

# Postgraduate Diploma Professional Cyclist Physiology and Biomechanics

Endorsed by the NBA





## Postgraduate Diploma Professional Cyclist Physiology and Biomechanics

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/in/sports-science/postgraduate-diploma/postgraduate-diploma-professional-cyclist-physiology-biomechanics](http://www.techtute.com/in/sports-science/postgraduate-diploma/postgraduate-diploma-professional-cyclist-physiology-biomechanics)

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Certificate

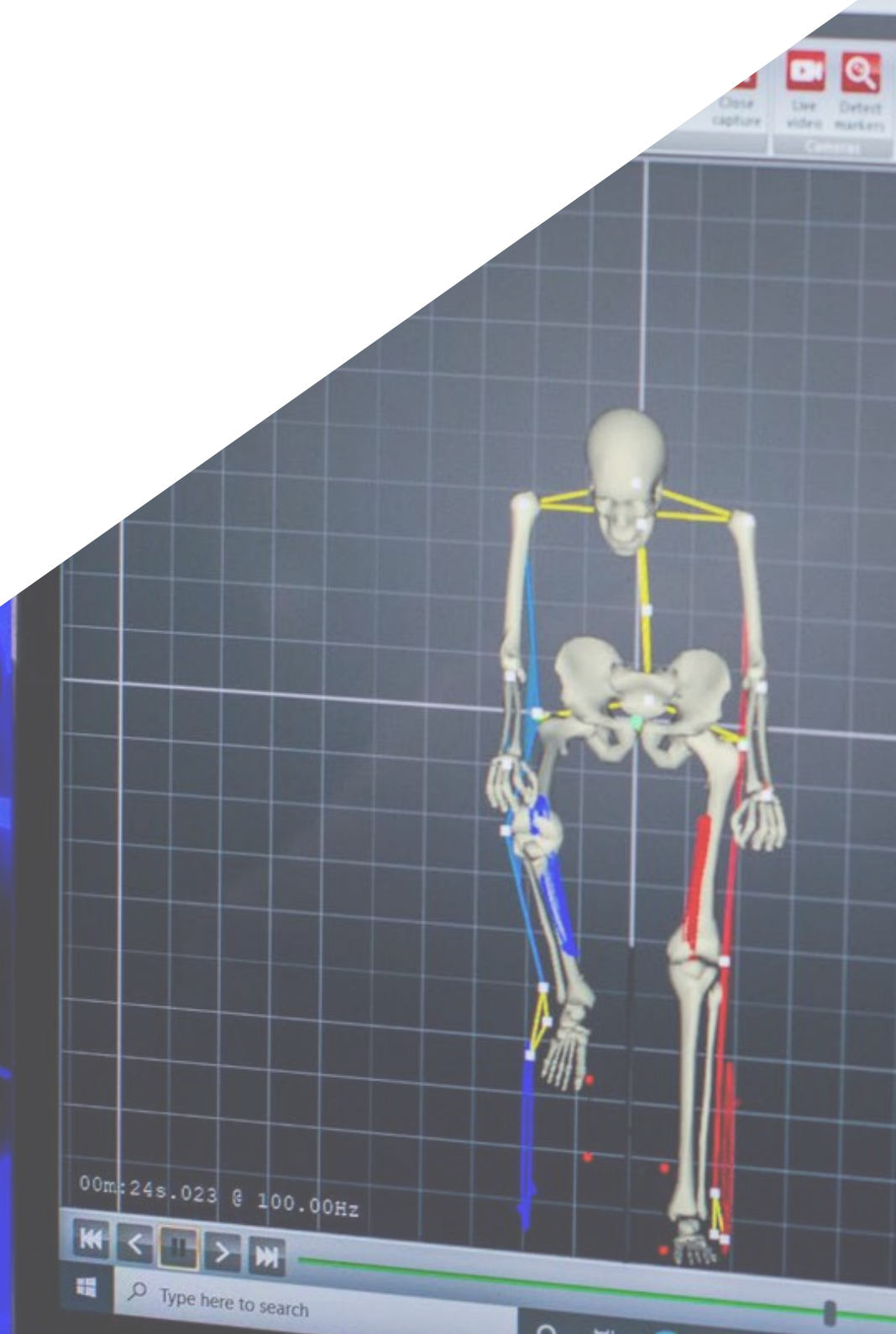
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# 01

# Introduction

Both the sizing of the chair and the bicycle, as well as the responses of the different energy systems, have a decisive influence on both the Biomechanics of the body and the athlete's own Physiology. Its in-depth study and knowledge on the part of the trainer can help to avoid injuries derived from bad positioning or even to quantify and dose the training load in a more optimal way. It is because of this tacit advantage that such knowledge offers the reason why this program has been created, focused on deepening both the Physiology and the Biomechanics of the cyclist. A completely online educational journey and based on the highest professional practice, with the maximum possible freedom.





“

*Give a decisive boost to your professional career in the field of cycling with the most advanced Biomechanics and Physiology techniques currently”*

The balance between good training and physical work is as important as the analysis of the athlete's activity, the detection of possible errors in their own practice or even the quantification of the load using software such as TrainingPeaks or Today's Plan. All this influences the final performance of the cyclist, which is why it is an essential area of specialization for every professional.

And it is that even in an exhaustive analysis of Biomechanics, anomalous behaviors in the opponents can be detected, which in turn allows acting with privileged information and responding to unforeseen situations. Such is the importance of this area that TECH has dedicated an entire program to delve into it, giving equal importance to Physiology and the professional cyclist's workload.

The student will find a detailed dissection of the most frequent injuries with a possible origin in Biomechanics, the different models of training and load quantification such as Banister, TRIMP and sRPE and the most valid performance markers and performance tests.

In this way, and through completely online teaching, the graduate will start from an advantageous position to stand out and lead complex cycling preparation teams. In addition, all the contents of the Virtual Campus are available for download, which means that they can be reviewed and studied by the student from the comfort of their Tablet, computer and even Smartphone of preference.

This **Postgraduate Diploma in Professional Cyclist Physiology and Biomechanics** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ◆ The development of case studies presented by experts in Cycling and of high-level sport
- ◆ The graphic, schematic and practical contents with which it is designed provide advanced and practical information on those disciplines that are essential for professional practice
- ◆ Practical exercises where self-assessment can be used to improve learning
- ◆ Its special emphasis on innovative methodologies
- ◆ Theoretical lessons, questions for 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



*Provide a distinctive and quality value to your training schedule with a deep and detailed knowledge of Physiology and Biomechanics in the Professional Cyclist"*

“

*Lean on the educational material of higher quality in the matter, with extensive multimedia documents on biomechanical and physiological analysis of professional cyclists”*

The program includes a team of professionals in its teaching staff from the sector who bring the experience of their work to this program, in addition to recognized specialists from prestigious reference societies and universities.

Its 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 an immersive education designed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve different professional practice situations that are presented throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

*It delves into the hematology applicable to the professional cyclist, including topics on the distinctive Physiology of women in this sport.*

*You will have the Virtual Campus available 24 hours a day, being you the one who dictates the teaching rhythms of the program.*



# 02 Objectives

The main objective of this Postgraduate Diploma is to offer a deep and detailed vision of both Physiology and Biomechanics in the field of cycling at the highest level. For this reason, all the teaching staff have poured their own sports experience into the didactic content, giving a practical approach to all the topics covered throughout the program.







“

*You will be in a position to considerably improve your sports preparation and analysis thanks to this Postgraduate Diploma”*



## General Objectives

- ◆ Understand the performance factors of sport and, therefore, learn to assess the specific needs of each athlete
- ◆ Being able to plan, periodize and develop training programs for cyclists, in short, train students to practice the profession of coach
- ◆ Acquire specific knowledge related to the biomechanics of cycling
- ◆ Understand the operation of the new applications used in the quantification of loads and training prescription
- ◆ Understand the benefits strength training and be able to apply them to concurrent training
- ◆ Acquire a specialization in cycling-oriented nutrition
- ◆ Understand the functioning of the cycling structures, as well as the modalities and categories of the competitions



*Sign up for this program now and don't miss out on the opportunity to access the analytical and working methodology of elite cyclists"*





## Specific Objectives

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### Module 1. Cyclist Exercise Physiology

- ◆ Address the different energy pathways and their influence on human performance
- ◆ Know the physiological milestones and know how to determine them
- ◆ Analyze the role of lactate and HRV
- ◆ Understanding the physiology of women in sport

### Module 2. Quantification of charges

- ◆ Know what the training load is and its applicability to cycling
- ◆ Know the relationship between training load and performance
- ◆ Know and use new platforms to quantify and prescribe training

### Module 3. Biomechanics in the cyclist

- ◆ Know the importance of Biomechanics in cycling and apply different methods
- ◆ Differentiate kinematics from kinetics and know the importance of the latter in performance
- ◆ Know the importance of functional assessment in the biomechanical process
- ◆ Know the benefits of aerodynamics in performance

03

# Course Management

To guarantee the highest standard of quality in the writing and development of content, TECH has assembled a highly competitive teaching team. His professional experience in multiple avant-garde cycling teams is a reliable guarantee that all the didactic material is based on the most rigorous and current sports practice, and this knowledge can even be transferred directly to the student's practice.



“

*All the teaching staff are fully involved so that you get the most out of this Postgraduate Diploma providing you with the necessary keys and the most advanced technology in professional cycling”*

## Management



### Dr. Sola, Javier

- CEO of Training4ll
- WT UAE team coach
- Head of Performance Massi Tactic UCI Womens Team
- Specialist in the biomechanical area of Jumbo Visma UCI WT
- WKO adviser to World Tour cycling teams
- Trainer at Coaches4coaches
- Associate Professor at Loyola University
- Bachelor of Science in Physical Activity and Sport from the University of Seville
- Postgraduate in High Performance of Cyclic Sports from the University of Murcia
- Sports Director Level III
- Numerous Olympic medals and medals at European Championships, World Cups and National Championships

## Professors

### D. Celdrán, Raúl

- ◆ CEO of Natur Training System
- ◆ Burgos BH ProConti Team Nutrition Manager
- ◆ Performance Manager of the professional MTB Klimatiza Team
- ◆ Trainer at Coaches4coaches
- ◆ Degree in Pharmacy from the University of Alcalá
- ◆ Master in Nutrition, Obesity and High Performance in Cyclic Sports from the University of Navarra

### Dr. Moreno Morillo, Aner

- ◆ Performance Manager of the Kuwait National Cycling Team
- ◆ Assistant of the Euskaltel-Euskadi ProConti Team
- ◆ Graduated in Physical Activity and Sports Sciences from the Isabel I University
- ◆ Master's degree in CAFD research from the European University
- ◆ Master in High Performance of Cyclic Sports from the University of Murcia
- ◆ Sports Director National Level III

### D. Heijboer, Mathieu

- ◆ WT Jumbo-Visma Team Performance Manager
- ◆ High level cycling coach pro cyclist
- ◆ Former Professional Cyclist
- ◆ CAFD Graduate

### Dr. Iriberry, Jon

- ◆ CEO of Custom4us
- ◆ Head of Biomechanics of the WT Jumbo Visma team
- ◆ Head of Biomechanics at Movistar Team
- ◆ Professor at the UCI World Center
- ◆ Bachelor of Science in Physical Activity and Sports from the University of the Basque Country
- ◆ Master in High Performance from the Colorado State University, in the USA

# 04

## Structure and Content

To ensure an academic experience that does not imply a sacrifice of study hours by the student, the contents of this program have been developed based on the Relearning pedagogical methodology. This implies that all the educational material is structured in an organic and non-linear way, since the key concepts are reiterated throughout the entire syllabus to favor a more effective and complete learning.





“

*Take advantage of the variety of educational materials that you will find, from interactive summaries to complete work guides prepared by the teachers themselves”*

## Module 1. Cyclist Exercise Physiology

- 1.1. Energy Systems
  - 1.1.1. Phosphagen Metabolism
  - 1.1.2. Glycolysis
  - 1.1.3. Oxidative System
- 1.2. Heart Rate
  - 1.2.1. Basal FC
  - 1.2.2. Reverse FC
  - 1.2.3. Maximum FC
- 1.3. The Role of the Lactate
  - 1.3.1. Definition
  - 1.3.2. Lactate Metabolism
  - 1.3.3. The Role in Physical Activity and in Determining Thresholds
- 1.4. Determination of Ventilatory Thresholds (Physiological Milestones)
  - 1.4.1. VT1
  - 1.4.2. VT2
  - 1.4.3. VO2 MAX
- 1.5. Performance Markers
  - 1.5.1. FTP/CP
  - 1.5.2. VAM
  - 1.5.3. Compound Score
- 1.6. Frisby Test
  - 1.6.1. Laboratory Test
  - 1.6.2. Field Test
  - 1.6.3. Power Profile Test
- 1.7. HRV (Heart Rate Variability)
  - 1.7.1. Definition
  - 1.7.2. Measuring Methods
  - 1.7.3. HRV-Based Accommodations
- 1.8. Adaptation
  - 1.8.1. Generalities
  - 1.8.2. Central
  - 1.8.3. Peripherals

- 1.9. Blood Analysis
  - 1.9.1. Biochemistry
  - 1.9.2. Hematology
  - 1.9.3. Hormones
- 1.10. Physiology of Women
  - 1.10.1. Characteristics of the Woman
  - 1.10.2. Training and Menstrual Cycle
  - 1.10.3. Specific Supplementation

## Module 2. Quantification of charges

- 2.1. Traditional Quantification Model
  - 2.1.1. Quantification Definition
  - 2.1.2. Triphasic Model
  - 2.1.3. Advantages and Disadvantages
- 2.2. Banister Model
  - 2.2.1. Definition
  - 2.2.2. Why this Model?
  - 2.2.3. Second Banister Model
- 2.3. TRIMP Model
  - 2.3.1. Definition
  - 2.3.2. Application Factors
  - 2.3.3. Advantages and Disadvantages
- 2.4. TRIMP Lucia
  - 2.4.1. Definition
  - 2.4.2. Application Factors
  - 2.4.3. Advantages and Disadvantages
- 2.5. CTL, ATL and TSB
  - 2.5.1. Definition
  - 2.5.2. Application Factors
  - 2.5.3. Advantages and Disadvantages
- 2.6. ECO Model
  - 2.6.1. Definition
  - 2.6.2. Application Factors
  - 2.6.3. Advantages and Disadvantages

- 2.7. Quantification Based on sRPE
  - 2.7.1. Definition
  - 2.7.2. Application Factors
  - 2.7.3. Advantages and Disadvantages
- 2.8. Training Peaks
  - 2.8.1. Explanation of the Platform
  - 2.8.2. Characteristics and Functions
  - 2.8.3. Advantages and Disadvantages
- 2.9. Quantification of Training in Professional Cycling
  - 2.9.1. Communication on a Daily Basis
  - 2.9.2. Quantification Models
  - 2.9.3. Limitations
- 2.10. Doctoral theses by Teun Van Erp and Dajo Sanders
  - 2.10.1. Quantification in Professional Competitions
  - 2.10.2. Correlations between Internal and External Load
  - 2.10.3. Limitations

### Module 3. Biomechanics in the cyclist

- 3.1. What is Biomechanics ? Educational Objective
  - 3.1.1. Definition
  - 3.1.2. History
  - 3.1.3. Application for Performance and Injury Prevention
- 3.2. Methods for Biomechanics
  - 3.2.1. Static
  - 3.2.2. Dynamics
  - 3.2.3. Accelerometers
- 3.3. Foot, Plantar Arch, ROM and Discrepancy Assessment
  - 3.3.1. Plantar Arch (ALI)
  - 3.3.2. First Radius
  - 3.3.3. Types of Feet
- 3.4. Functional Assessment
  - 3.4.1. ROM
  - 3.4.2. Dysmetria
  - 3.4.3. Compensation
- 3.5. Choice of shoes and bike size (stack and reach)
  - 3.5.1. Type of Shoes
  - 3.5.2. Choice of Frame Size
  - 3.5.3. Differences between Road Bikes, MTB and Time Trial
- 3.6. Goniometry (Optimal Angulations)
  - 3.6.1. Saddle Height
  - 3.6.2. Recoil
  - 3.6.3. Complementary Angles
- 3.7. Q factor and Cleat Adjustment
  - 3.7.1. Advances
  - 3.7.2. Q Factor
  - 3.7.3. Twist of the Cove
- 3.8. Torque
  - 3.8.1. Definition
  - 3.8.2. Application to Training
  - 3.8.3. Evaluation of the Pedal
- 3.9. Electromyography
  - 3.9.1. Definition
  - 3.9.2. Muscles Involved in Pedaling
  - 3.9.3. Pedal Assessment with from EMG Systems
- 3.10. Most Common Injuries
  - 3.10.1. Lower Back Injuries
  - 3.10.2. Knee Injuries
  - 3.10.3. Hand and Feet Injuries



*Download all the content and gain access to an essential reference guide for all elite cycling trainers"*

# 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.





“

*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"*

### Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

“

*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*



*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

**“** *Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question we face in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## 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.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.





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.

With this methodology, we have trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, markets, and financial instruments. All this in a highly demanding environment, where the students have a strong socio-economic 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 training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



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.



#### Classes

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

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



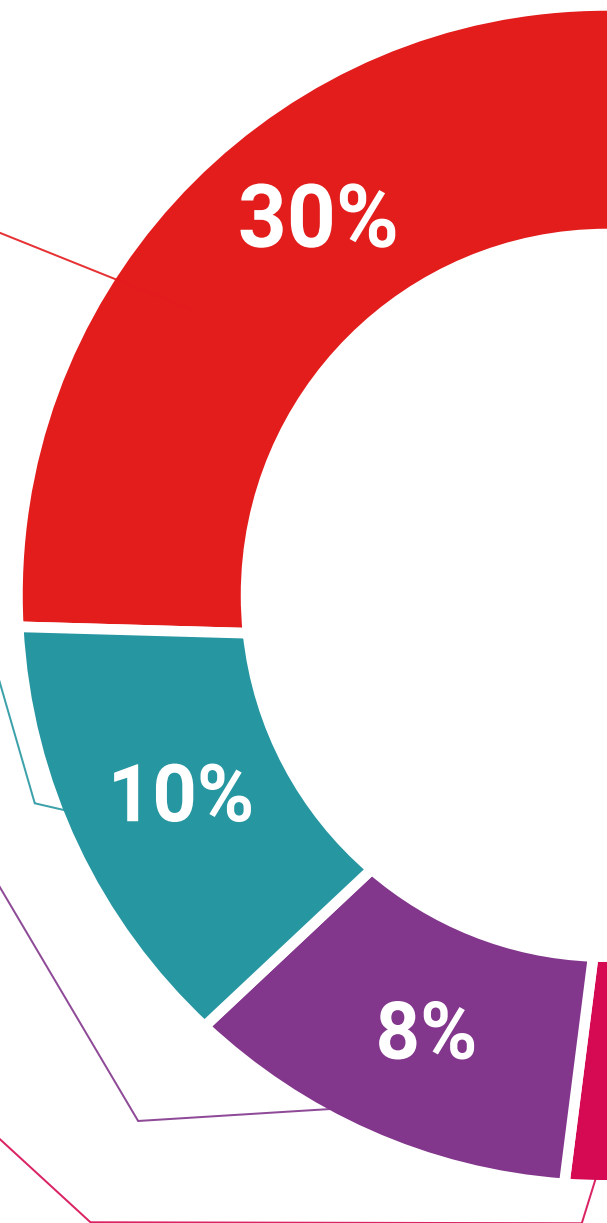
#### Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



#### 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.





#### Case Studies

Students will complete a selection of the best case studies chosen specifically for this situation. Cases that are presented, analyzed, and supervised by the best specialists in the world.



#### 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".



#### 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.



# 06 Certificate

The Postgraduate Diploma in Professional Cyclist Physiology and Biomechanics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.



“

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

This **Postgraduate Diploma in Professional Cyclist Physiology and Biomechanics** contains the most complete and up-to-date scientific program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Diploma** issued by **TECH Technological University** via tracked delivery\*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Diploma, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Professional Cyclist Physiology and Biomechanics**

Official N° of Hours: **450 h.**

Endorsed by the NBA



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

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
development language  
virtual classroom



**Postgraduate Diploma**  
Professional Cyclist  
Physiology and  
Biomechanics

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

# Postgraduate Diploma Professional Cyclist Physiology and Biomechanics

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