

Postgraduate Certificate Biomedical Signal Processing and Analysis





Postgraduate Certificate Biomedical Signal Processing and Analysis

Course Modality: Online

Duration: 6 weeks

Certificate: TECH Technological University

6 ECTS Credits

Teaching Hours: 150 hours

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

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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.





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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”

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.

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

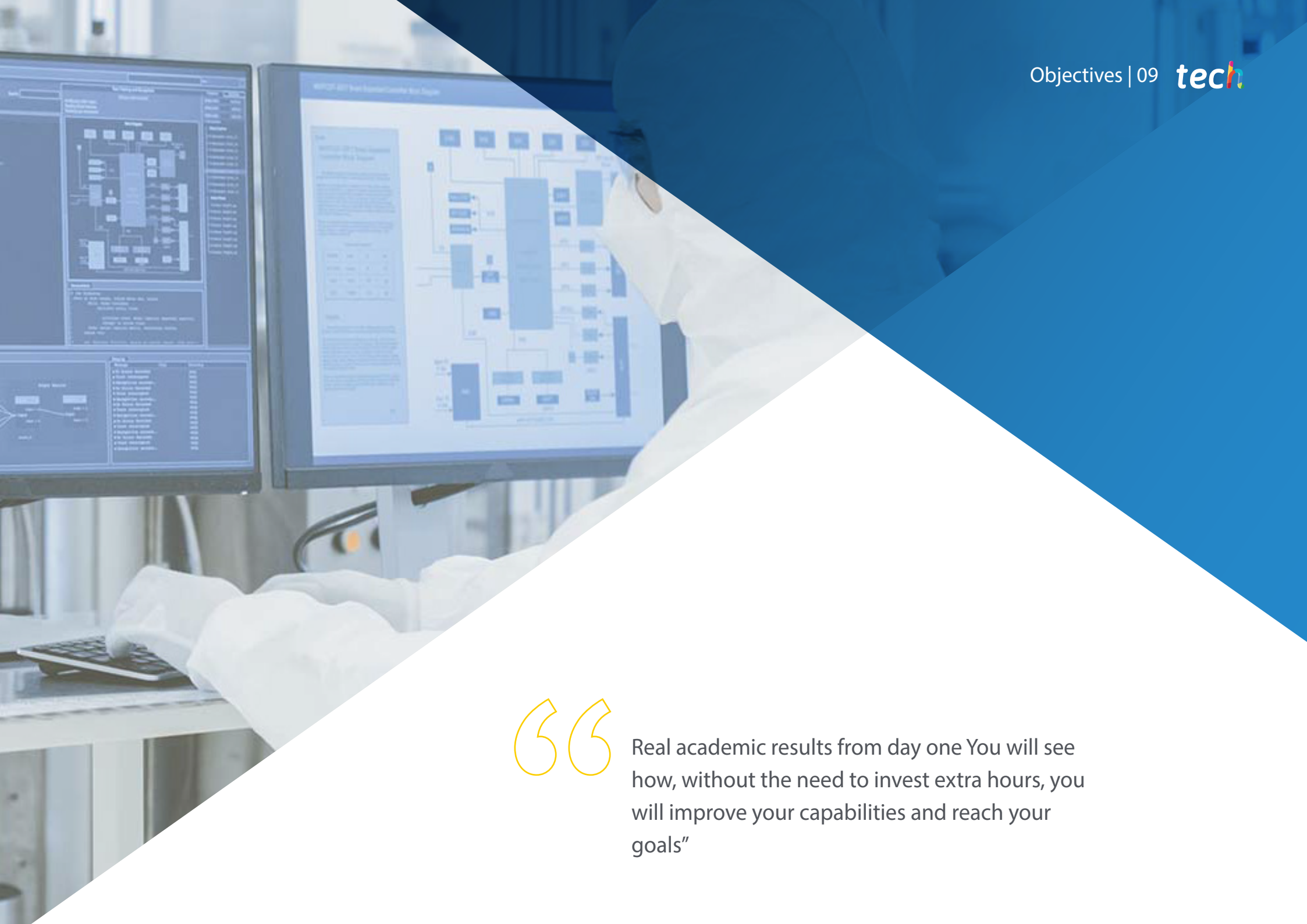


02

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.

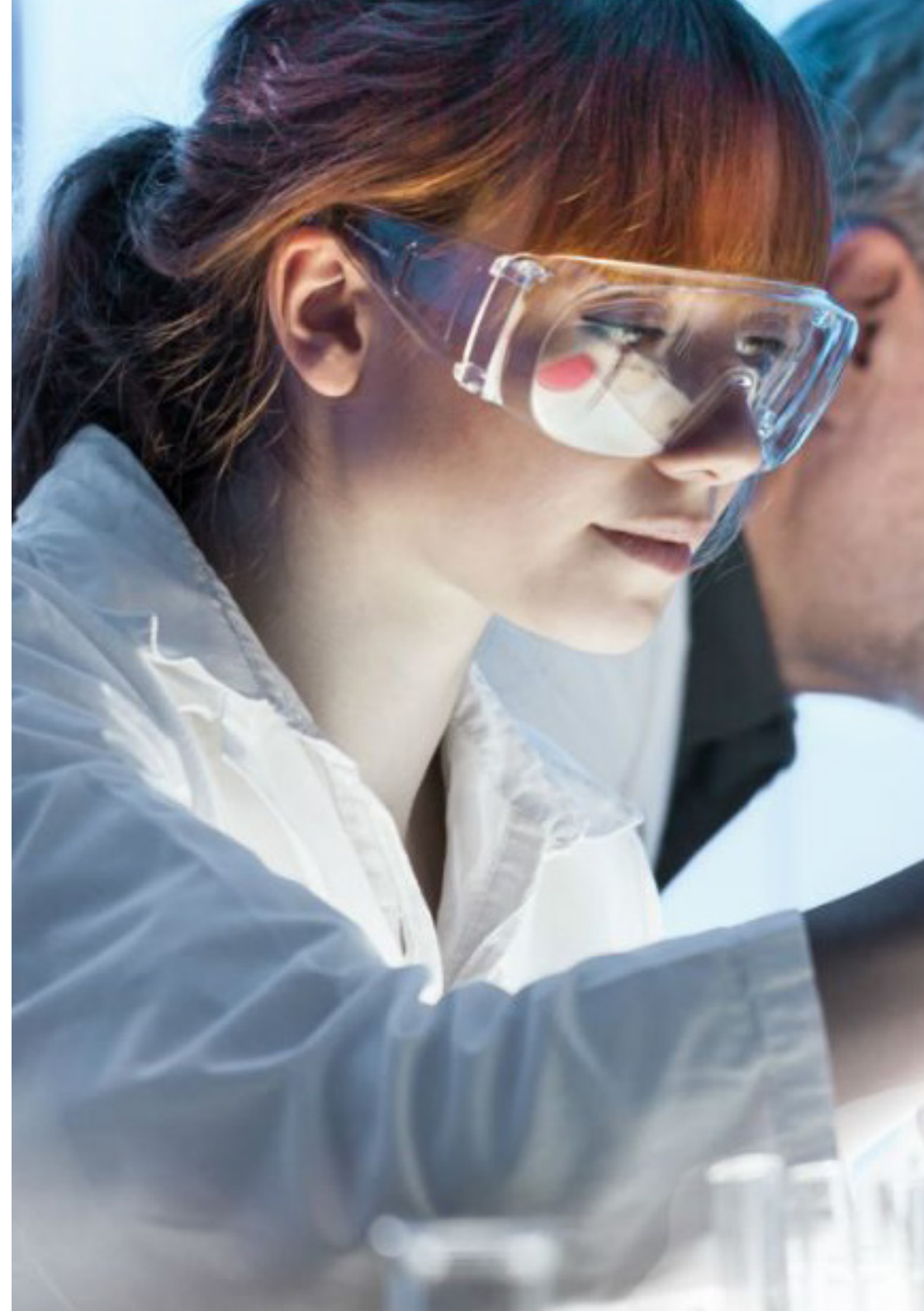


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In the Virtual Classroom you will find all the additional content you need to complement the syllabus and set yourself apart from other professionals specializing in biomedical signals”

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

Methodology

This training program provides you with a different way of learning. Our methodology uses a cyclical learning approach: Re-learning.

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.



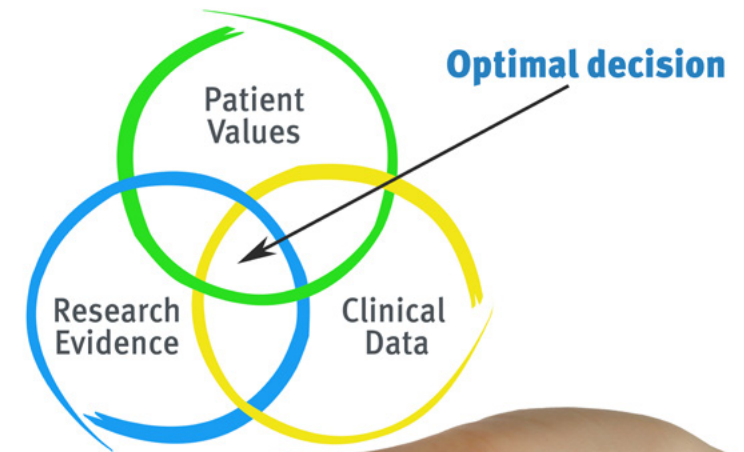
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Discover Re-learning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

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

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Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method”

The effectiveness of the method is justified by four fundamental achievements:

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



Re-learning Methodology

At TECH we enhance the Harvard case method with the best 100% online teaching methodology available: Re-learning.

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.

Professionals will learn through real cases and by resolving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.



At the forefront of world teaching, the Re-learning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best Spanish-speaking online university (Columbia University).

With this methodology, more than 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a high socioeconomic profile and an average age of 43.5 years old.

Re-learning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions:
a direct equation to success

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.



This program offers the best educational material, prepared with professionals in mind:



Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



Surgical Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current medical techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.



Interactive Summaries

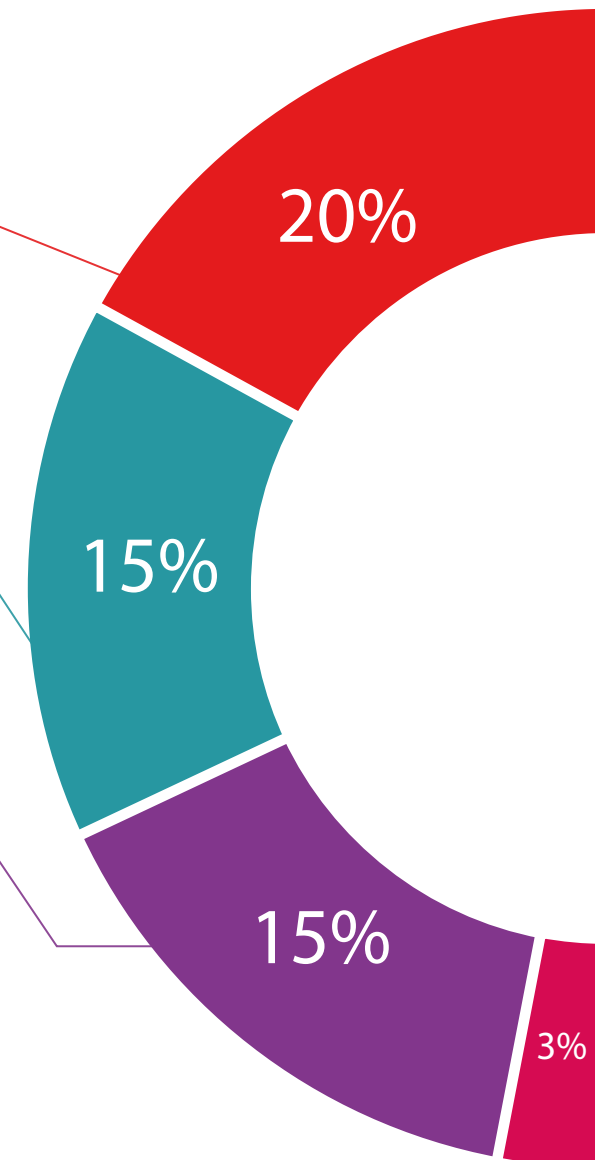
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

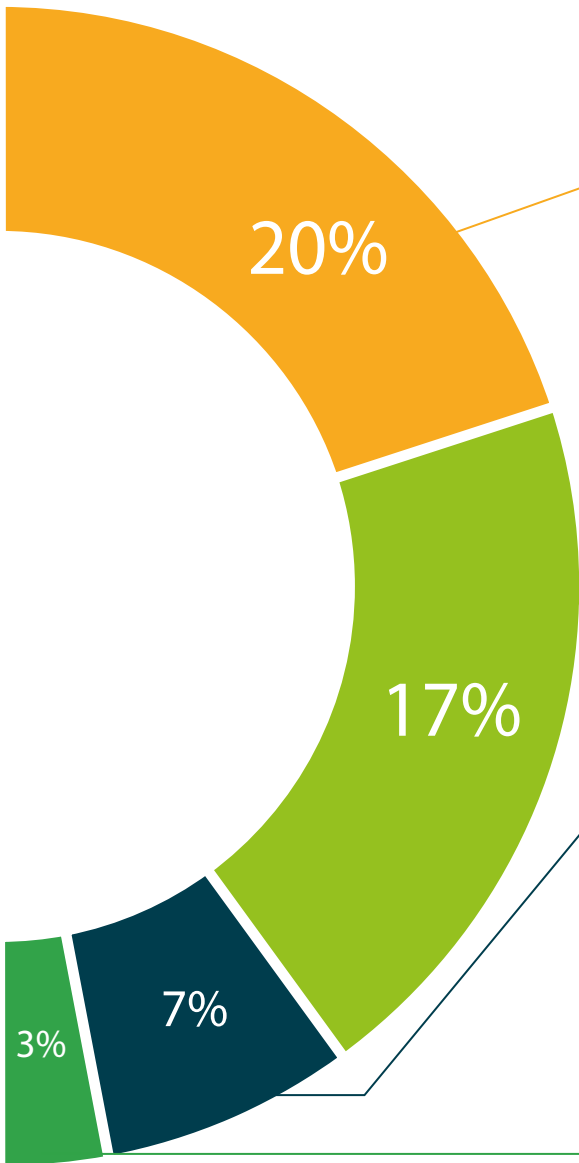
This exclusive multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".



Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.



Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises: so that they can see how they are achieving your goals.



Classes

There is scientific evidence on the usefulness of learning by observing experts: The system termed Learning from an Expert strengthens knowledge and recall capacity, and generates confidence in the face of difficult decisions in the future.



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 Technological University.





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

This Postgraduate Certificate in Biomedical Signal Processing and Analysis contains the most complete and updated program on the market.

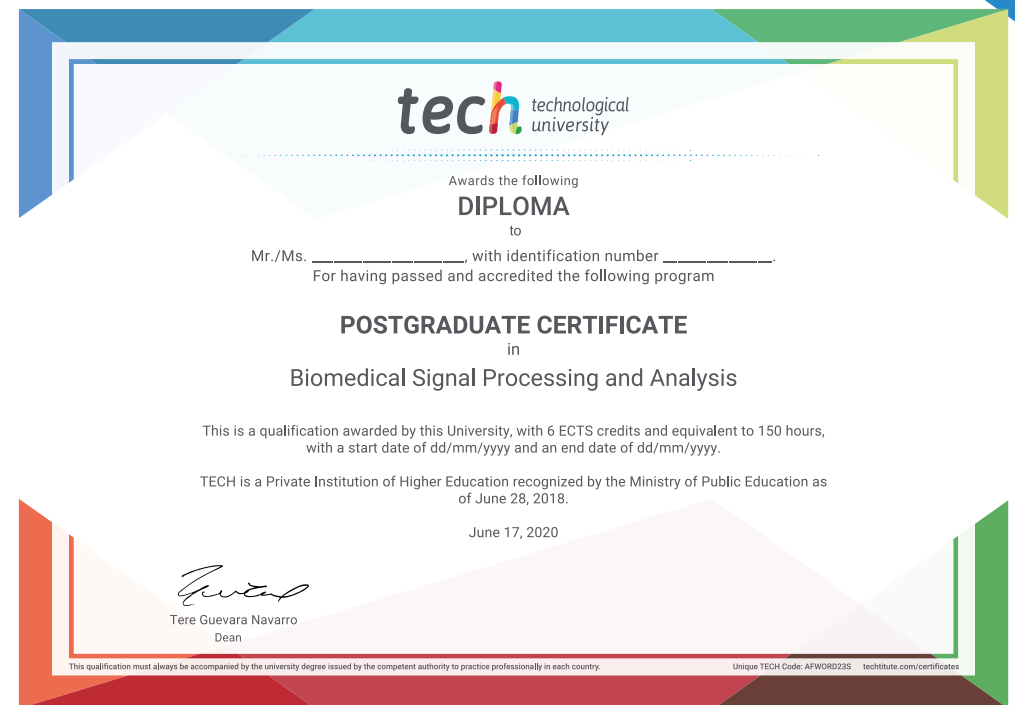
After passing the evaluation, the student will receive by mail* with acknowledgment of receipt the corresponding University Course certificate issued by TECH Technological University.

This qualification contributes significantly to the professional's continuing education and enhances their training with a highly regarded university syllabus, and is 100% valid for all public examinations, professional careers and job vacancies.

Title: Postgraduate Certificate in Biomedical Signal Processing and Analysis

ECTS: 6

Official N° of Hours: 150 hours



*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.

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



Postgraduate Certificate
Biomedical Signal
Processing and
Analysis

Course Modality: Online

Duration: 6 weeks

Certificate: TECH Technological University

6 ECTS Credits

Teaching Hours: 150 hours

Postgraduate Certificate Biomedical Signal Processing and Analysis

