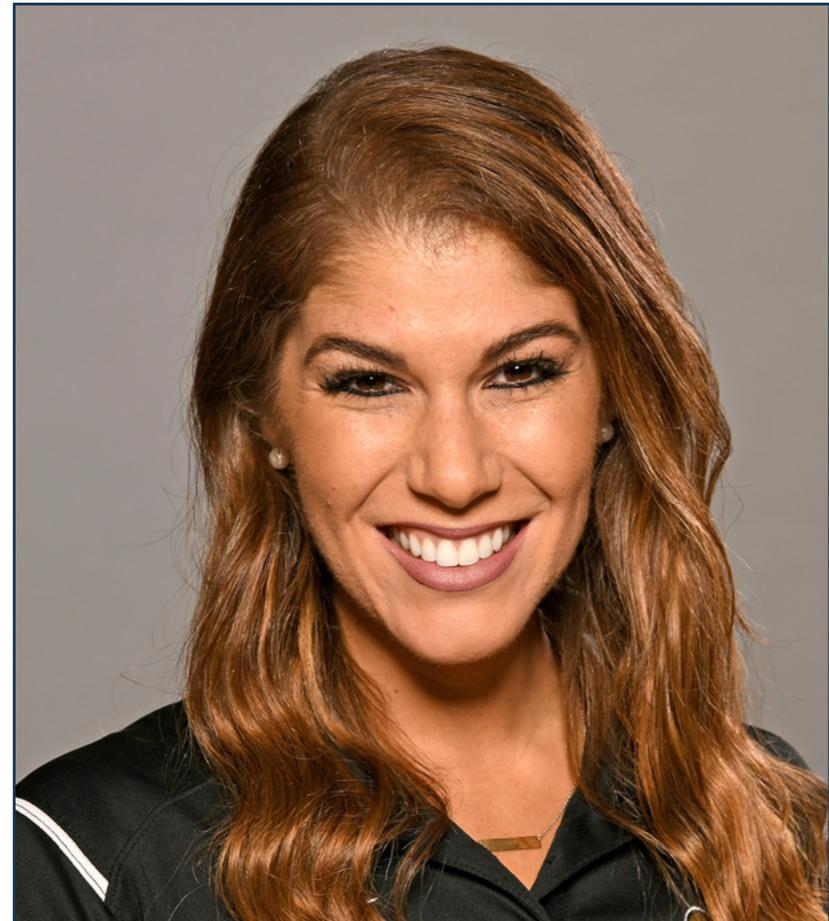
Jamie Meeks has proven throughout her career her dedication to Sports Nutrition. After graduating from Louisiana State University with a degree in Sports Nutrition, he quickly rose to prominence. Her talent and commitment were recognized when she received the prestigious Young Dietitian of the Year award from the Louisiana Dietetic Association, an achievement that marked the beginning of a successful career.

After completing her bachelor's degree, Jamie Meeks continued her education at the University of Arkansas, where she completed her internship in Dietetics. She then went on to obtain a Master's Degree in Kinesiology with a specialization in Exercise Physiology from Louisiana State University. Her passion for helping athletes reach their full potential and her tireless commitment to excellence make her a leading figure in the sports and nutrition community.

Her deep knowledge in this area led her to become the first Director of Sports Nutrition in the history of Louisiana State University's athletic department. There, she developed innovative programs to meet the dietary needs of athletes and educate them on the importance of proper nutrition for optimal performance.

Subsequently, she has held the position of Director of Sports Nutrition for the NFL's New Orleans Saints. In this role, she is dedicated to ensuring that professional players receive the best nutritional care possible, working closely with coaches, trainers, physical trainers and medical staff to optimize individual performance and health.

As such, Jamie Meeks is considered a true leader in her field, being an active member of several professional associations and participating in the advancement of Sports Nutrition on a national level. In this regard, she is also a member of the Academy of Nutrition and Dietetics and the Association of Collegiate and Professional Sports Dietitians.



## Dña. Meeks, Jamie

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- ♦ Director of Sports Nutrition for the New Orleans Saints of the NFL, Louisiana, United States
- ♦ Coordinator of Sports Nutrition at Louisiana State University
- ♦ Registered Dietitian by the Academy of Nutrition and Dietetics
- ♦ Certified Specialist in Sports Dietetics
- ♦ Master's Degree in Kinesiology with a specialization in Exercise Physiology from Louisiana State University
- ♦ Graduate in Dietetics from Louisiana State University
- ♦ Member of: Louisiana Dietetic Association, Association of Collegiate and Professional Sports Dietitians, Cardiovascular and Wellness Sports Nutrition Dietetic Practice Group

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

## Management



### Dr. Marhuenda Hernández, Javier

- ♦ Fellow of the Spanish Academy of Human Nutrition and Dietetics.
- ♦ Professor and researcher at the Catholic UCAM University San Antonio in Murcia
- ♦ Ph.D. in Nutrition
- ♦ Master's Degree in Clinical Nutrition
- ♦ Graduate in Nutrition

## Professors

### D. Arcusa, Raúl

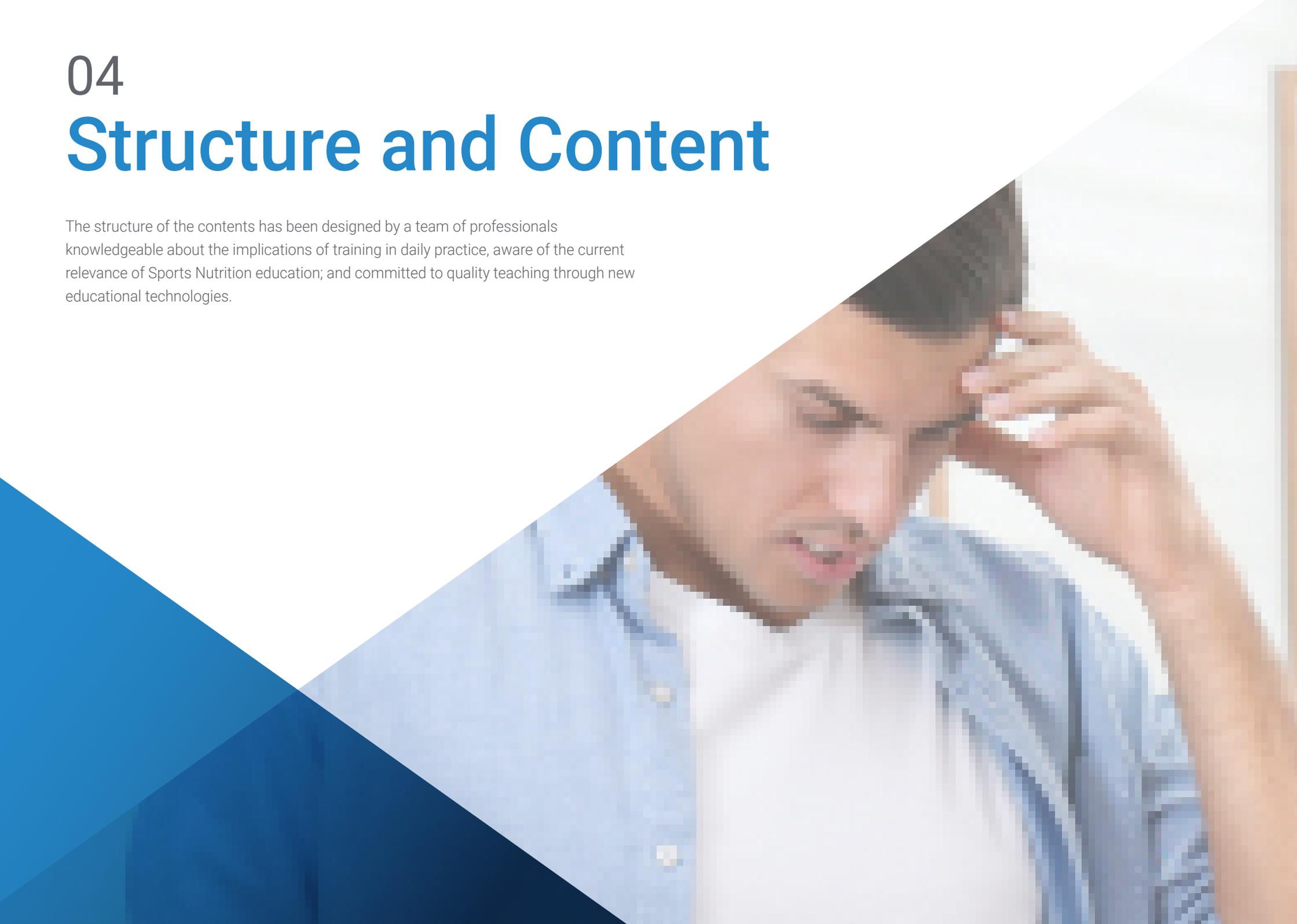
- ♦ Graduate in Human Nutrition and Dietetics
- ♦ Master's Degree in Nutrition in Physical Activity and Sport
- ♦ Anthropometrist ISAK level 1
- ♦ Currently a Doctoral student in the Department of Pharmacy of the UCAM, researching Nutrition and Oxidative Stress, in addition to his work as a Nutritionist in the Youth Team of C.D. Castellón.
- ♦ Possesses experience in different soccer teams in the Valencian community, as well as extensive experience in face-to-face clinical consultation.



# 04

# Structure and Content

The structure of the contents has been designed by a team of professionals knowledgeable about the implications of training in daily practice, aware of the current relevance of Sports Nutrition education; and committed to quality teaching through new educational technologies.





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*This Postgraduate Diploma in Muscular and Metabolic Physiology contains the most complete and up-to-date scientific program on the market”*

## Module 1. Muscle and Metabolic Physiology Associated with Exercise

- 1.1. Cardiovascular Adaptations Related to Exercise
  - 1.1.1 Increased Systolic Volume
  - 1.1.2 Decreased Heart Rate
- 1.2. Ventilatory Adaptations Related to Exercise
  - 1.2.1 Changes in the Ventilatory Volume
  - 1.2.2 Changes in Oxygen Consumption
- 1.3. Hormonal Adaptations Related to Exercise
  - 1.3.1 Cortisol
  - 1.3.2 Testosterone
- 1.4. Muscle Structure and Types of Muscle Fibers
  - 1.4.1 Muscle Fiber
  - 1.4.2 Type I Muscle Fiber
  - 1.4.3 Type II Muscle Fibers
- 1.5. The Concept of Lactic Threshold
- 1.6. ATP and Phosphagen Metabolism
  - 1.6.1 Metabolic Pathways for ATP Resynthesis during Exercise
  - 1.6.2 Phosphagen Metabolism
- 1.7. Carbohydrate Metabolism
  - 1.7.1 Carbohydrate Mobilization during Exercise
  - 1.7.2 Types of Glycolysis
- 1.8. Lipid Metabolism
  - 1.8.1 Lipolysis
  - 1.8.2 Fat Oxidation during Exercise
  - 1.8.3 Ketone Bodies
- 1.9. Protein Metabolism
  - 1.9.1 Ammonium Metabolism
  - 1.9.2 Amino Acid Oxidation
- 1.10. Mixed Bioenergetics of Muscle Fibers
  - 1.10.1 Energy Sources and their Relation to Exercise
  - 1.10.2 Factors Determining the Use of One or Another Energy Source during Exercise

## Module 2. The Evaluation of the Athlete at Different Moments of the Season

- 2.1. Biochemical Evaluation
  - 2.1.1 Blood Count:
  - 2.1.2 Overtraining Markers
- 2.2. Anthropometric Assessment
  - 2.2.1 Body composition
  - 2.2.2 ISAK Profile
- 2.3. Preseason
  - 2.3.1 High Workload
  - 2.3.2 Assuring Caloric and Protein Intake
- 2.4. Competitive Season
  - 2.4.1 Sports Performance
  - 2.4.2 Recovery between Games
- 2.5. Transition Period
  - 2.5.1 Vocational Period
  - 2.5.2 Changes in Body Composition
- 2.6. Travel
  - 2.6.1 Tournaments during the Season
  - 2.6.2 Off-Season Tournaments (World Cups, European Cups and The Olympic Games)
- 2.7. Athlete Monitoring
  - 2.7.1 Basal Athlete Status
  - 2.7.2 Evolution during the Season
- 2.8. Sweat Rate Calculation
  - 2.8.1 Hydric Losses
  - 2.8.2 Calculation Protocol
- 2.9. Multidisciplinary Work
  - 2.9.1 The Role of the Nutritionist in the Athlete's Environment
  - 2.9.2 Communication with the Rest of the Areas
- 2.10. Doping
  - 2.10.1 WADA List
  - 2.10.2 Anti-doping Tests

## Module 3. Para-Athletes

- 3.1. Classification and Categories in Para-Athletes
  - 3.1.1 What is a Para Athlete?
  - 3.1.2 How are Para Athletes Classified?
- 3.2. Sports Science in Para Athletes
  - 3.2.1 Metabolism and Physiology
  - 3.2.2 Biomechanics
  - 3.2.3 Psychology
- 3.3. Energy Requirements and Hydration in Para-Athletes
  - 3.3.1 Optimal Energy Demands for Training
  - 3.3.2 Hydration Planning before, during and after Training and Competitions
- 3.4. Nutritional Problems in the Different Categories of Para Athletes According to Pathology or Anomaly
  - 3.4.1 Spinal Cord Injuries
  - 3.4.2 Cerebral Palsy and Acquired Brain Injuries
  - 3.4.3 Amputees
  - 3.4.4 Vision and Hearing Impairment
  - 3.4.5 Intellectual Impairments
- 3.5. Nutritional Planning in Parathletes With Spinal Cord Injury, Cerebral Palsy and Acquired Brain Injuries
  - 3.5.1 Nutritional Requirements (Macro and Micronutrients)
  - 3.5.2 Sweating and Fluid Replacement during Exercise
- 3.6. Nutritional Planning in Amputee Para Athletes
  - 3.6.1 Energy Requirements
  - 3.6.2 Macronutrients
  - 3.6.3 Thermoregulation and Hydration
  - 3.6.4 Nutritional Issues Related to Prosthetics
- 3.7. Planning and Nutritional Problems in Para Athletes with Vision-Hearing Impairment and Intellectual Impairment
  - 3.7.1 Sports Nutrition Problems With Vision Impairment: Retinitis Pigmentosa, Diabetic Retinopathy, Albinism, Stargardt's Disease and Hearing Pathologies
  - 3.7.2 Sports Nutrition Problems With Intellectual Deficiencies: Down Syndrome, Autism, Aspergers Syndrome and Phenylketonuria
- 3.8. Body Composition in Para Athletes
  - 3.8.1 Measurement Techniques
  - 3.8.2 Factors Influencing the Reliability of Different Measurement Methods
- 3.9. Pharmacology and Nutrient Interactions
  - 3.9.1 Different Types of Drugs Taken by Para Athletes
  - 3.9.2 Micronutrient Deficiencies in Para Athletes
- 3.10. Ergogenic Aids
  - 3.10.1 Potentially Beneficial Supplements for Para Athletes
  - 3.10.2 Adverse Effects on Health and Contamination and Doping Problems Due to the Intake of Performance Enhancing drugs



*A unique, key, and decisive educational experience to boost your professional development”*

05

# Methodology

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

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



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

## At TECH 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 assess 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

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*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 prepared with unprecedented success in all clinical specialties regardless of surgical load. Our educational 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 adapted in audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high-quality pieces in each and every one of the materials that are made available to the student.



#### 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

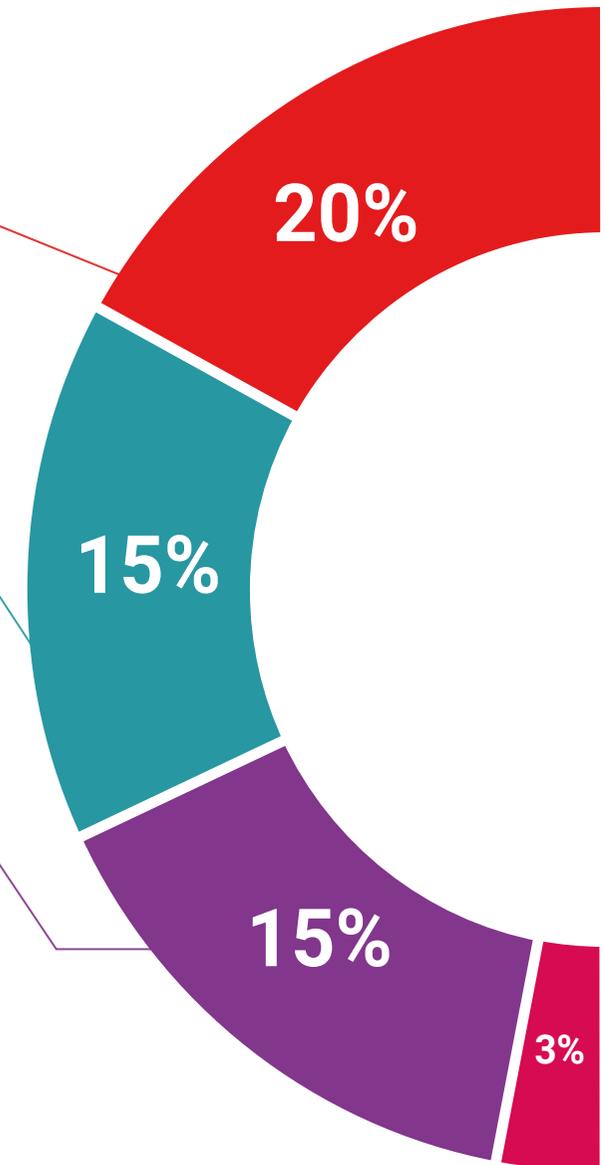
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

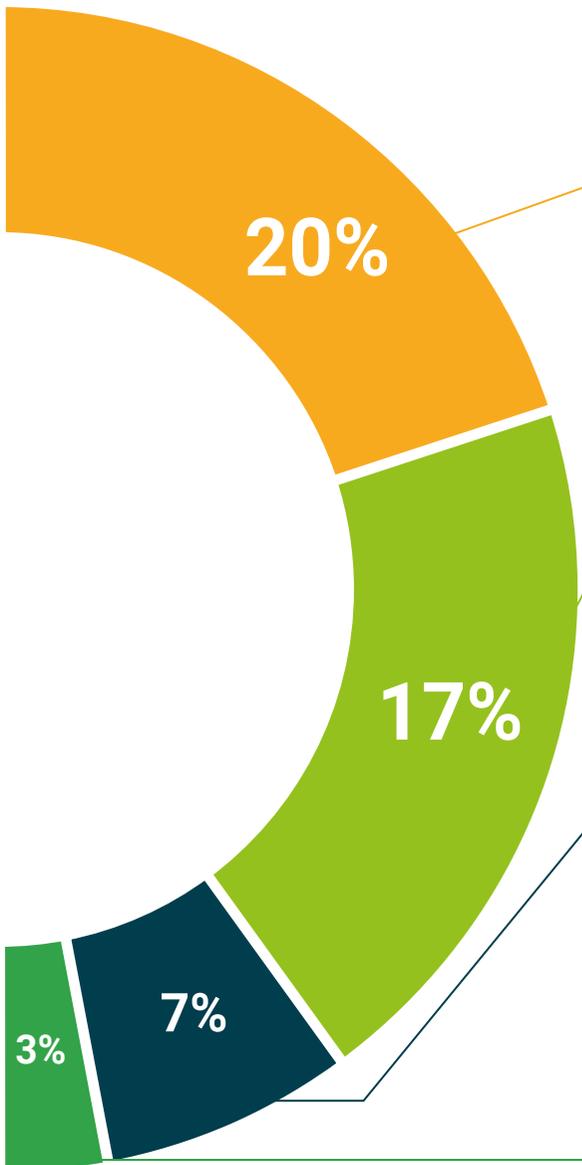
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



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



### Classes

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



### Quick Action Guides

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



# 06 Certificate

The Postgraduate Diploma in Muscular and Metabolic Physiology guarantees, in addition to the most rigorous and up-to-date training, access to a Postgraduate 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 **Postgraduate Diploma in Muscular and Metabolic Physiology** endorsed by **TECH Global University**, the world's largest online university.

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

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

Title: **Postgraduate Diploma in Muscular and Metabolic Physiology**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**





**Postgraduate Diploma**  
Muscular and Metabolic  
Physiology

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 18 ECTS
- » Schedule: at your own pace
- » Exams: online

# Postgraduate Diploma Muscular and Metabolic Physiology

