Postgraduate Certificate
Biomedical Signal Processing and Analysis

tech global university

tech global university

Postgraduate Certificate
Biomedical Signal Processing and Analysis

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Global University**
- Accreditation: **6 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/medicine/postgraduate-certificate/biomedical-signal-processing-analysis**

Index

01

Introduction

The continuous advances in Biomedical Signals and the promising results that accompany the research carried out in recent years, have made it possible to help in the diagnosis of situations or states in many clinical cases. This is why it is a field of interest for specialists in different branches of medicine, which is why TECH has developed this complete program. The degree will allow the graduate to delve deeper into this field through theoretical and scientific issues, supported by additional material that includes real cases, audiovisual content, dynamic summaries and all the facilities provided by a 100% online degree.

You will have a comprehensive program based exclusively on biomedical signals, types, fundamentals and systems, processing, filtering, analysis, event detection and the software for their processing"

The continuous advances in Biomedical Engineering and the success of its application in real clinical cases has allowed to improve the diagnosis and, above all, the treatment of numerous pathologies in sick people. Knowledge of the most effective techniques has enabled professionals around the world to improve their professional practice and therefore the service they offer to their patients.

These reasons awaken in the specialist the need and the desire to invest in a degree with which to know in detail all the information that will also allow them to incorporate this set of techniques and procedures into their daily practice. That is why TECH has launched this program, to provide them with the best academic experience to achieve their goals quickly and comfortably.

This is a complete degree that covers the concepts necessary to master the field of biomedical signals, from types, fundamentals and systems to the best software for their processing. A syllabus created by experts in the sector and aimed at medical professionals with which the specialist will be able to implement the best techniques.

A degree that is compatible with any work activity due to the flexibility and ease of being 100% online. In addition, the graduate will have all the content from the first day, thus facilitating the organization of the teaching process. You will also have at your disposal complementary material and individualized tutorials that will allow you to further your objectives during the Postgraduate Certificate.

This **Postgraduate Certificate in Biomedical Signal Processing and Analysis** is the most comprehensive and up-to-date educational program on the market. The most important features include:

- Practical cases presented by experts in Biomedicine
- The graphic, schematic, and eminently 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
- Access to content from any fixed or portable device with an Internet connection.

The way this degree is organized will allow you to organize the program according to your own study patterns”

Implement the most modern and sophisticated techniques in electrocardiography, electroencephalography and magnetoencephalography in your daily life"

Develop your full potential and expand your knowledge in only 150 hours with this Postgraduate Certificate

You will delve into, through real clinical cases, in the classification and examples of biomedical signals

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.

02

Objectives

Given the current demand from the medical sector in relation to biomedicine, more specifically in relation to biomedical signals, TECH's objective is to offer the best degree in the market with which to update knowledge and improve concepts and techniques. This is possible thanks to the commitment that exists so that all graduates who pursue any degree at this university finish their academic experience knowing and feeling that they have invested their time in the best way.

Real academic results from day one You will see how, without the need to invest extra hours, you will improve your capabilities and reach your goals”

General Objectives

- 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

TECH's objective is not that you obtain a degree, but that you finish this Postgraduate Certificate being a better professional and increasing your chances of success in the diagnosis and treatment of clinical pathologies"

Specific Objectives

- Distinguish the different types of biomedical signals
- Determine how biomedical signals are acquired, interpreted, analyzed and processed
- Analyze the clinical applicability of biomedical signals through practical case studies
- Apply mathematical and physical knowledge to analyze signals
- Examine the most common signal filtering techniques and how to apply them
- Develop fundamental engineering knowledge of signals and systems
- Understand the operation of a biomedical signal processing system.
- Identify the main components of a digital signal processing system

03

Course Management

For the direction of this Postgraduate Certificate, TECH has selected the best possible teaching group, capable, with total guarantee, to create an academic environment based on their experience and good professional practice that accompanies their careers as experts in the sector. This not only guarantees a syllabus designed by and for specialists, but also ensures an academic experience in which practice will always be present with real and common clinical cases in day-to-day medical practice.

Lean on the tutoring and solve daily questions that arise Propose topics and discuss with industry professionals"

International Guest Director

Awarded by the Academy of Radiology Research for his contribution to the understanding of this area of science, Dr. Zahi A Fayad is considered a prestigious Biomedical Engineer. In this sense, most of his line of research has focused on both the detection and prevention of Cardiovascular Diseases. In this way, he has made multiple contributions in the field of Multimodal Biomedical Imaging, promoting the correct use of technological tools such as Magnetic Resonance Imaging or Positron Emission Computed Tomography in the health community.

In addition, he has an extensive professional background that has led him to occupy relevant positions such as the Director of the Institute of Biomedical Engineering and Imaging at Mount Sinai Medical Center, located in New York. It should be noted that he combines this work with his facet as a Research Scientist at the National Institutes of Health of the United States government. He has written more than 500 exhaustive clinical articles on subjects such as drug development, the integration of the most avant-garde techniques of Multimodal Cardiovascular Imaging in clinical practice or non-invasive in vivo methods in clinical trials for the development of new therapies to treat Atherosclerosis. Thanks to this, his work has facilitated the understanding of the effects of Stress on the immune system and Cardiac Pathologies significantly.

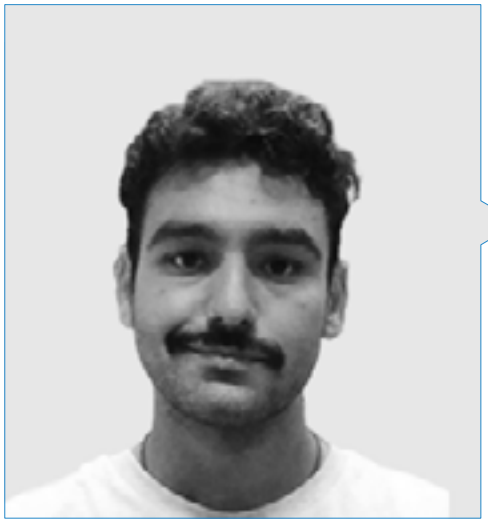
On the other hand, this specialist leads 4 multicenter clinical trials funded by the US pharmaceutical industry for the creation of new cardiovascular drugs. His objective is to improve therapeutic efficacy in conditions such as Hypertension, Heart Failure or Stroke. At the same time, it develops prevention strategies to raise public awareness of the importance of maintaining healthy lifestyle habits to promote optimal cardiac health.

Dr. A Fayad, Zahi

- Director of the Institute for Biomedical Engineering and Imaging at Mount Sinai Medical Center, New York
- Chairman of the Scientific Advisory Board of the National Institute of Health and Medical Research at the European Hospital Pompidou AP-HP in Paris, France
- Principal Investigator at Women's Hospital in Texas, United States
- Associate Editor of the "Journal of the American College of Cardiology"
- Ph.D. in Bioengineering from the University of Pennsylvania
- B.S. in Electrical Engineering from Bradley University
- Founding member of the Scientific Review Center of the National Institutes of Health of the United States government

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

Management



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 Universidad Pontificia de Comillas 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

Rodríguez Arjona, Antonio

- Project Manager, Technical Manager and Expert in the Regulation of Medical Devices at Omologic, Homologation and CE Marking.
- Development of the Smart Stent project in collaboration with the TIC-178 research group of the University of Seville
- Technical Engineer in the Logistics Department of Docriluc, S.L.
- Digitization Manager at Ear Protech, the in-ear experience
- Computer Technician at the Centro Asociado María Zambrano of the Universidad Nacional de Educación a Distancia (National University of Distance Education)
- Graduate in Health Engineering with a major in Biomedical Engineering from the University of Malaga
- Master's Degree in Biomedical Engineering and Digital Health from the University of Seville

04

Structure and Content

The content of this program has been designed following the guidelines of the *relearning* methodology, through which the most important concepts are repeated throughout the program, facilitating their natural and progressive acquisition. TECH is committed to the most modern and sophisticated pedagogical techniques, so by choosing this university, the graduate will be investing their time in a modern, quality degree that meets their personal and professional needs.

In the Virtual Classroom you will find all the additional content you need to complement the syllabus and set yourself apart from other professionals specializing in biomedical signals"

Module 1. Biomedical Signals

1.1. Biomedical Signals
- 1.1.1. Origin of Biomedical Signals
- 1.1.2. Biomedical Signals
  - 1.1.2.1. Amplitude
  - 1.1.2.2. Period
  - 1.1.2.3. Frequency (F)
  - 1.1.2.4. Wave Length
  - 1.1.2.5. Phase
- 1.1.3. Classification and Examples of Biomedical Signals

1.2. Types of Biomedical Signals Electrocardiography, Electroencephalography and Magnetoencephalography
- 1.2.1. Electrocardiography (ECG)
- 1.2.2. Electroencephalography (EEG)
- 1.2.3. Magnetoencephalography (MEG)

1.3. Types of Biomedical Signals Electroneurography and Electromyography
- 1.3.1. Electroneurography (ENG)
- 1.3.2. Electromyography (EMG)
- 1.3.3. Event-Related Potentials (ERPs)
- 1.3.4. Other Types

1.4. Signals and Systems
- 1.4.1. Signals and Systems
- 1.4.2. Continuous and Discrete Signals: Analog vs. Digital
- 1.4.3. Systems in the Time Domain
- 1.4.4. Systems in Frequency Domain Spectral Method

1.5. Fundamentals of Signals and Systems
- 1.5.1. Sampling: Nyquist
- 1.5.2. The Fourier Transform DFT
- 1.5.3. Stochastic Processes
  - 1.5.3.1. Deterministic vs Random Signals
  - 1.5.3.2. Types of Stochastic Processes
  - 1.5.3.3. Stationarity
  - 1.5.3.4. Ergodicity
  - 1.5.3.5. Relationships Between Signals

1.5.4. Power Spectral Density

1.6. Processing of Biomedical Signals
- 1.6.1. Processing of Signals
- 1.6.2. Objectives and Processing Steps
- 1.6.3. Key Elements of a Digital Processing System
- 1.6.4. Applications. Tendencies

1.7. Filtering: Artifact Removal
- 1.7.1. Motivation. Types of Filtering
- 1.7.2. Time Domain Filtering
- 1.7.3. Frequency Domain Filtering
- 1.7.4. Applications and Examples

1.8. Time-Frequency Analysis
- 1.8.1. Motivation
- 1.8.2. Time-Frequency Plane
- 1.8.3. Short Time Fourier Transform (STFT)
- 1.8.4. Wavelet Transform
- 1.8.5. Applications and Examples

1.9. Event Detection
- 1.9.1. Study Case I: ECG
- 1.9.2. Study Case II: EEG
- 1.9.3. Evaluation of Detection

1.10. Software for Biomedical Signal Processing
- 1.10.1. Applications, Environments and Programming Languages
- 1.10.2. Libraries and Tools
- 1.10.3. Practical Applications: Basic Biomedical Signal Processing System

The time has arrived. This is your opportunity to progress professionally with the best university and the best experts"

05

Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.

TECH will prepare you to face new challenges in uncertain environments and achieve success in your career"

The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.
The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

"At TECH you will NOT have live classes (which you might not be able to attend)"

The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

> *TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want"*

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.

Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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.

A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.

The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule"

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.

The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the teaching quality, the quality of the materials, the structure of the program and its objectives is excellent. Not surprisingly, the institution became the top-rated university by its students according to the global score index, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.

As such, the best educational materials, thoroughly prepared, will be available in this program:

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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.

Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.

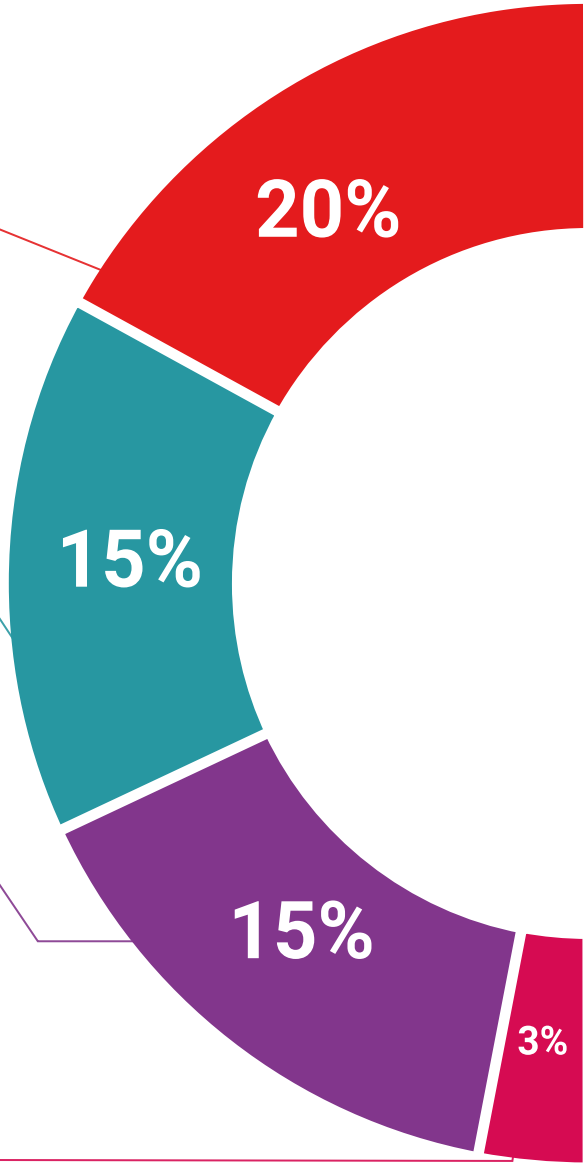
Interactive Summaries

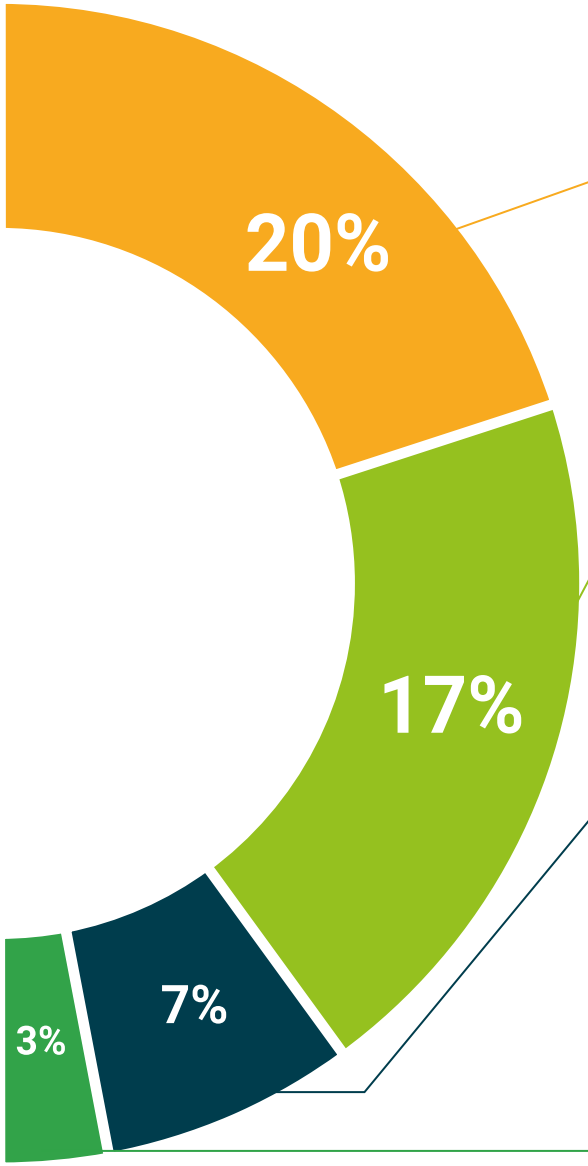
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

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 for 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 Certificate in Biomedical Signal Processing and Analysis guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH TECH Global University.

Successfully complete this training program and receive your university certificate without travel or laborious paperwork"

This private qualification will allow you to obtain a **Postgraduate Certificate in Biomedical Signal Processing and Analysis** endorsed by **TECH Global University**, the world's largest online university.

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

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

Title: **Postgraduate Certificate in Biomedical Signal Processing and Analysis**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Certificate in Biomedical Signal Processing and Analysis

This is a private qualification of 180 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

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

tech global university

Postgraduate Certificate
Biomedical Signal Processing and Analysis

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Global University**
- Accreditation: **6 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Postgraduate Certificate
Biomedical Signal Processing and Analysis

tech global university