

# Postgraduate Certificate Biomechanics





## Postgraduate Certificate Biomechanics

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 8h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/pk/engineering/postgraduate-certificate/biomechanics](http://www.techtute.com/pk/engineering/postgraduate-certificate/biomechanics)

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# 01

# Introduction

Given the rapid advances in 3D printing and other recent developments in multiple scientific and medical fields, the intersection of engineering and medicine is more necessary than ever. Professionals specialized in Biomechanics have a promising future ahead of them, as their work has repercussions in fields as wide-ranging as ergonomics, sports performance or even medical prosthetics. This TECH university program delves into the most technical and advanced knowledge needed by the professional to get up to date in Biomechanics and continue their daily work with the best possible performance. All of this backed by the best teachers and the best technical team at TECH.







“

*Get up to date with a broad and extensive syllabus on Biomechanics, which covers aspects of vital importance such as human anatomy or the biomechanics of bones and ligaments”*

The field of Biomechanics is a very broad one, which allows engineering professionals to develop and specialize in a multitude of areas that not only affect medicine itself, but go beyond. This means that engineers can devote their professional efforts to development in the sports, industrial or occupational fields, among others.

Since this is a branch of engineering that requires very specific biological and technical knowledge, TECH has assembled a teaching group that brings together both the theoretical and practical skills necessary to create a high-level academic program.

This way, the engineer will have access to a syllabus with the latest scientific postulates on the functioning of tissues, bone biomechanics, biofluid mechanics and the general problems of biomechanics, all with an innovative approach and adapted to current research and practice.

In addition, the format is 100% online, which means that the engineer does not have to adapt to preset schedules or classes. At TECH, students have the freedom to adapt the syllabus and course workload to your personal and professional responsibilities, giving them the flexibility you need to continue the necessary academic updating without having to abandon their daily work.

This **Postgraduate Certificate in Biomechanics** contains the most complete and up-to-date educational program on the market. The most important features include:

- ◆ Case studies presented by experts in Biomedical Engineering
- ◆ 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
- ◆ Practical exercises where the self-assessment process can be carried out to improve learning
- ◆ Its special emphasis on innovative methodologies
- ◆ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ◆ Content that is accessible from any fixed or portable device with an Internet connection



*Delve into Biomechanics together with a faculty with extensive experience in all types of Biomechanics applications"*

“

*You choose when, where and how to study all the material taught by highly qualified professionals in Biomechanics”*

The program’s teaching staff includes professionals from sector who contribute their work experience to this training 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 training programmed to train in real situations.

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

*Benefit from the practical and theoretical vision of the program, with case studies based on real projects.*

*You will give your professional profile a significant boost by adding this qualification to your academic background.*



# 02

# Objectives

The objective of this Postgraduate Certificate is to provide a practical and comprehensive education on Biomechanics. That is why TECH has entrusted the drafting and creation of this course to a teaching staff of the highest level, which is also fully committed to the engineer so that they achieve the maximum benefit from all the material taught.





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*You will reach your professional goals sooner than you expect thanks to this Postgraduate Certificate”*



## General Objectives

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- ◆ Generate specialized knowledge on the main types of biomedical signals and their uses
- ◆ Develop the physical and mathematical knowledge underlying biomedical signals
- ◆ Fundamentals of the principles governing signal analysis and processing systems
- ◆ Analyze the main applications, trends and lines of research and development in the field of biomedical signals
- ◆ Develop expertise in classical mechanics and fluid mechanics
- ◆ Analyze the general functioning of the motor system and its biological mechanisms
- ◆ Develop models and techniques for the design and prototyping of interfaces based on design methodologies and their evaluation
- ◆ Provide the student with critical skills and tools for interface assessment
- ◆ Explore the interfaces used in pioneering technology in the biomedical sector
- ◆ Analyze the fundamentals of medical imaging acquisition, inferring its social impact
- ◆ Develop specialized knowledge about the operation of the different imaging techniques, understanding the physics behind each modality
- ◆ Identify the usefulness of each method in relation to its characteristic clinical applications
- ◆ Investigate post-processing and management of acquired images
- ◆ Use and design biomedical information management systems
- ◆ Analyze current digital health applications and design biomedical applications in a hospital setting or clinical center







## Specific Objectives

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- ◆ Generate specialized knowledge on the concept of biomechanics
- ◆ Examine the different types of movements and the forces involved in them
- ◆ Understanding the functioning of the circulatory system
- ◆ Develop biomechanical analysis methods
- ◆ Analyze muscle positions to understand their effect on resultant forces
- ◆ Evaluate common problems related to biomechanics
- ◆ Identify the main lines of action of biomechanics

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*Rely on the world's largest online academic institution, TECH, with the latest educational technology at your fingertips”*

03

# Course Management

The management of this Postgraduate Certificate is composed of professionals with extensive experience in Biomechanics, with expertise in 3D modeling projects and state-of-the-art design software. Thanks to this, the teachers have been able to complement the extensive theoretical work with a unique practical vision, from which the engineer will undoubtedly benefit.

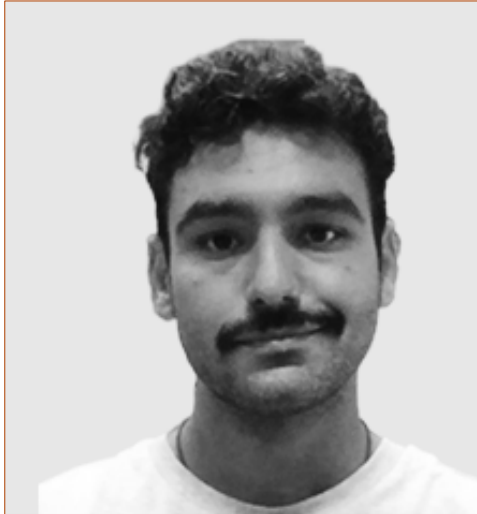




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*You will have the constant support of a faculty that will solve all your doubts throughout the program"*

## Management



### Mr. Ruiz Díez, Carlos

- ◆ Researcher at the National Microelectronics Center of the CSIC.
- ◆ Researcher. Composting Research Group of the Department of Chemical, Biological and Environmental Engineering of the UAB.
- ◆ Founder and product development at NoTime Ecobrand, a fashion and recycling brand.
- ◆ Development cooperation project manager for the NGO Future Child Africa in Zimbabwe.
- ◆ Graduate in Industrial Technologies Engineering from Pontificia de Comillas University ICAI.
- ◆ Master's Degree in Biological and Environmental Engineering from the Autonomous University of Barcelona.
- ◆ Master's Degree in Environmental Management from the Universidad Española a Distancia (Spanish Open University)

## Professors

### Ms. Sirera Pérez, Ángela

- ◆ Technaid. Design and manufacture of specific parts for 3D printing.
- ◆ Use of CAD Inventor Design Software. Knowledge of the mechanics of lower limb exoskeletons for the Rehabilitation of persons with reduced mobility.
- ◆ Nuclear Medicine. Clinical University of Navarra. Analysis of Nuclear Medicine images. Dose assessment of patients with PET brain studies. Research on the optimization of methionine activity.
- ◆ Degree in Biomedical Engineering from the University of Navarra





# 04

# Structure and Content

By employing Relearning as a teaching methodology, TECH ensures that this university program is the most effective for the engineer. This is due to the fact that up-to-date knowledge is acquired progressively and naturally, without having to force the professional or demand an excessive investment of hours.





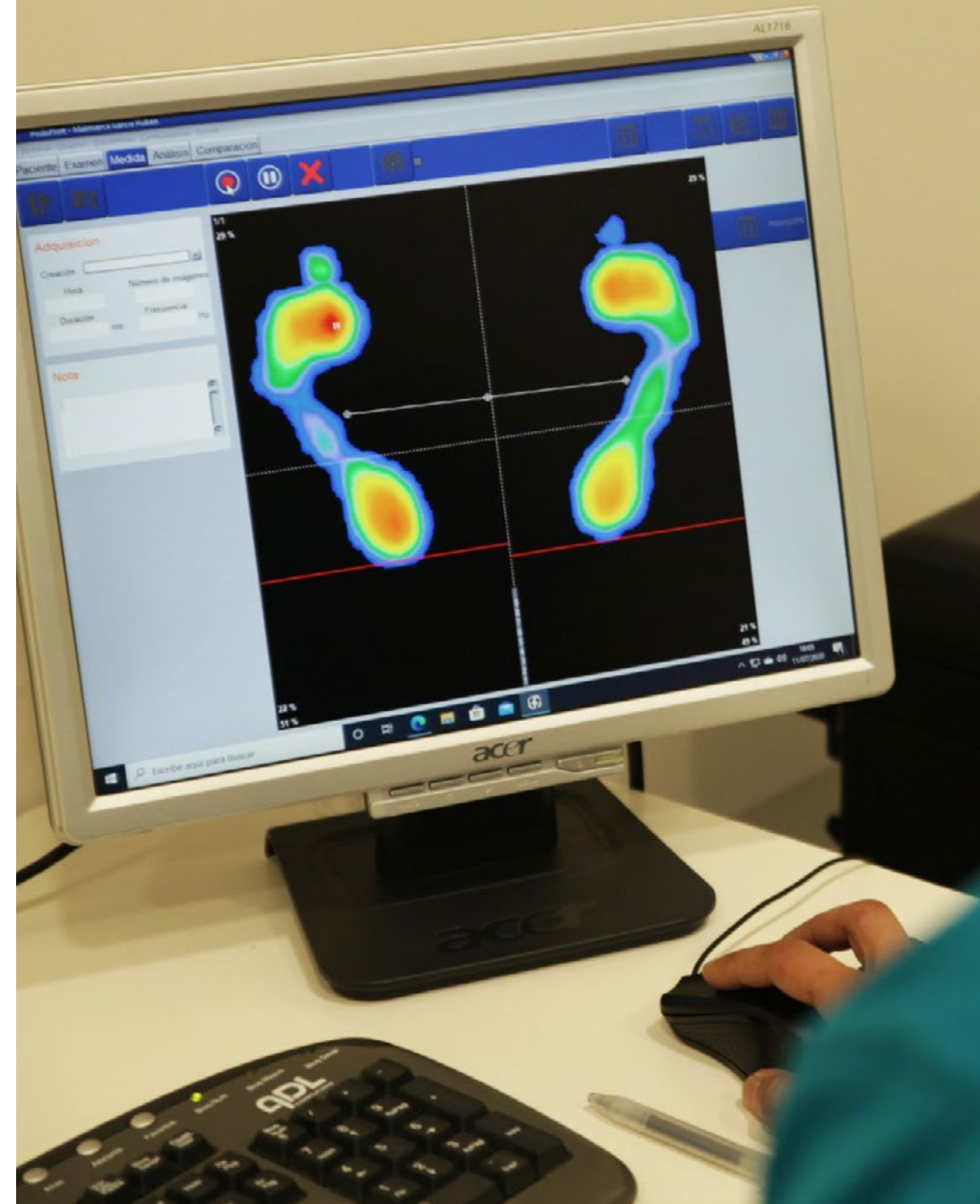



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*You will be able to access complementary readings that will help you to contextualize and study all units more decisively”*

## Module 1. Biomechanics

- 1.1. Biomechanics
  - 1.1.1. Biomechanics
  - 1.1.2. Qualitative and Quantitative Analysis
- 1.2. Basic Mechanics
  - 1.2.1. Functional Mechanisms
  - 1.2.2. Basic Units
  - 1.2.3. The Nine Fundamentals of Biomechanics
- 1.3. Mechanical Fundamentals Linear and Angular Kinematics
  - 1.3.1. Linear Movement
  - 1.3.2. Relative Movement
  - 1.3.3. Angular Movement
- 1.4. Mechanical Fundamentals Linear Kinetics
  - 1.4.1. Newton's Law
  - 1.4.2. Principle of Inertia
  - 1.4.3. Energy and Work
  - 1.4.4. Stress Angle Analysis
- 1.5. Mechanical Fundamentals Angular Kinetics
  - 1.5.1. Torque
  - 1.5.2. Angular Momentum
  - 1.5.3. Newton's Angles
  - 1.5.4. Balance and Gravity
- 1.6. Fluid Mechanics
  - 1.6.1. Fluid
  - 1.6.2. Flows
    - 1.6.2.1. Laminar Flow
    - 1.6.2.2. Turbulent Flow
    - 1.6.2.3. Pressure-Velocity: The Venturi Effect
  - 1.6.3. Forces in Fluids



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- 1.7. Human Anatomy: Limitation
    - 1.7.1. Human Anatomy
    - 1.7.2. Muscles: Active and Passive Stress
    - 1.7.3. Mobility Range
    - 1.7.4. Mobility-Strength Principles
    - 1.7.5. Limitations in the Analysis
  - 1.8. Mechanisms of the Motor System Bone, Muscle-Tendon and Ligament Mechanics
    - 1.8.1. Tissue Functioning
    - 1.8.2. Biomechanics of Bones
    - 1.8.3. Biomechanics of the Muscle-Tendon Unit
    - 1.8.4. Biomechanics of Ligaments
  - 1.9. Mechanisms of the Motor System Mechanics of Muscles
    - 1.9.1. Mechanical Characteristics of Muscles
      - 1.9.1.1. Force-Speed Relationship
      - 1.9.1.2. Force-Distance Relationship
      - 1.9.1.3. Force-Time Relationship
      - 1.9.1.4. Traction-Compression Cycles
      - 1.9.1.5. Neuromuscular Control
      - 1.9.1.6. The Spine and Backbone
  - 1.10. Mechanics of Biofluids
    - 1.10.1. Mechanics of Biofluids
      - 1.10.1.1. Transport, Stress and Pressure
      - 1.10.1.2. The Circulatory System
      - 1.10.1.3. Blood Characteristics
    - 1.10.2. General Problems in Biomechanics
      - 1.10.2.1. Problems in Nonlinear Mechanical Systems
      - 1.10.2.2. Problems in Biofluids
      - 1.10.2.3. Solid-Liquid Problems



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 that you are presented with 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.

This methodology has 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, and financial markets and 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 skills and abilities in each subject 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 program. 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 Certificate in Biomechanics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.



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

This **Postgraduate Certificate in Biomechanics** contains the most complete and up-to-date program on the market.

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

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

Title: **Postgraduate Certificate in Biomechanics**

Official N° of Hours: **150 h.**



\*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 quality  
development language  
virtual classroom



## Postgraduate Certificate Biomechanics

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- › Duration: 6 weeks
- › Certificate: TECH Technological University
- › Dedication: 16h/week
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- › Exams: online

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