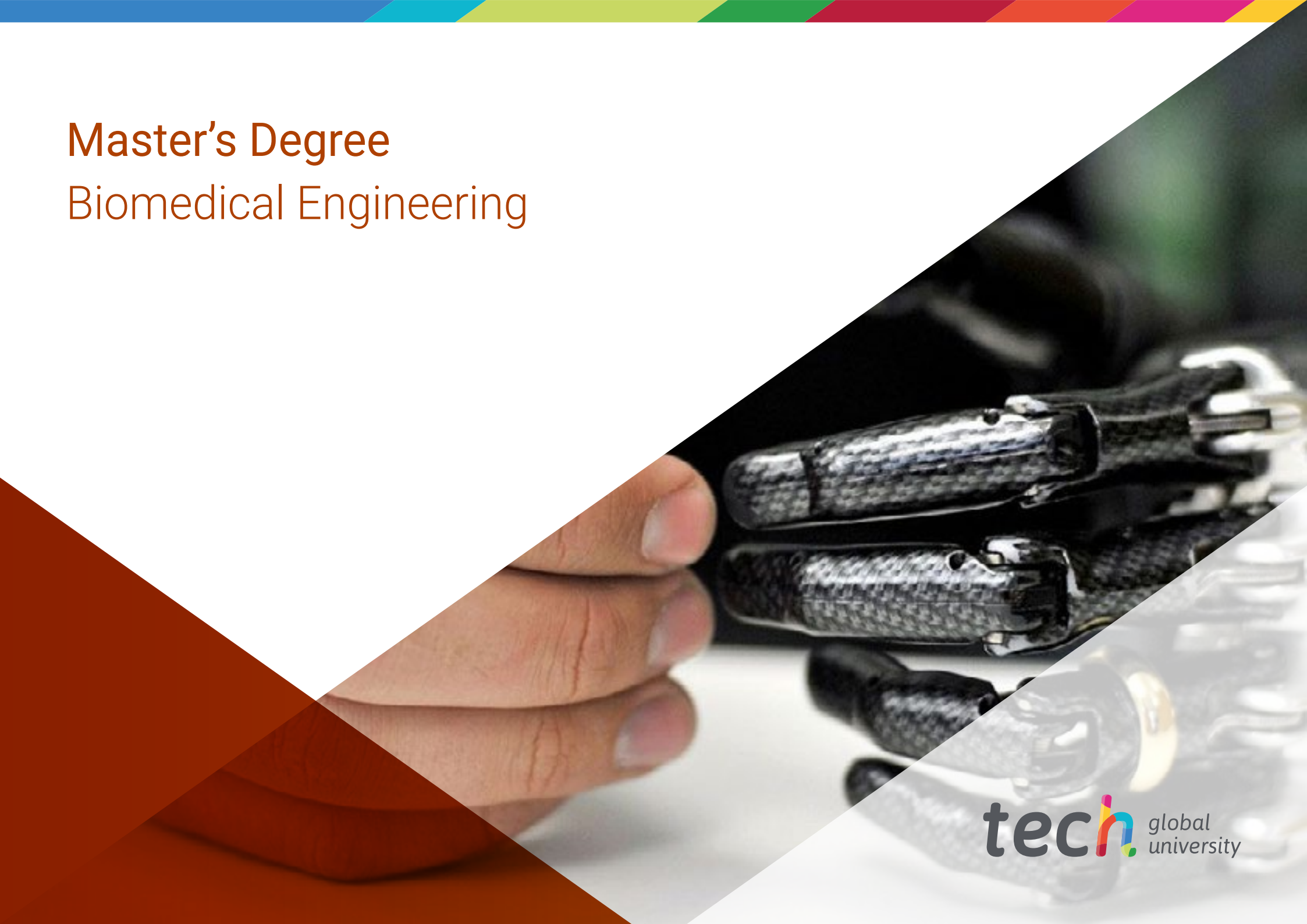
Master's Degree
Biomedical Engineering



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Master's Degree

Biomedical Engineering

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/engineering/master-degree/master-biomedical-engineering**

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01

Introduction

In recent years, numerous techniques have emerged that rely on the latest technological advances to provide physicians with better methods of diagnosis and treatment. As such, biomedical engineering is a growing area of specialization that incorporates knowledge from disciplines such as bioinformatics and medical signals and the management, analysis and statistics of medical and pharmacological data. It has numerous applications in the medical field and more and more specialized services are appearing in this field, which is why professionals are needed to keep up to date with its innovations. This program offers a complete update on this subject, and will delve into aspects such as nanoparticles, methods of human genetic sequence analysis or data mining in Bioinformatics.

Grow as a biomedical engineer and incorporate into your professional practice the latest advances in this booming area, delving into issues such as bionanomaterials"

Biomedical engineering is the next big leap in the healthcare world. This discipline takes advantage of a series of technological and computer tools that have emerged in recent years and applies them to the medical field to achieve more precise diagnoses and treatments. Therefore, it has numerous applications such as micro-implants, nuclear medicine, regenerative tissue growth, artificial vision and robotics. For this reason, it is one of the fields with the greatest present and future, and which requires more qualified professionals.

This Master's Degree in Biomedical Engineering is, therefore, presented as the answer to this situation, since it provides engineers and computer scientists with the latest knowledge in this area. Accordingly, the program will cover aspects such as Tissue Engineering, Nanomedicine, types of biomaterials and their applications, biomedical signals, Digital Radiology or relational databases and their applications in digital health, among many others.

All with the support of a high-level teaching staff, made up of experts in the different areas of biomedical engineering, and through a 100% online teaching system that allows students to balance their professional life with their studies. Furthermore, students will benefit from numerous multimedia resources such as practical exercises, interactive summaries, explanatory videos or master classes. On the other hand, the itinerary counts with the participation of a renowned International Guest Director, who will give 10 exhaustive Masterclasses to delve into the latest trends in the field of Biomedical Engineering.

This **Master's Degree in Biomedical Engineering** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in Biomedical Engineering
- 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 self-assessment can be used 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 prestigious International Guest Director will offer 10 rigorous Masterclasses on the latest advances in the field of Biomedical Engineering"

This program will allow you to get in touch with the most recent scientific and informatics developments in this area, especially in fields such as Biomechanics or biodevices and biosensors"

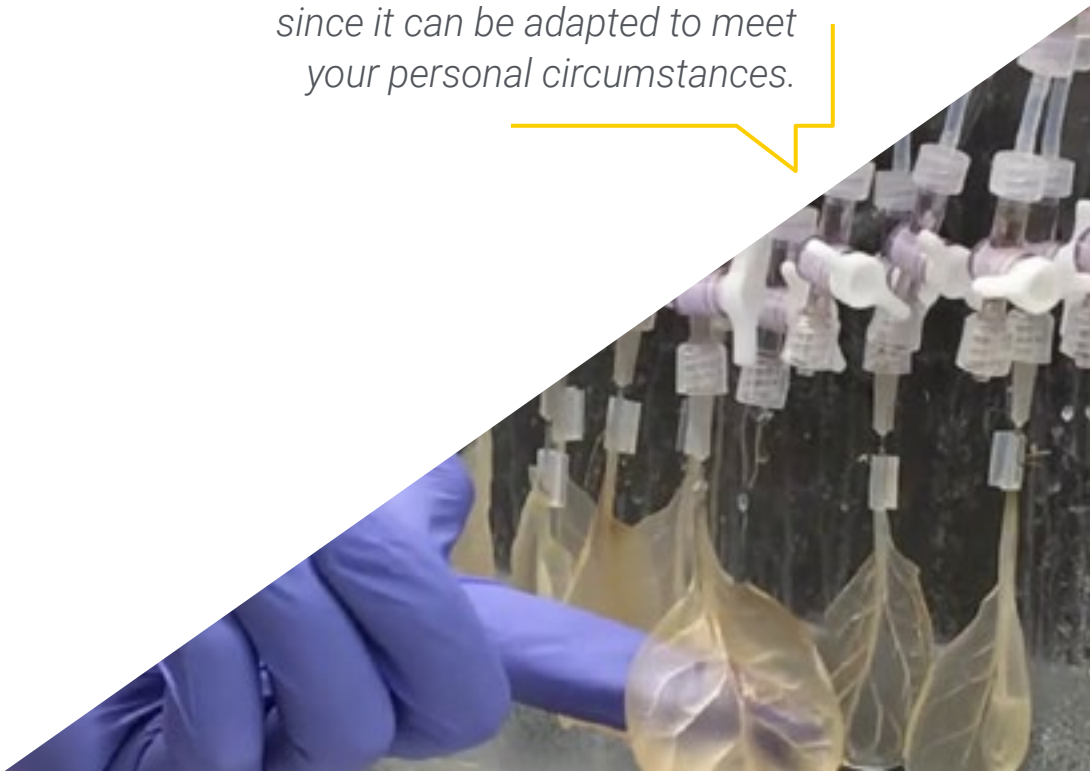
Delve into biomedical signals and their applications, and position yourself as an engineer in high demand by numerous health services.

You will be able to balance your professional career with your studies thanks to TECH's innovative 100% online teaching methodology, since it can be adapted to meet your personal circumstances.

The program's teaching staff includes professionals from the field 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 experts in the field of educational coaching with extensive experience.



02

Objectives

The main objective of this Master's Degree in Biomedical Engineering is to offer engineers and computer scientists the latest advances in this discipline, so that they can incorporate them into their work. As a result, they will improve their professional prospects by becoming up-to-date and highly specialized experts in a booming field, since areas such as biomedical engineering and bioinformatics will be the future of engineering and computer science.

You know biomedical engineering is the future: specialize in this field and immediately improve your career prospects"

General Objectives

- Examine the different tissues and organs directly related to tissue engineering
- Analyze tissue balance and the role of the matrix, growth factors and the cells themselves in the tissue microenvironment
- Cover the fundamentals of tissue engineering
- Analyze the relevance of biomaterials today
- Develop a specialized view of the types of biomaterials available and their main characteristics
- Generate specialized knowledge on cell biology and the interaction between biomaterials and tissues
- 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
- In-depth study of biofluidics and transport systems
- Address real case studies
- 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
- Fundamentals of design theory principles and their application to the biomedical field
- Determine the needs and differences of UX/UI design in the healthcare context
- 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
- Examine the variety and use of biodevices
- Analyze the different data and database systems
- Determine the importance of data in health
- Develop the fundamentals of data analysis

Specific Objectives

Module 1. Tissue Engineering

- Generate specialized knowledge on histology and functioning of the cellular environment
- Review the current status of tissue engineering and regenerative medicine
- Address the main challenges facing tissue engineering
- Present the most promising techniques and the future of tissue engineering
- Develop the main trends of the future of regenerative medicine
- Analyze the regulation of tissue engineered products
- Examine the interaction of biomaterials with the cellular environment and the complexity of this process

Module 2. Biomaterials in Biomedical Engineering

- Analyze biomaterials and their evolution throughout history
- Examine traditional biomaterials and their uses
- Determine the biomaterials of biological origin and their applications
- Deepen the knowledge of polymeric biomaterials of synthetic origin
- Determine the behavior of biomaterials in the human body, with special emphasis on their degradation

Module 3. Biomedical Signals

- 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

Module 4. Biomechanics

- 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

Module 5. Medical Bioinformatics

- Develop a reference framework for medical bioinformatics
- Examine computer hardware and software required in medical bioinformatics
- Generate specialized knowledge on data mining techniques in Bioinformatics
- Analyze artificial intelligence and ig Data techniques in medical bioinformatics
- Establish the applications of bioinformatics for prevention, diagnosis and clinical therapies
- Delve into the methodology and medical bioinformatics workflow
- Assess the factors associated with sustainable bioinformatics applications and future trends

Module 6. Human-Machine Interface Applied to Biomedical Engineering

- 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
- Delve into UX/UI tools in the design process
- Establish methods for evaluating and validating interfaces
- Train 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

Module 7. Biomedical Images

- Develop specialized knowledge about medical imaging as well as the DICOM standard
- Analyze the radiological technique for medical imaging, clinical applications and aspects influencing the outcome
- Examine the technique of magnetic resonance imaging for medical imaging, clinical applications, and aspects influencing outcome
- Analyze the radiological technique for medical imaging, clinical applications and aspects influencing the outcome
- Evaluate the effect of noise on clinical images as well as different image processing methods
- Present and analyze image segmentation technologies and explain their usefulness
- Gain a deeper understanding of the direct relationship between surgical interventions and imaging techniques

Module 8. Digital Health Applications in Biomedical Engineering

- Analyze the referential framework of digital health applications
- Examine medical image storage and transmission systems
- Evaluate relational database management for digital health applications
- Establish the operation of digital health applications based on web development
- Develop web applications in a hospital or clinical center environment and telemedicine applications
- Analyze applications with the Internet of Medical Things, IoMT and digital health applications with artificial intelligence techniques

Module 9. Biomedical Technologies: Biodevices and Biosensors

- Generate specialized knowledge in the conception, design, implementation and operation of medical devices through the technologies used in this field
- Determine the main technologies for rapid prototyping
- Discover the main fields of application: diagnostic, therapeutic and support.
- Establish the different types of biosensors and their use for each diagnostic case
- Deepen the understanding of the physical/electrochemical functioning of the different types of biosensors
- Examine the importance of biosensors in modern medicine

Module 10. Biomedical and Healthcare Databases

- Data Structure
- Analyze Relational Systems
- Develop conceptual data modeling
- Design and standardize a relational database
- Examine functional dependencies between data
- Generate specialized knowledge on Big Data
- Delve into the ODMS architecture
- Learn about data integration in medical record systems
- Analyze the bases and restrictions

03

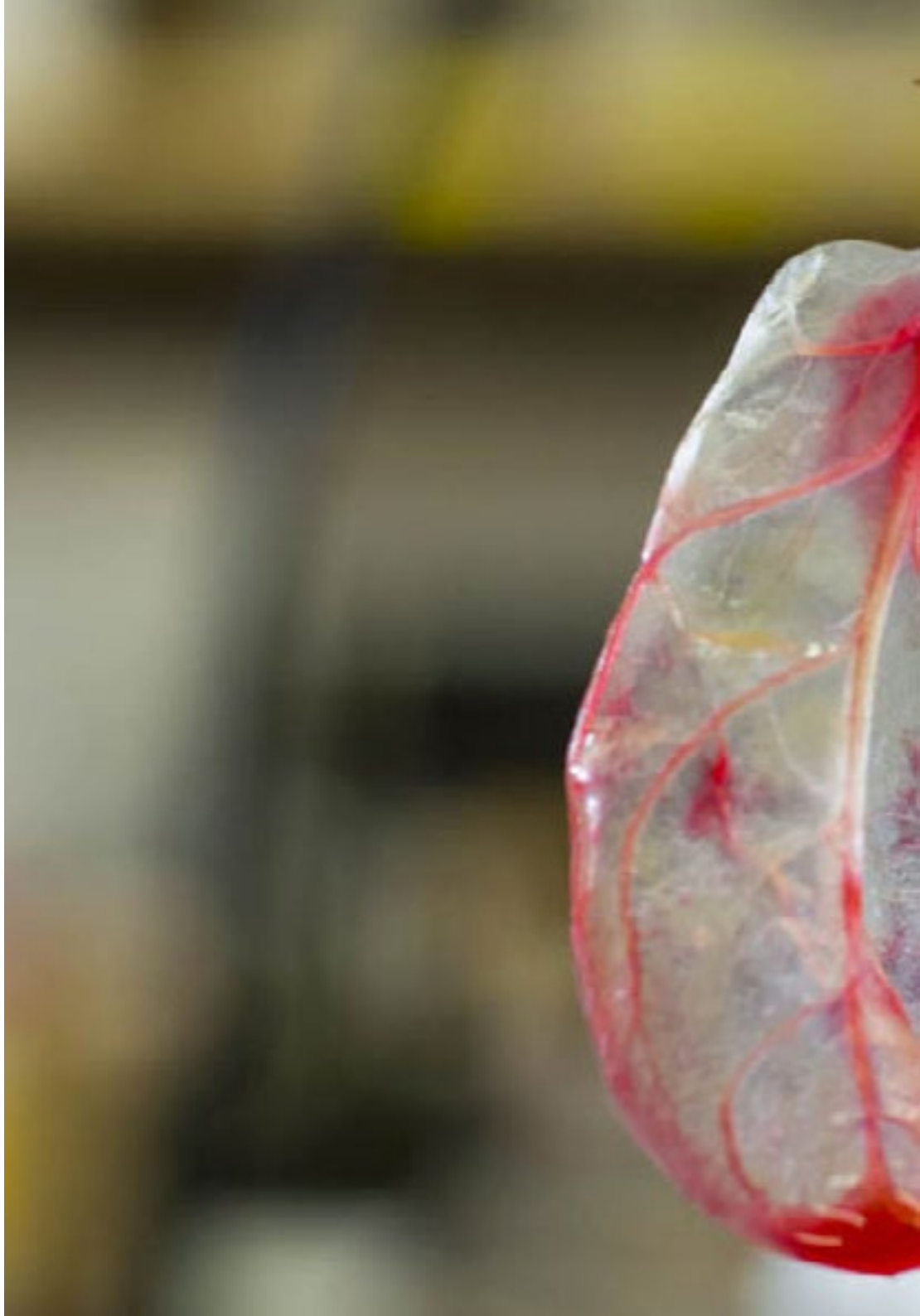
Skills

Throughout this Master's Degree in Biomedical Engineering, the student will be able to develop a series of skills intended to transform them into specialized and updated professionals in this area. Students will learn how to use the most important software and hardware in this field, apply the principles of artificial intelligence to Biomedical Engineering, master the aspects of Nanotechnology and be able to build a biomedical signal processing system, among many other skills and knowledge.

Develop the best skills to become a great biomedical engineer thanks to this Master's Degree"

General Skills

- Develop a global vision of the main techniques and therapies included in the field of Tissue Engineering and Regenerative Medicine.
- Examine the various applications of biomaterials
- Establish the basis for obtaining, synthesizing or producing biomaterials
- Delve into the analysis and processing of biomedical signals
- Utilize computer hardware and software tools for genomic analysis
- Analyze programming languages used for DNA sequence analysis
- Apply the concepts of artificial intelligence and Big Data for use in prevention, diagnosis and medical therapy
- Make use of the workflows that bioinformaticians have in their research and professional fields
- Identify human and technological factors related to interactive system interfaces
- Make use of the different technologies involved in digital health application projects
- Analyze the types of biosensors and their applications
- Build a hospital database
- Establish how clinical needs are translated into data
- Discover the uses and potential of medical nanotechnology



Specific Skills

- Integrate the key concepts of tissue engineering and how they are used in different therapies
- Detail the characteristics, synthesis and uses of hydrogels
- Explore advanced biomaterials, both with the use of smart biomaterials and nanomaterials
- Develop specific applications of biomaterials, particularly those for neuroengineering and biomedical machines
- Develop a basic software-based biomedical signal processing system
- Determine the use of the statistical programming language R and the use of the multipurpose programming language Python
- Analyze the performance of human genetic sequence analysis methods
- Analyze ultrasound technique for medical imaging, clinical applications and aspects influencing the outcome
- Develop the technique of computed tomography imaging for medical imaging, clinical applications, and aspects influencing outcome
- Develop the different applications of machine learning and deep learning in pattern recognition in medical images, thereby furthering innovation in the sector
- Determine the main uses of digital health applications with Big Data and the factors associated with sustainable digital health projects and future trends
- Analyze microfabrication and nanofabrication techniques, develop the lab-on-a-chip concept and its impact

04

Course Management

This Master's Degree in Biomedical Engineering has a teaching staff of the highest level composed of professionals and researchers who know the latest developments in this field and who will, in turn, be able to convey the most recent advances to the student. Throughout this program, students will be in contact with leading specialists who will guide them throughout the learning process, guaranteeing a fluid and direct transmission of knowledge.

The best teaching staff is at your disposal: take advantage of this opportunity and progress in the field of biomedical engineering with the best specialists"

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 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, he 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"
- Doctorate 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

Mr. Ruiz Díez, Carlos

- Specialist in Biological and Environmental Engineering
- Researcher at the National Microelectronics Center of the CSIC
- Director of Competitive Engineering Training at ISC
- Volunteer trainer at Caritas Employment Classroom
- Research intern in the Composting Research Group of the Department of Chemical, Biological and Environmental Engineering of the UAB.
- Founder and product developer at NoTime Ecobrand, a fashion and recycling brand
- Development cooperation project manager for the NGO Future Child Africa in Zimbabwe
- Director of the Innovation Department and Founding Member of the Aerodynamic Department team of ICAI Speed Club: Racing Motorcycle Racing Team, Pontificia University de Comillas
- 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

Mr. Rodríguez Arjona, Antonio

- Associate Professional Application Designer, and Clinical and Hospital IT at Dedalus
- Biomedical Engineer and Technical Manager at OMOLOGIC, Homologation and CE Marking
- Technical Engineer at Docriluc
- Digitalization Manager at Earprotech® The In-Ear Experience
- Health and Biomedical Engineer by the University of Malaga.
- Master's Degree in Biomedical Engineering and Digital Health from the University of Seville

Mr. Rubio Bey, Javier

- Pharmacist and Biotechnologist
- Biologics Marketing Trainee in the Special Care Units of GSK Spain
- Pharmacy Assistant at Trébol Pharmacies
- Research Trainee at King's College London
- Hospital Pharmacy Student at La Princesa University Hospital
- Degree in Pharmacy from CEU San Pablo University.
- Degree in Biotechnology from CEU San Pablo University.
- CITIUS Program of Professional Initiation in the Company at the Autonomous University of Madrid
- Degree in Pharmacy, Erasmus Mobility by Semmelweis University. Budapest, Hungary
- Nova Member Certificate by Nova Talent
- EXXITO: Children, Youth and Community Pharmacy, Approach to Most Common Diseases in Youth Population General Council of Pharmaceutical Associations

Ms. Vivas Hernando, Alicia

- Biomedical Engineer Expert in Network Optimization and Design
- Supply Chain and Optimization Analyst at Deloitte, United Kingdom
- Researcher at the Ecole Polytechnique Fédérale in Lausanne, Switzerland
- Researcher in Corporate and International Development at Seguros Santalucía, Spain
- Master's Degree in Materials Science and Engineering from Ecole Polytechnique Fédérale de Lausanne, Switzerland
- Master's Degree in Industrial Engineering from the Universidad Pontificia Comillas, Spain

Ms. Sirera Pérez, Ángela

- Biomedical Engineer expert in Nuclear Medicine and Exoskeleton Design.
- Designer of specific parts for 3D printing at Technadi
- Technician in the Nuclear Medicine Department of the Clinical University of Navarra
- Degree in Biomedical Engineering from the University of Navarra
- MBA and Leadership in Healthcare and Medical Technology Companies

Ms. Travesí Bugallo, Blanca

- Cofounder of U4IMPACT
- Marketing at GIANT HEALTH EVENT
- Coordinator of the Bioengineering course at the Technological Campus of ICAI.
- Degree in Biomedical Engineering from the Polytechnic University of Madrid.
- Master's Degree in Biomedical Engineering from the Polytechnic University of Madrid.
- Master's Degree in Health Technology Innovation by Sorbonne Université

Dr. Baselga Lahoz, Marta

- Member of the Research Group of the Aragón Health Research Institute
- Collaborating researcher at the Institute of Professional Training in Forensic Sciences
- R&D Engineer and Technical Engineer in the automotive sector
- Design Engineer UX/UI in the web development and graphic design sector
- Graduated in Industrial Design Engineering and Product Development from the University of Zaragoza
- Master's Degree in Biomedical Engineering from the International University of Valencia.
- Master's Degree in Design and Management of Technological Projects from the International University of La Rioja
- Postgraduate Diploma in Diagnostic Techniques in Health Sciences from the University of San Jorge

Ms. Ruiz Díez, Sara

- Biomedical Engineer at the Cajal Institute of CSIC
- Mentoring of Excellence for the Development of Female STEM Talent of the Royal Academy of Engineering
- Member of: Neural Rehabilitation Group, Cajal Institute of CSIC.
- Responsible for Illustrations for Short Films on Angiology and Vascular Surgery, by Dr. Ruiz Grande
- Degree in Biomedical Engineering from the Polytechnic University of Madrid.
- Master's Degree in Bioinformatics and Biostatistics in Biomedical Engineering from Oberta de Catalunya University

Dr. Somolinos Simón, Francisco Javier

- Biomedical Engineering Researcher at the Bioengineering and Telemedicine GBT-UPM
- R&D&I Consultant at Evalue Innovation
- Biomedical Engineering Researcher at the Bioengineering and Telemedicine Group of the Polytechnic University of Madrid
- PhD's Degree in Biomedical Engineering from the Polytechnic University of Madrid.
- Graduate in Biomedical Engineering from the Polytechnic University of Madrid.
- Master's Degree in Management and Development of Biomedical Technologies, Carlos III University of Madrid.

Dr. Zavallo, Ana Teresa

- Senior data management analyst at Asphalion
- Analytical development analyst at Craveri
- Galenic development analyst at Craveri
- Technology transfer analyst at Gador
- Regulatory site compliance analyst at Merck
- Ph.D. in Pharmacy from the University of Buenos Aires
- Ph.D. in Biochemistry from the University of Buenos Aires
- Degree in Pharmacy from the University of Buenos Aires
- Degree in in Biochemistry from the University of Buenos Aires
- Specialization in Magistral Formulation from BIOXENTYS
- MBA and Business Leadership in Pharmaceutical Talent from the European University of Madrid
- Postgraduate degree in Pharmaceutical Product Development

Dr. Vásquez Cevallos, Leonel

- Advisor in the Preventive and Corrective Maintenance and Sale of Medical Equipment and Software
- Director of Telemedicine Cayapas Research Project
- Manager of Knowledge Transfer and Knowledge Management at Officegolden
- Received medical imaging equipment maintenance training in Seoul, South Korea
- PhD's Degree in Biomedical Engineering from the Polytechnic University of Madrid
- Master's Degree in Telemedicine and of Bioengineering from the Polytechnic University of Madrid
- Engineer Graduate in Electronics and Telecommunications from the ESPOL University, Ecuador
- Teachers at Polytechnic University of Madrid.
- Professor at the University ESPOL Ecuador
- Professor at the University of Guayaquil.
- Professor at Technological University of Business in Guayaquil.

Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"

05

Structure and Content

The contents of this Master's Degree in Biomedical Engineering have been organized in 10 specialized modules, which will allow students to delve into issues such as gene therapy, different biomaterials, biomaterials applied to Neuroengineering, the capture, analysis and measurement of biomedical signals, fluid mechanics, computation in Medical Biology or the use of the R programming language for data analysis, among many others.

The most up-to-date contents in biomedical engineering are here. Enter the future with this specialized program"

Module 1. Tissue Engineering

1.1. Histology
- 1.1.1. Cellular Organization in Higher Structures: Tissues and Organs
- 1.1.2. Cell Cycle: Tissue Regeneration
- 1.1.3. Regulation: Interaction with the Extracellular Matrix
- 1.1.4. Importance of Histology in Tissue Engineering

1.2. Tissue Engineering
- 1.2.1. Tissue Engineering
- 1.2.2. Scaffolding
  - 1.2.2.1. Properties
  - 1.2.2.2. The Ideal Scaffolding
- 1.2.3. Biomaterials for Tissue Engineering
- 1.2.4. Bioactive Materials
- 1.2.5. Cells

1.3. Stem Cells
- 1.3.1. Stem Cells
  - 1.3.1.1. Potentiality
  - 1.3.1.2. Tests to Evaluate Potentiality
- 1.3.2. Regulation: Niche
- 1.3.3. Types of Stem Cells
  - 1.3.3.1. Embryonic
  - 1.3.3.2. IPS
  - 1.3.3.3. Adult Stem Cells

1.4. Nanoparticles
- 1.4.1. Nanomedicine: Nanoparticles
- 1.4.2. Types of Nanoparticles
- 1.4.3. Methods of Obtaining
- 1.4.4. Bionanomaterials in Tissue Engineering

1.5. Genetic Therapy
- 1.5.1. Genetic Therapy
- 1.5.2. Uses: Gene Supplementation, Cell Replacement, Cellular Reprogramming
- 1.5.3. Vectors for the Introduction of Genetic Material
  - 1.5.3.1. Viral Vectors

1.6. Biomedical Applications of Tissue Engineering Products Regeneration, Grafts and Replacements
- 1.6.1. *Cell Sheet Engineering*
- 1.6.2. Cartilage Regeneration: Joint Repair
- 1.6.3. Corneal Regeneration
- 1.6.4. Skin Grafting for Major Burn Injuries
- 1.6.5. Oncology
- 1.6.6. Bone Replacement

1.7. Biomedical Applications of Tissue Engineering Products. Circulatory, Respiratory and Reproductive System
- 1.7.1. Cardiac Tissue Engineering
- 1.7.2. Hepatic Tissue Engineering
- 1.7.3. Lung Tissue Engineering
- 1.7.4. Reproductive Organs and Tissue Engineering

1.8. Quality Control and Biosecurity
- 1.8.1. NCF Applied to Advanced Therapy Drugs
- 1.8.2. Quality Control
- 1.8.3. Aseptic Processing: Viral and Microbiological Safety
- 1.8.4. Cell Production Unit: Characteristics and Design

1.9. Legislation and Regulation
- 1.9.1. Current Legislation
- 1.9.2. Authorization
- 1.9.3. Regulation of Advanced Therapies

1.10. Future Perspectives
- 1.10.1. Current Status of Tissue Engineering
- 1.10.2. Clinical Needs
- 1.10.3. Main Challenges at Present
- 1.10.4. Focus and Future Challenges

Module 2. Biomaterials in Biomedical Engineering

2.1. Biomaterials
- 2.1.1. Biomaterials
- 2.1.2. Types of Biomaterials and Application
- 2.1.3. Biomaterial Selection

2.2. Metallic Biomaterials
- 2.2.1. Types of Metallic Biomaterials
- 2.2.2. Properties and Current Challenges
- 2.2.3. Applications

2.3. Ceramic Biomaterials
- 2.3.1. Types of Ceramic Biomaterials
- 2.3.2. Properties and Current Challenges
- 2.3.3. Applications

2.4. Natural Polymeric Biomaterials
- 2.4.1. Interaction of Cells With Their Environment
- 2.4.2. Types of Biomaterials of Biological Origin
- 2.4.3. Applications

2.5. Synthetic Polymeric Biomaterials: In Vivo Behavior
- 2.5.1. Biological Response to Foreign Bodies (FBR)
- 2.5.2. In Vivo Behavior of Biomaterials
- 2.5.3. Biodegradation of Polymers Hydrolysis
  - 2.5.3.1. Biodegradation Mechanisms
  - 2.5.3.2. Degradation by Diffusion and Erosion
  - 2.5.3.3. Hydrolysis Rate
- 2.5.4. Specific Applications

2.6. Synthetic Polymeric Biomaterials: Hydrogels
- 2.6.1. Hydrogels
- 2.6.2. Classification of Hydrogels
- 2.6.3. Hydrogel Properties
- 2.6.4. Hydrogel Synthesis
  - 2.6.4.1. Physical Cross-Linking
  - 2.6.4.2. Enzymatic Cross-Linking
  - 2.6.4.3. Physical Cross-Linking
- 2.6.5. Structure and Swelling of Hydrogels
- 2.6.6. Specific Applications

2.7. Advanced Biomaterials: Intelligent Materials
- 2.7.1. Shape Memory Materials
- 2.7.2. Intelligent Hydrogels
  - 2.7.2.1. Thermo-Responsive Hydrogels
  - 2.7.2.2. PH Sensitive Hydrogels
  - 2.7.2.3. Electrically Actuated Hydrogels
- 2.7.3. Electroactive Materials

2.8. Advanced Biomaterials: Nanomaterials
- 2.8.1. Properties
- 2.8.2. Biomedical Applications
  - 2.8.2.1. Biomedical Images
  - 2.8.2.2. Coatings
  - 2.8.2.3. Focused Ligands
  - 2.8.2.4. Stimulus-Sensitive Connections
  - 2.8.2.5. Biomarkers

2.9. Specific Applications: Neuroengineering
- 2.9.1. The Nervous System
- 2.9.2. New Approaches to Standard Biomaterials
  - 2.9.2.1. Soft Biomaterials
  - 2.9.2.2. Bioabsorbable Materials
  - 2.9.2.3. Implantable Materials
- 2.9.3. Emerging Biomaterials Tissue Interaction

2.10. Specific Applications: Biomedical Micromachines
- 2.10.1. Artificial Micronadators
- 2.10.2. Contractile Microactuators
- 2.10.3. Small Scale Manipulation
- 2.10.4. Biological Machines

Module 3. Biomedical Signals

3.1. Biomedical Signals
- 3.1.1. Origin of Biomedical Signals
- 3.1.2. Biomedical Signals
  - 3.1.2.1. Amplitude
  - 3.1.2.2. Period
  - 3.1.2.3. Frequency (F)
  - 3.1.2.4. Wave Length
  - 3.1.2.5. Phase
- 3.1.3. Classification and Examples of Biomedical Signals

3.2. Types of Biomedical Signals. Electrocardiography, Electroencephalography and Magnetoencephalography
- 3.2.1. Electrocardiography (ECG)
- 3.2.2. Electroencephalography (EEG)
- 3.2.3. Magnetoencephalography (MEG)

3.3. Types of Biomedical Signals. Electroneurography and Electromyography
- 3.3.1. Electroneurography (ENG)
- 3.3.2. Electromyography (EMG)
- 3.3.3. Event-Related Potentials (ERPs)
- 3.3.4. Other Types

3.4. Signals and Systems
- 3.4.1. Signals and Systems
- 3.4.2. Continuous and Discrete Signals: Analog vs. Digital
- 3.4.3. Systems in the Time Domain
- 3.4.4. Systems in Frequency Domain. Spectral Method

3.5. Fundamentals of Signals and Systems
- 3.5.1. Sampling: Nyquist
- 3.5.2. The Fourier Transform. DFT
- 3.5.3. Stochastic Processes
  - 3.5.3.1. Deterministic vs. Random Signals
  - 3.5.3.2. Types of Stochastic Processes
  - 3.5.3.3. Stationarity
  - 3.5.3.4. Ergodicity
  - 3.5.3.5. Relationships Between Signals
- 3.5.4. Power Spectral Density

3.6. Processing of Biomedical Signals
- 3.6.1. Processing of Signals
- 3.6.2. Objectives and Processing Steps
- 3.6.3. Key Elements of a Digital Processing System
- 3.6.4. Applications. Trends

3.7. Filtering: Removal of Artifacts
- 3.7.1. Motivation. Types of Filtering
- 3.7.2. Time Domain Filtering
- 3.7.3. Frequency Domain Filtering
- 3.7.4. Applications and Examples

3.8. Time-Frequency Analysis
- 3.8.1. Motivation
- 3.8.2. Time-Frequency Plane
- 3.8.3. Short Time Fourier Transform (STFT)
- 3.8.4. Wavelet Transform
- 3.8.5. Applications and Examples

3.9. Event Detection
- 3.9.1. Study Case I: ECG
- 3.9.2. Study Case II: EEG
- 3.9.3. Evaluation of Detection

3.10. Software for Biomedical Signal Processing
- 3.10.1. Applications, Environments and Programming Languages
- 3.10.2. Libraries and Tools
- 3.10.3. Practical Application: Basic Biomedical Signal Processing System

Module 4. Biomechanics

4.1. Biomechanics
- 4.1.1. Biomechanics
- 4.1.2. Qualitative and Quantitative Analysis

4.2. Basic Mechanics
- 4.2.1. Functional Mechanisms
- 4.2.2. Basic Units
- 4.2.3. The Nine Fundamentals of Biomechanics

4.3. Mechanical Fundamentals. Linear and Angular Kinematics
- 4.3.1. Linear Movement
- 4.3.2. Relative Movement
- 4.3.3. Angular Movement

4.4. Mechanical Fundamentals. Linear Kinetics
- 4.4.1. Newton's Law
- 4.4.2. Principle of Inertia
- 4.4.3. Energy and Work
- 4.4.4. Stress Angle Analysis

4.5. Mechanical Fundamentals. Angular Kinetics
- 4.5.1. Torque
- 4.5.2. Angular Momentum
- 4.5.3. Newton's Angles
- 4.5.4. Balance and Gravity

4.6. Fluid Mechanics
- 4.6.1. Fluid
- 4.6.2. Flows
  - 4.6.2.1. Laminar Flow
  - 4.6.2.2. Turbulent Flow
  - 4.6.2.3. Pressure-Velocity: the Venturi Effect
- 4.6.3. Forces in Fluids

4.7. Human Anatomy: Limitation
- 4.7.1. Human Anatomy
- 4.7.2. Muscles: Active and Passive Tension
- 4.7.3. Mobility Range
- 4.7.4. Mobility-Strength Principles
- 4.7.5. Limitations in the Analysis

4.8. Mechanisms of the Motor System. Bone, Muscle-Tendon and Ligament Mechanics
- 4.8.1. Tissue Functioning
- 4.8.2. Biomechanics of Bones
- 4.8.3. Biomechanics of the Muscle-Tendon Unit
- 4.8.4. Biomechanics of Ligaments

4.9. Mechanisms of the Motor System. Mechanics of Muscles
- 4.9.1. Mechanical Characteristics of Muscles
  - 4.9.1.1. Force-Speed Relationship
  - 4.9.1.2. Force-Distance Relationship
  - 4.9.1.3. Force-Time Relationship
  - 4.9.1.4. Traction-Compression Cycles
  - 4.9.1.5. Neuromuscular Control
  - 4.9.1.6. The Spine and Backbone

4.10. Mechanics of Biofluids
- 4.10.1. Mechanics of Biofluids
  - 4.10.1.1. Transport, Stress and Pressure
  - 4.10.1.2. The Circulatory System
  - 4.10.1.3. Blood Characteristics
- 4.10.2. General Problems in Biomechanics
  - 4.10.2.1. Problems in Nonlinear Mechanical Systems
  - 4.10.2.2. Problems in Biofluidics
  - 4.10.2.3. Solid-Liquid Problems

Module 5. Medical Bioinformatics

5.1. Medical Bioinformatics
- 5.1.1. Computing in Medical Biology
- 5.1.2. Medical Bioinformatics
  - 5.1.2.1. Bioinformatic Applications
  - 5.1.2.2. Computer Systems, Networks and Medical Databases
  - 5.1.2.3. Applications of Medical Bioinformatics in Human Health

5.2. Computer Equipment and Software Required in Bioinformatics
- 5.2.1. Scientific Computing in Biological Sciences
- 5.2.3. The Computer
- 5.2.4. Hardware, Software and Operating Systems
- 5.2.5. Workstations and Personal Computers
- 5.2.6. High-Performance Computing Platforms and Virtual Environments
- 5.2.7. Linux Operating System
  - 5.2.7.1. Linux Installation
  - 5.2.7.2. Using the Linux Command Line Interface

5.3. Data Analysis Using R Programming Language
- 5.3.1. Language R Statistical Programming
- 5.3.2. Installation and Uses of R
- 5.3.3. Data Analysis Methods With R
- 5.3.4. R Applications in Medical Bioinformatics

5.4. Data Analysis Using R Programming Language
- 5.4.1. Multipurpose Programming Language Python
- 5.4.2. Installation and Uses of Python
- 5.4.3. Data Analysis Methods With Python
- 5.4.4. Python Applications in Medical Bioinformatics

5.5. Methods of Human Genetic Sequence Analysis
- 5.5.1. Human Genetics
- 5.5.2. Techniques and Methods for Sequencing Analysis of Genomic Data
- 5.5.3. Sequence Alignments
- 5.5.4. Tools for Detection, Comparison and Modeling of Genomes

5.6. Data Mining in Bioinformatics
- 5.6.1. Phases of Knowledge Discovery in Databases, KDD
- 5.6.2. Processing Techniques
- 5.6.3. Knowledge Discovery in Biomedical Databases
- 5.6.4. Human Genomics Data Analysis

5.7. Artificial Intelligence and Big Data Techniques in Medical Bioinformatics
- 5.7.1. Machine Learning for Medical Bioinformatics
  - 5.7.1.1. Supervised Learning: Regression and Classification
  - 5.7.1.2. Unsupervised Learning: Clustering and Association Rules
- 5.7.2. *Big Data*
- 5.7.3. Computing Platforms and Development Environments

5.8. Applications of Bioinformatics for Prevention, Diagnosis and Clinical Therapies
- 5.8.1. Disease-Causing Gene Identification Procedures
- 5.8.2. Procedure to Analyze and Interpret the Genome for Medical Therapies
- 5.8.3. Procedures to Assess Genetic Predispositions of Patients for Prevention and Early Diagnosis

5.9. Medical Bioinformatics Workflow and Methodology
- 5.9.1. Creation of Workflows to Analyze Data
- 5.9.2. Application Programming Interfaces, APIs
  - 5.9.2.1. R and Python Libraries for Bioinformatics Analysis
  - 5.9.2.2. Bioconductor: Installation and Uses
- 5.9.3. Uses of Bioinformatics Workflows in Cloud Services

5.10. Factors Associated with Sustainable Bioinformatics Applications and Future Trends
- 5.10.1. Legal and Regulatory Framework
- 5.10.2. Best Practices in the Development of Medical Bioinformatics Projects
- 5.10.3. Future Trends in Bioinformatics Applications

Module 6. Human-Machine Interface Applied to Biomedical Engineering

6.1. Human-Machine Interface
- 6.1.1. Human-Machine Interface
- 6.1.2. Model, System, User, Interface and Interaction
- 6.1.3. Interface, Interaction and Experience

6.2. Human-Machine Interaction
- 6.2.1. Human-Machine Interaction
- 6.2.2. Principles and Laws of Interaction Design
- 6.2.3. Human Factors
  - 6.2.3.1. Importance of the Human Factor in the Interaction Process
  - 6.2.3.2. Psychological-Cognitive Perspective: Information Processing, Cognitive Architecture, User Perception, Memory, Cognitive Ergonomics and Mental Models
- 6.2.4. Technological Factors
- 6.2.5. Basis of Interaction: Levels and Styles of Interaction
- 6.2.6. At the Forefront of Interaction

6.3. Interface Design (I): Design Process
- 6.3.1. Design Process
- 6.3.2. Value Proposition and Differentiation
- 6.3.3. Requirements Analysis and Briefing
- 6.3.4. Collection, Analysis and Interpretation of Information
- 6.3.5. The Importance of UX and UI in the Design Process

6.4. Interface Design (II): Prototyping and Evaluation
- 6.4.1. Interface Prototyping and Evaluation
- 6.4.2. Methods for the Conceptual Design Process
- 6.4.3. Techniques for Idea Organization
- 6.4.4. Prototyping Tools and Process
- 6.4.5. Evaluation Methods
- 6.4.6. Evaluation Methods with Users: Interaction Diagrams, Modular Design, Heuristic Evaluation
- 6.4.7. User-Free Evaluation Methods: Surveys and Interviews, Card Sorting, A/B Testing and Design of Experiments
- 6.4.8. Applicable ISO Norms and Standards

6.5. User Interfaces (I): Interaction Methods in Today's Technologies
- 6.5.1. User Interface (UI)
- 6.5.2. Classical User Interfaces: Graphical User Interfaces (GUIs), Web, Touch, Voice, etc.
- 6.5.3. Human Interfaces and Limitations: Visual, Hearing, Motor and Cognitive Diversity
- 6.5.4. Innovative User Interfaces: Virtual Reality, Augmented Reality, Collaborative

6.6. User Interfaces (II): Interaction Design
- 6.6.1. The Importance of Graphic Design
- 6.6.2. Design Theory
- 6.6.3. Design Rules: Morphological Elements, Wireframes, Use and Theory of Color, Graphic Design Techniques, Iconography, Typography
- 6.6.4. Semiotics Applied to Interfaces

6.7. User Experience (I): Methodologies and Design Fundamentals
- 6.7.1. User Experience(UX)
- 6.7.2. Evolution of Usability Effort-to-Benefit Ratio
- 6.7.3. Perception, Cognition and Communication
  - 6.7.3.1. Mental Models
- 6.7.4. User Focused Design Methodology
- 6.7.5. Methodology of Design Thinking

6.8. The User Experience (II): User Experience Principles
- 6.8.1. UX Principles
- 6.8.2. UX Hierarchy: Strategy, Scope, Structure, Skeleton and Visual Component
- 6.8.3. Usability and Accessibility
- 6.8.4. Information Architecture: Classification, Labeling, Navigation, and Search Systems
- 6.8.5. *Affordances & Signifiers*
- 6.8.6. Heuristics: Heuristics of Understanding, Interaction and Feedback

6.9. Interfaces in the Field of Biomedicine (I): the Interaction of the Health Care Worker
- 6.9.1. Usability in the Intrahospital Context
- 6.9.2. Interaction Processes in Healthcare Technology
- 6.9.3. Health Care Provider and Patient Perception
- 6.9.4. Healthcare Ecosystem: Primary Care Physician vs. Operating Room Surgeon
- 6.9.5. Interaction of the Healthcare Worker in a Context of Stress
  - 6.9.5.1. ICU Cases
  - 6.9.5.2. The Case of Extreme Circumstances and Emergencies
  - 6.9.5.3. The Case of the Operating Rooms
- 6.9.6. *Open Innovation*
- 6.9.7. Persuasive Design

6.10. Interfaces in the Field of Biomedicine (II): Current Outlook and Future Trends
- 6.10.1. Classical Biomedical Interfaces in Healthcare Technologies
- 6.10.2. Innovative Biomedical Interfaces in Healthcare Technologies
- 6.10.3. The Role of Nanomedicine
- 6.10.4. Biochips
- 6.10.5. Electronic Implants
- 6.10.6. Brain-Computer Interfaces (BCI)

Module 7. Biomedical Images

7.1. Biomedical Images
- 7.1.1. Medical Images
- 7.1.2. Objectives of Imaging Systems in Medicine
- 7.1.3. Types of Images

7.2. Radiology
- 7.2.1. Radiology
- 7.2.2. Conventional Radiology
- 7.2.3. Digital Radiology

7.3. Ultrasound
- 7.3.1. Medical Images With Ultrasound
- 7.3.2. Training and Image Quality
- 7.3.3. Doppler Ultrasound
- 7.3.4. Implementation and New Technologies

7.4. Computerized Tomography
- 7.4.1. CT Imaging Systems
- 7.4.2. Reconstruction and CT Image Quality
- 7.4.3. Clinical Applications

7.5. Magnetic Resonance
- 7.5.1. Magnetic Resonance Imaging (MRI)
- 7.5.2. Resonance and Nuclear Magnetic Resonance
- 7.5.3. Nuclear Relaxation
- 7.5.4. Tissue Contrast and Clinical Applications

7.6. Nuclear Medicine
- 7.6.1. Generation and Image Detection
- 7.6.2. Image Quality
- 7.6.3. Clinical Applications

7.7. Image Processing
- 7.7.1. Noise
- 7.7.2. Intensification
- 7.7.3. Histograms
- 7.7.4. Magnification
- 7.7.5. Processing

7.8. Analysis and Image Segmentation
- 7.8.1. Segmentation
- 7.8.2. Segmentation by Regions
- 7.8.3. Edge Detection Segmentation
- 7.8.4. Generation of Biomodels From Images

7.9. Image-Guided Interventions
- 7.9.1. Visualization Methods
- 7.9.2. Image-Guided Surgeries
  - 7.9.2.1. Planning and Simulation
  - 7.9.2.2. Surgical Visualization
  - 7.9.2.3. Virtual Reality
- 7.9.3. Robotic Vision

7.10. Deep Learning and Machine Learning in Medical Imaging
- 7.10.1. Types of Recognition
- 7.10.2. Supervised Techniques
- 7.10.3. Unsupervised Techniques

Module 8. Digital Health Applications in Biomedical Engineering

8.1. Digital Health Applications
- 8.1.1. Medical Hardware and Software Applications
- 8.1.2. Software Applications: Digital Health Systems
- 8.1.3. Usability of Digital Health Systems

8.2. Medical Image Storage and Transmission Systems
- 8.2.1. Image Transmission Protocol: DICOM
- 8.2.2. Medical Image Storage and Transmission Server Installation: PAC System

8.3. Relational Database Management for Digital Health Applications
- 8.3.1. Relational Database, Concept and Examples
- 8.3.2. Database Language
- 8.3.3. Database With MySQL and PostgreSQL
- 8.3.4. Applications: Connection and Uses in Web Programming Language

8.4. Digital Health Applications Based on Web Development
- 8.4.1. Web Application Development
- 8.4.2. Web Development Model, Infrastructure, Programming Languages and Working Environments
- 8.4.3. Examples of Web Applications With the Languages: PHP, HTML, AJAX, CSS Javascript, AngularJS, NodeJS
- 8.4.4. Development of Applications in Web Frameworks: Symfony and Laravel
- 8.4.5. Development of Applications in Content Management Systems (CMS): Joomla and WordPress

8.5. WEB Applications in a Hospital Environment or Clinical Center
- 8.5.1. Applications for Patient Management: Reception, Scheduling, and Billing
- 8.5.2. Applications for Medical Professionals: Consultations or Medical Care, Medical History, Reports, etc.
- 8.5.3. Web and Mobile Applications for Patients: Scheduling Requests, Monitoring, etc.

8.6. Telemedicine Applications
- 8.6.1. Service Architecture Models
- 8.6.2. Telemedicine Applications: Teleradiology, Telecardiology and Teledermatology
- 8.6.3. Rural Telemedicine

8.7. Applications With the Internet of Medical Things, IoMT
- 8.7.1. Models and Architectures
- 8.7.2. Medical Data Acquisition Equipment and Protocols
- 8.7.3. Applications: Patient Monitoring

8.8. Digital Health Applications Using Artificial Intelligence Techniques
- 8.8.1. Machine Learning
- 8.8.2. Computing Platforms and Development Environments
- 8.8.3. Examples

8.9. Digital Health Applications with Big Data
- 8.9.1. Digital Health Applications with Big Data
- 8.9.2. Technologies Used in Big Data
- 8.9.3. Use Cases of Big Data in Digital Health

8.10. Factors Associated With Sustainable Digital Health Applications and Future Trends
- 8.10.1. Legal and Regulatory Framework
- 8.10.2. Best Practices in the Development of Digital Health Application Projects
- 8.10.3. Future Trends in Digital Health Applications

Module 9. Biomedical Technologies: Biodevices and Biosensors

9.1. Medical Devices
- 9.1.1. Product Development Methodology
- 9.1.2. Innovation and Creativity
- 9.1.3. CAD Technologies

9.2. Nanotechnology
- 9.2.1. Medical Nanotechnology
- 9.2.2. Nanostructured Materials
- 9.2.3. Nano-Biomedical Engineering

9.3. Micro and Nanofabrication
- 9.3.1. Design of Micro and Nano Products
- 9.3.2. Techniques
- 9.3.3. Tools for Manufacturing

9.4. Prototypes
- 9.4.1. Additive Manufacturing
- 9.4.2. Rapid Prototyping
- 9.4.3. Classification
- 9.4.4. Applications
- 9.4.5. Study Cases
- 9.4.6. Conclusions

9.5. Diagnostic and Surgical Devices
- 9.5.1. Development of Diagnostic Methods
- 9.5.2. Surgical Planning
- 9.5.3. Biomodels and Instruments Made With 3D Printing
- 9.5.4. Device-Assisted Surgery

9.6. Biomechanic Devices
- 9.6.1. Prosthetists
- 9.6.2. Intelligent Materials
- 9.6.3. Orthotics

9.7. Biosensors
- 9.7.1. Biosensor
- 9.7.2. Sensing and Transduction
- 9.7.3. Medical Instrumentation for Biosensors

9.8. Types of Bio-Sensors (I): Optic Sensors
- 9.8.1. Reflectometry
- 9.8.2. Interferometry and Polarimetry
- 9.8.3. Evanescent Field
- 9.8.4. Fiber Optic Probes and Guides

9.9. Types of Bio-Sensors (II): Physical, Electrochemical and Acoustic Sensors
- 9.9.1. Physical Sensors
- 9.9.2. Electrochemical Sensors
- 9.9.3. Acoustic Sensors

9.10. Integrated Systems
- 9.10.1. *Lab-On-A-Chip*
- 9.10.2. Microfluidics
- 9.10.3. Medical Application

Module 10. Biomedical and Healthcare Databases

10.1. Hospital Databases
- 10.1.1. Data Bases
- 10.1.2. The Importance of Data
- 10.1.3. Data in a Clinical Context

10.2. Conceptual Modeling
- 10.2.1. Data Structure
- 10.2.2. Systematic Data Model
- 10.2.3. Data Standardization

10.3. Relational Data Model
- 10.3.1. Advantages and Disadvantages
- 10.3.2. Formal Languages

10.4. Designing from Relational Databases
- 10.4.1. Functional Dependence
- 10.4.2. Relational Forms
- 10.4.3. Standardization

10.5. SQL Language
- 10.5.1. Relational Model
- 10.5.2. Object-Relationship Model
- 10.5.3. XML- Object-Relationship Model

10.6. NoSQL
- 10.6.1. JSON
- 10.6.2. NoSQL
- 10.6.3. Differential Amplifiers
- 10.6.4. Integrators and Differentiators

10.7. MongoDB
- 10.7.1. ODMS Architecture
- 10.7.2. NodeJS
- 10.7.3. Mongoose
- 10.7.4. Aggregation

10.8. Data Analysis
- 10.8.1. Data Analysis
- 10.8.2. Qualitative Analysis
- 10.8.3. Quantitative Analysis

10.9. Legal Bases and Regulatory Standards
- 10.9.1. General Data Protection Regulation
- 10.9.2. Cybersecurity Considerations
- 10.9.3. Regulations Applied to Health Data

10.10. Integration of Databases in Medical Records
- 10.10.1. Medical History
- 10.10.2. HIS Systems
- 10.10.3. HIS Data

This program offers you the most advanced content, the most expert faculty and a unique teaching methodology for you to become a great biomedical engineer"

06

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 quality of teaching, quality of materials, course structure and objectives is excellent. Not surprisingly, the institution became the best rated university by its students on the Trustpilot review platform, 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.

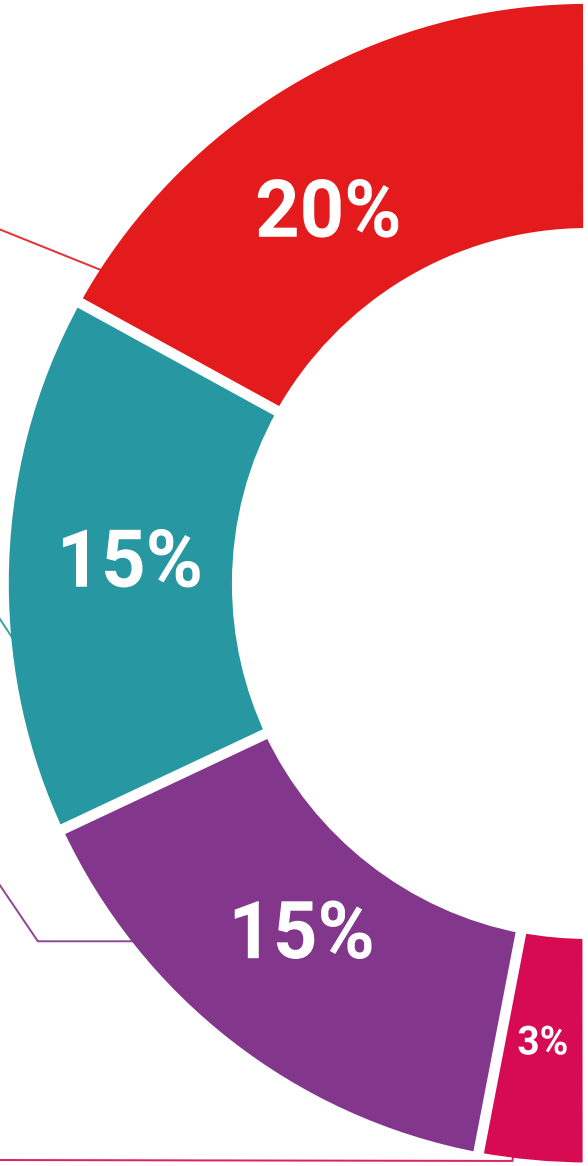
Interactive Summaries

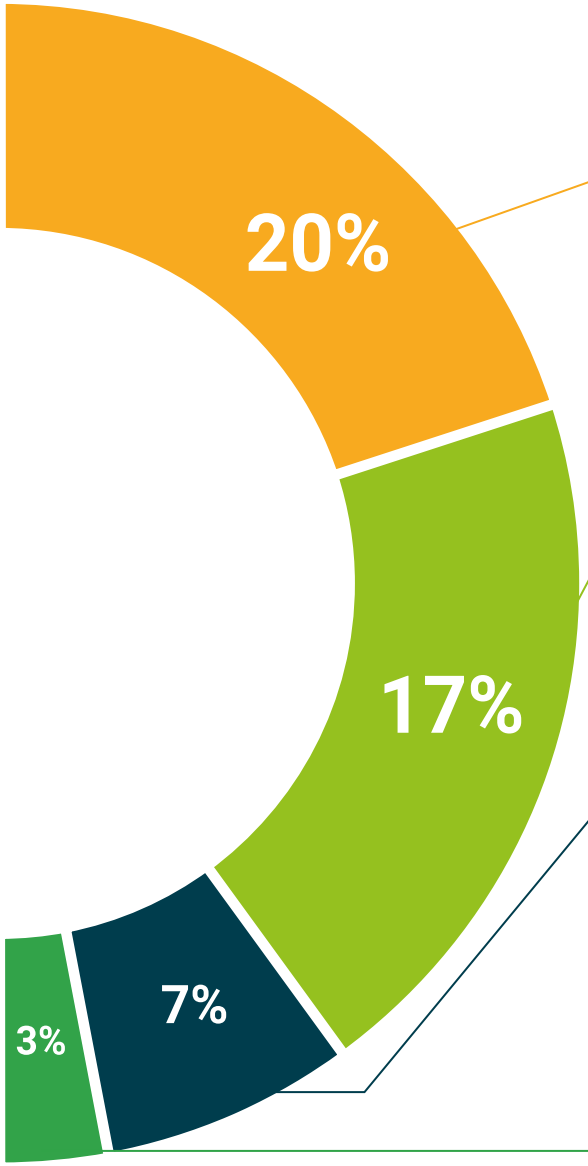
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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.

07

Certificate

The Master's Degree in Biomedical Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a qualification issued by TECH Global University.

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 **Master's Degree diploma 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** 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: **Master's Degree in Biomedical Engineering**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**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Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Master's Degree in Biomedical Engineering

This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

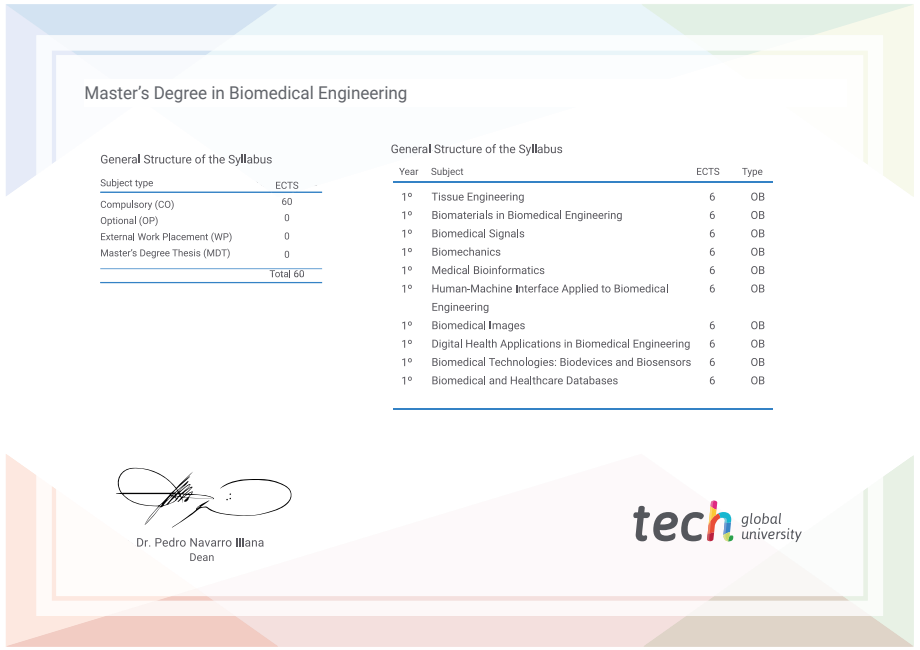
TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

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


Master's Degree in Biomedical Engineering

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 60

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Tissue Engineering	6	OB
1º	Biomaterials in Biomedical Engineering	6	OB
1º	Biomedical Signals	6	OB
1º	Biomechanics	6	OB
1º	Medical Bioinformatics	6	OB
1º	Human-Machine Interface Applied to Biomedical Engineering	6	OB
1º	Biomedical Images	6	OB
1º	Digital Health Applications in Biomedical Engineering	6	OB
1º	Biomedical Technologies: Biodevices and Biosensors	6	OB
1º	Biomedical and Healthcare Databases	6	OB

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*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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Master's Degree
Biomedical Engineering

- Modality: **online**
- Duration: **12 months.**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Master's Degree
Biomedical Engineering

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