

Postgraduate Certificate

Design and Creation of Human-Machine Interface in Biomedical Engineering





Postgraduate Certificate Design and Creation of Human-Machine Interface in Biomedical Engineering

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

Website: www.techtute.com/us/medicine/postgraduate-certificate/design-creation-human-medicine-interface-biomedical-engineering

Index

01

Introduction

p. 4

02

Objectives

p. 8

03

Course Management

p. 12

04

Structure and Content

p. 16

05

Methodology

p. 20

06

Certificate

p. 28

01

Introduction

To ensure the success of a given software or application, it is important to develop an intuitive and attractive interface that meets the user's needs, in this case, in the medical field. The objective of this program is to introduce the specialist to the multiple possibilities that arise around the different typologies of interfaces and their adaptation to each context. Thanks to the 100% online methodology, the graduate will have all the essential educational tools that will allow them to develop a critical capacity for the design of interfaces in the medical sector.



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You will gain a deeper understanding of UX/UI tools in the design process and expand your knowledge in the development of the human-machine interaction concept”

Numerous studies have shown that the quality of the interface design of any application or software has a significant impact on its results, since having a program based on a good user experience can help the specialist by facilitating its use and allowing them to achieve the objectives for which it was designed, faster and with better results.

In the field of biomedical technology, where advances are made on a daily basis, it is important that there is collaboration and communication between engineers and physicians in order to increase productivity in both the design and creation processes, as well as in the collection of information once they are implemented. This is why there is a need among healthcare professionals to find a program that introduces them to this field and allows them to acquire all the information they need to increase their knowledge in this area.

In response to this demand TECH has created the Postgraduate Certificate in Design and Creation of Human-Machine Interface in Biomedical Engineering, in which specialists will work from the interface and human-machine interaction to the design process based on prototyping and evaluation. In addition, this program places special emphasis on the interaction methods of current technologies and the importance of graphic design as a key to success.

180 hours of content that includes additional audiovisual material, summaries of each unit, case studies and complementary readings, all in the characteristic online format that defines TECH. In addition, during the program, the specialist will be able to consult with the teaching staff for any doubts or questions that may arise during the course of the Postgraduate Certificate.

This **Postgraduate Certificate in Design and Creation of Human-Machine Interface in Biomedical Engineering** contains the most complete and up-to-date educational program on the market. Its most notable features are:

- ♦ Practical cases presented by experts in Biomedicine
- ♦ The graphic, schematic and eminently practical contents with which it is conceived gather scientific and practical information on those disciplines that are indispensable 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



A 100% online program where you decide. We provide you with all the content and the best tools, but you set the pace"

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An opportunity to access the best program from the best experts and with the guarantee offered by a university with years of experience in online teaching of the highest quality”

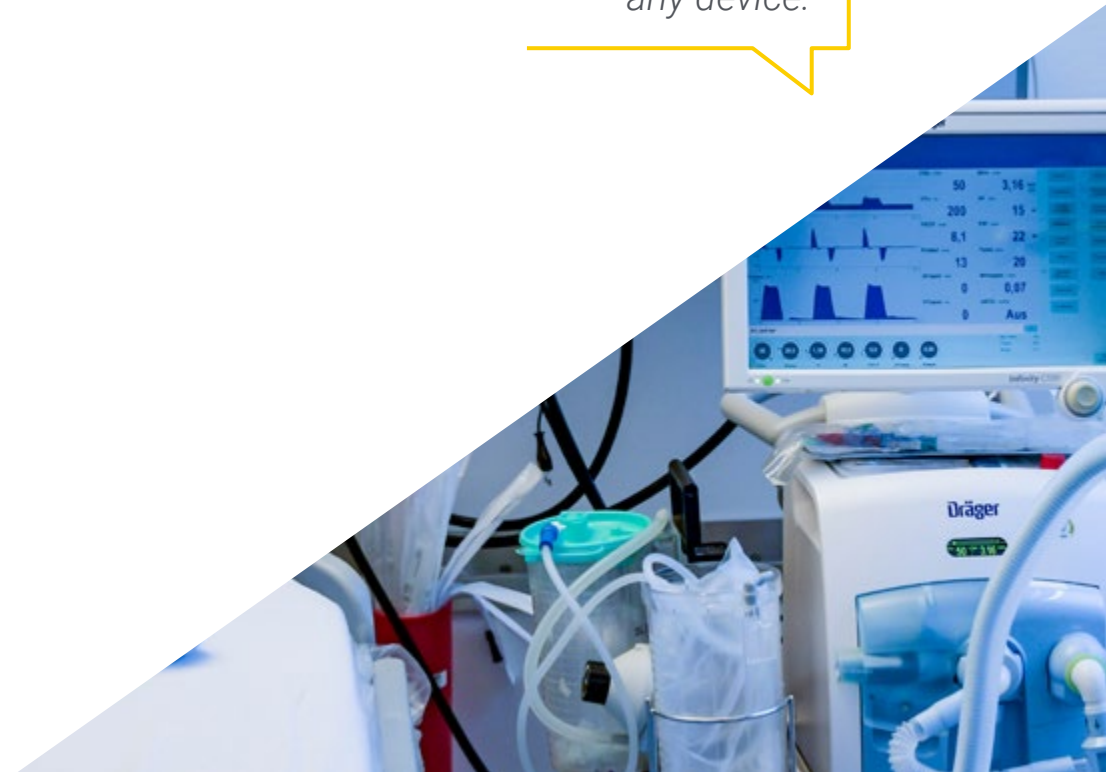
The program's teaching staff includes professionals from the sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

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

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

Enter the world of prototyping and interface evaluation and delve into the techniques of organizing ideas and the importance of User Experience (UX).

You will have all the content from the very beginning. In addition, you will be able to access the virtual classroom and download the entire program from any device.



02 Objectives

Although it may seem that the subject of this Postgraduate Certificate is more oriented towards engineering rather than medicine, TECH's objective is for the medical specialist to understand the necessary concepts that will allow them to develop and actively participate in the process of designing and creating biomedical interfaces. This way, the result will be more promising and productive as they will be able to provide their own user experience and improve the software or applications they are working on.



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A 100% online program that aims to have a positive impact on the specialist's professional career, providing them with the essential concepts that allow them to develop in the world of design and creation of biomedical interfaces"



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





Specific Objectives

- Develop the concept of human-machine interaction
- Analyze interface typologies and their adaptation to each context
- Identify the human and technological factors involved in the interaction process
- Examine design theory and its application to interface design
- Deepen UX/UI tools in the design process
- Establish methods for evaluating and validating interfaces
- Training in the use of user-centered methodology and *Design Thinking* methodology
- Further study of new technologies and interfaces in the biomedical sector
- Address the importance of user perception in the in-hospital context
- Develop critical interface design skills

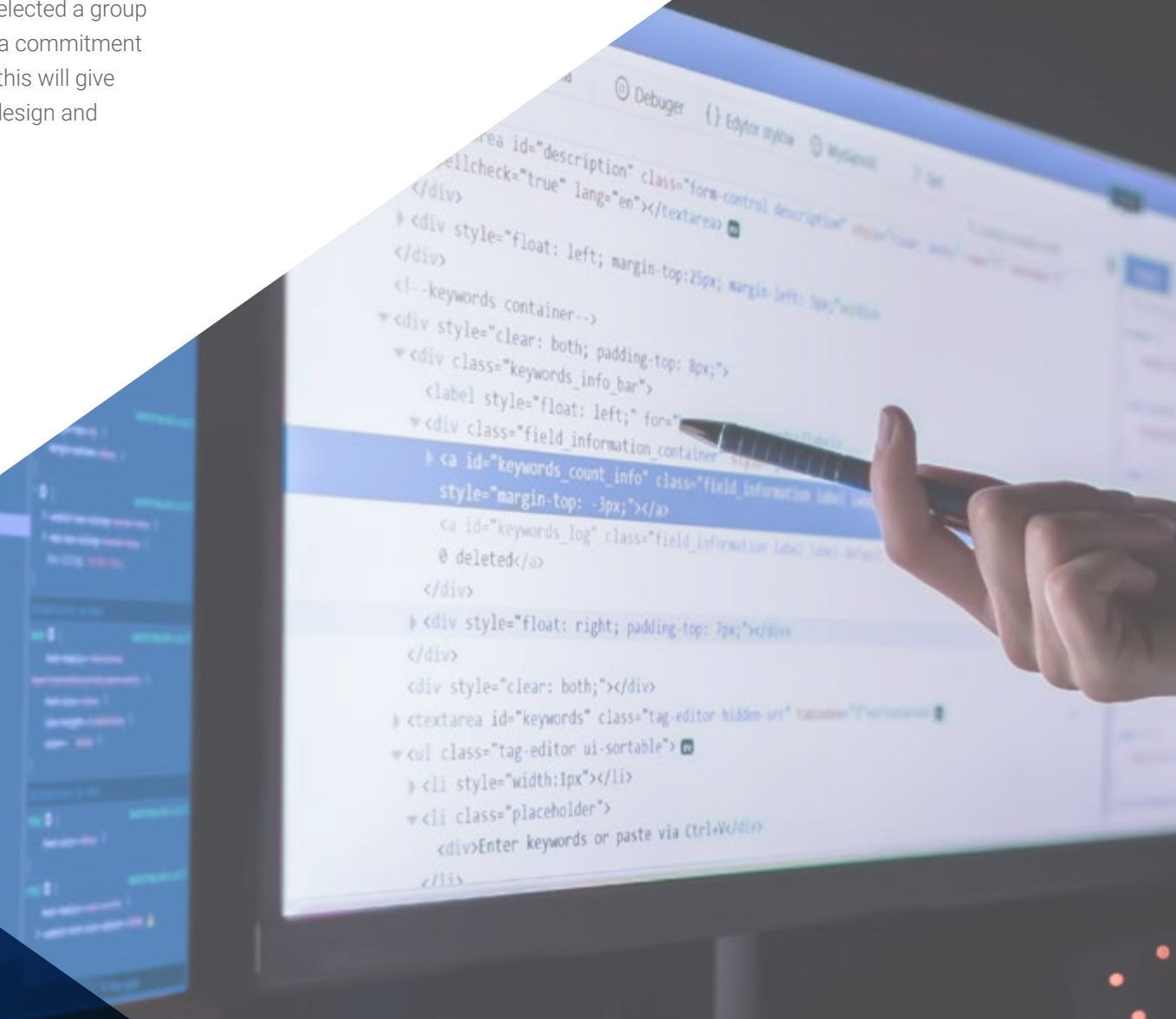


The more demanding your objectives are, the more you will be able to get out of this Postgraduate Certificate"

03

Course Management

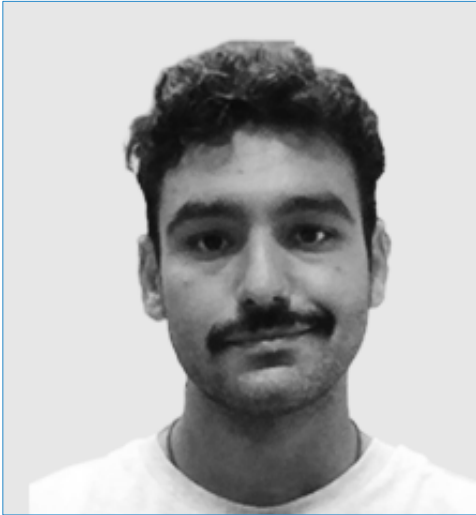
For the management and teaching staff of this program, TECH has selected a group of specialists in the field, with extensive experience in the sector and a commitment to the professional improvement of the graduate. Having a team like this will give the specialist's career the boost they need to become experts in the design and creation of interfaces applied to biomedical engineering.



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The teaching team will be available to guide you to achieve all the goals you set for yourself with this Postgraduate Certificate"

Management



Dr. 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 University de Comillas ICAI.
- ♦ Master's Degree in Biological and Environmental Engineering from the Autonomous University of Barcelona.
- ♦ Master's Degree in Environmental Management from Spanish Open University



Professors

Ms. Baselga Lahoz, Marta

- ♦ R&D Engineer and Technical Engineer in the automotive sector.
- ♦ Design Engineer (UX/UI) in the web development and graphic design sector (Madrid, Spain).
- ♦ Graduated in Industrial Design Engineering and Product Development from the University of Zaragoza, Spain.
- ♦ Professional Master's Degree in Biomedical Engineering from the International University of Valencia (Valencia, Spain).
- ♦ Professional Master's Degree in Design and Management of Technological Projects from the International University of La Rioja (La Rioja, Spain).
- ♦ D. candidate in Biomedical Engineering at the University of Zaragoza, Spain.
- ♦ Doctor of Medicine, University of Zaragoza, Spain.
- ♦ Postgraduate Diploma in Diagnostic Techniques in Health Sciences, Universidad San Jorge (Zaragoza, Spain).

04

Structure and Content

Following TECH's pedagogical line, this Postgraduate Certificate has been designed following the criteria of the teaching team and based on the most modern and effective educational methodology. In addition, thanks to the tools available at this university, the graduate will find an educational experience of the highest quality in all TECH programs, which guarantees the best results with which the specialist will feel satisfied since the progress is visible from the first day.





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You will have additional content of the highest quality: videos, images, dynamic summaries, real case studies and much more!”

Module 1. Human-Machine Interface Applied to Biomedical Engineering

- 1.1. Human-Machine Interface
 - 1.1.1. Human-Machine Interface
 - 1.1.2. Model, System, User, Interface and Interaction
 - 1.1.3. Interface, Interaction and Experience
- 1.2. Human-Machine Interaction
 - 1.2.1. Human-Machine Interaction
 - 1.2.2. Principles and Laws of Interaction Design
 - 1.2.3. Human Factors
 - 1.2.3.1. Importance of the Human Factor in the Interaction Process
 - 1.2.3.2. Psychological-Cognitive Perspective: Information Processing, Cognitive Architecture, User Perception, Memory, Cognitive Ergonomics and Mental Models
 - 1.2.4. Technological factors
 - 1.2.5. Basis of Interaction: Levels and Styles of Interaction
 - 1.2.6. At the Forefront of Interaction
- 1.3. Interface Design (I): Design Process
 - 1.3.1. Design Process
 - 1.3.2. Value Proposition and Differentiation
 - 1.3.3. Requirements Analysis and Briefing
 - 1.3.4. Collection, Analysis and Interpretation of Information
 - 1.3.5. The Importance of UX and UI in the Design Process
- 1.4. Interface Design (II): Prototyping and Evaluation
 - 1.4.1. Prototyping and Evaluation of Interfaces
 - 1.4.2. Methods for the Conceptual Design Process
 - 1.4.3. Techniques for Idea Organization
 - 1.4.4. Prototyping Tools and Process
 - 1.4.5. Evaluation Methods
 - 1.4.6. Evaluation Methods with Users: Interaction Diagrams, Modular Design, Heuristic Evaluation
 - 1.4.7. Evaluation Methods Without Users: Surveys and Interviews, Card Sorting, A/B Testing and Experiment Design
 - 1.4.8. Applicable ISO Norms and Standards
- 1.5. User Interfaces (I): Interaction Methods in Today's Technologies
 - 1.5.1. User Interface (UI)
 - 1.5.2. Classical User Interfaces: Graphical User Interfaces (GUIs), Web, Touch, Voice, etc.
 - 1.5.3. Human Interfaces and Limitations: Visual, Hearing, Motor and Cognitive Diversity
 - 1.5.4. Innovative User Interfaces: Virtual Reality, Augmented Reality, Collaborative
- 1.6. User Interfaces (II): Interaction Design
 - 1.6.1. The Importance of Graphic Design
 - 1.6.2. Design Theory
 - 1.6.3. Design Rules: Morphological Elements, Wireframes, Use and Color Theory, Graphic Design Techniques, Iconography, Typography
 - 1.6.4. Semiotics Applied to Interfaces
- 1.7. User Experience (I): Methodologies and Design Fundamentals
 - 1.7.1. User Experience(UX)
 - 1.7.2. Evolution of Usability Effort-to-Benefit Ratio
 - 1.7.3. Perception, Cognition and Communication
 - 1.7.3.1. Mental Models
 - 1.7.4. User Focused Design Methodology
 - 1.7.5. Methodology of Design Thinking
- 1.8. The User Experience (II): User Experience Principles
 - 1.8.1. UX Principles
 - 1.8.2. UX Hierarchy: Strategy, Scope, Structure, Skeleton and Visual Component
 - 1.8.3. Usability and Accessibility
 - 1.8.4. Information Architecture: Classification, Labeling, Navigation, and Search Systems
 - 1.8.5. *Affordances & Signifiers*
 - 1.8.6. Heuristics: Heuristics of Understanding, Interaction and Feedback
- 1.9. Interfaces in the Field of Biomedicine (I): the Interaction of the Health Care Worker
 - 1.9.1. Usability in the Intrahospital Context



- 1.9.2. Interaction Processes in Healthcare Technology
- 1.9.3. Health Care Provider and Patient Perception
- 1.9.4. Healthcare Ecosystem: Primary Care Physician Vs. Operating Room Surgeon
- 1.9.5. Interaction of the Healthcare Worker in a Context of Stress
 - 1.9.5.1. ICU Cases
 - 1.9.5.2. The Case of Extreme Circumstances and Emergencies
 - 1.9.5.3. The Case of the Operating Rooms
- 1.9.6. *Open Innovation*
- 1.9.7. Persuasive Design
- 1.10. Interfaces in the Field of Biomedicine (II): Current Overview and Future Trends
 - 1.10.1. Classical Biomedical Interfaces in Healthcare Technologies
 - 1.10.2. Innovative Biomedical Interfaces in Healthcare Technologies
 - 1.10.3. The role of Nanomedicine
 - 1.10.4. Biochips
 - 1.10.5. Electronic Implants
 - 1.10.6. Brain-Computer Interfaces (BCI)



If you have long wanted to direct your career towards the world of interface design in biomedicine, this is your opportunity and TECH is the best option to achieve your goals"

05

Methodology

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

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



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

At TECH, we use the Case Method

What should a professional do in a given situation? Throughout the program, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.



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

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

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

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



Relearning Methodology

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

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

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



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

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

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

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

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



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



Study Material

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

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



Surgical Techniques and Procedures on Video

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



Interactive Summaries

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

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



Additional Reading

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





Expert-Led Case Studies and Case Analysis

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



Testing & Retesting

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



Classes

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



Quick Action Guides

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



06 Certificate

The Postgraduate Certificate in Design and Creation of Human-Machine Interface in Biomedical Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.





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

This private qualification will allow you to obtain a **Postgraduate Certificate in Design and Creation of Human-Machine Interface in Biomedical Engineering** endorsed by **TECH Global University**, the world's largest online university.

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

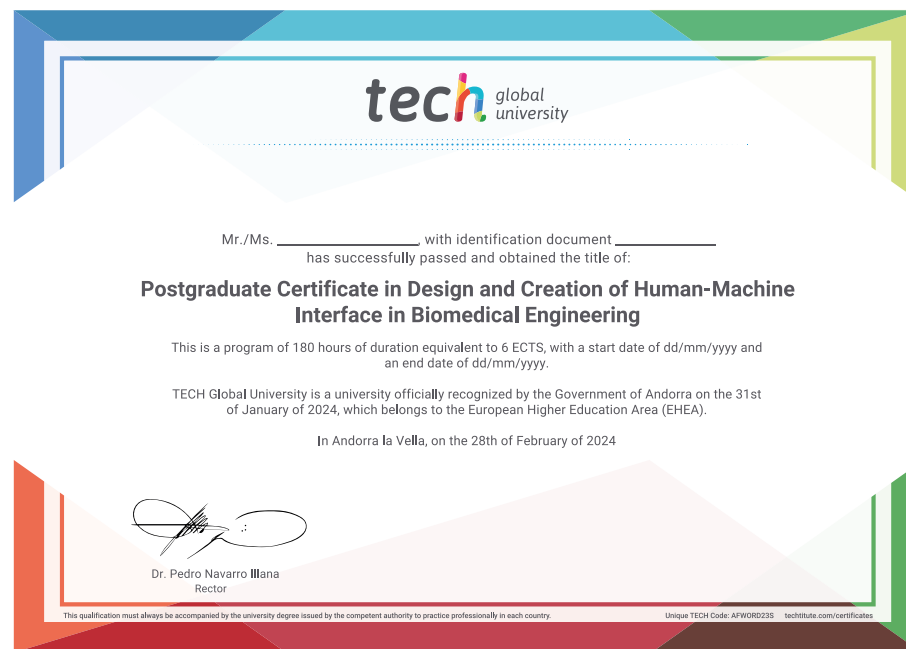
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Design and Creation of Human-Machine Interface in Biomedical Engineering**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



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



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