Postgraduate Diploma

Diagnostic Engineering and Clinical Monitoring

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Postgraduate Diploma
Diagnostic Engineering and Clinical Monitoring

Course Modality: **Online**

Duration: **6 months.**

Certificate: **TECH Technological University**

Official Nº of hours: **450 h.**

Website: **www.techtitute.com/in/engineering/postgraduate-diploma/postgraduate-diploma-diagnostic-engineering-clinical-monitoring**

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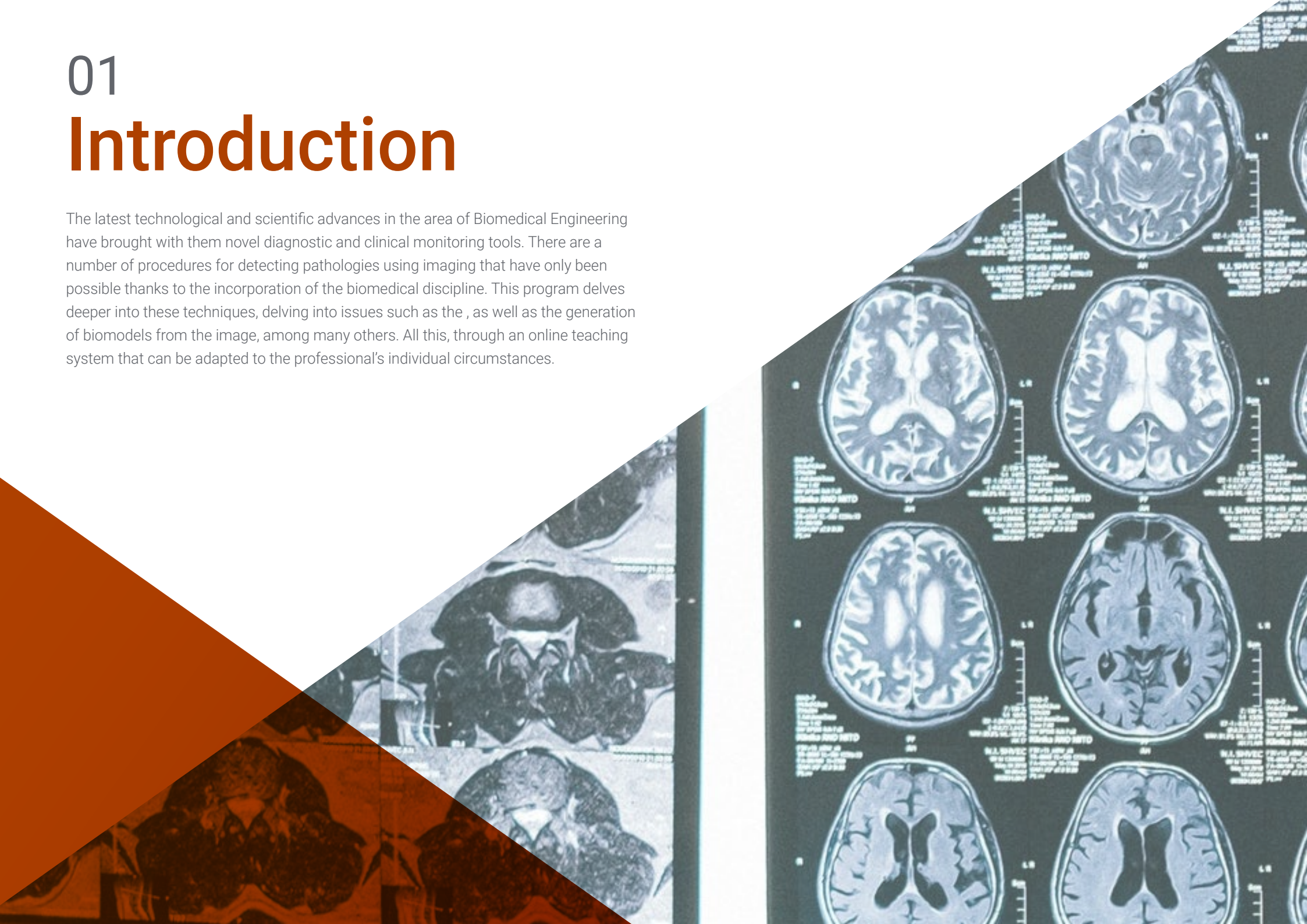
01

Introduction

The latest technological and scientific advances in the area of Biomedical Engineering have brought with them novel diagnostic and clinical monitoring tools. There are a number of procedures for detecting pathologies using imaging that have only been possible thanks to the incorporation of the biomedical discipline. This program delves deeper into these techniques, delving into issues such as the , as well as the generation of biomodels from the image, among many others. All this, through an online teaching system that can be adapted to the professional's individual circumstances.



Incorporate the latest biomedical engineering diagnostic techniques and procedures into your professional work thanks to this Postgraduate Diploma"

Biomedical engineering has provided numerous novel solutions and techniques for the treatment and diagnosis of different patients and pathologies. For this reason, this is one of the most important fields at present, since it offers an answer to extremely difficult challenges such as the detection of certain diseases or the monitoring of patients in a delicate clinical position. This Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring offers the engineer the most advanced knowledge in this field, allowing them to develop a professional career in this area with all the guarantees.

They will do so thanks to the in-depth study of aspects such as nuclear medicine, ultrasound medical imaging, image processing, image-guided surgery, robotic vision, deep learning and machine learning applied to medical imaging, applications of medical hardware and software, and biosensors, among many other things.

The engineer will be able to update their knowledge on these issues thanks to TECH's 100% online learning system, which will allow them to balance their studies with their professional career. Participants will also benefit from numerous multimedia teaching resources such as procedural videos, interactive summaries, case studies or master classes, always supervised by a teaching staff specialized in this area of engineering.

This **Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring** contains the most complete and up-to-date educational program on the market. Its most notable features are:

- The development of case studies presented by experts in Biomedical Engineering
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

Learn the latest techniques in diagnosis and clinical monitoring from an engineer's point of view, delving into issues such as robotic vision and the generation of biomodels from images"

Diagnostic Engineering is one of the most in-demand fields today: this program gives you all the tools you need to specialize and give your career a boost"

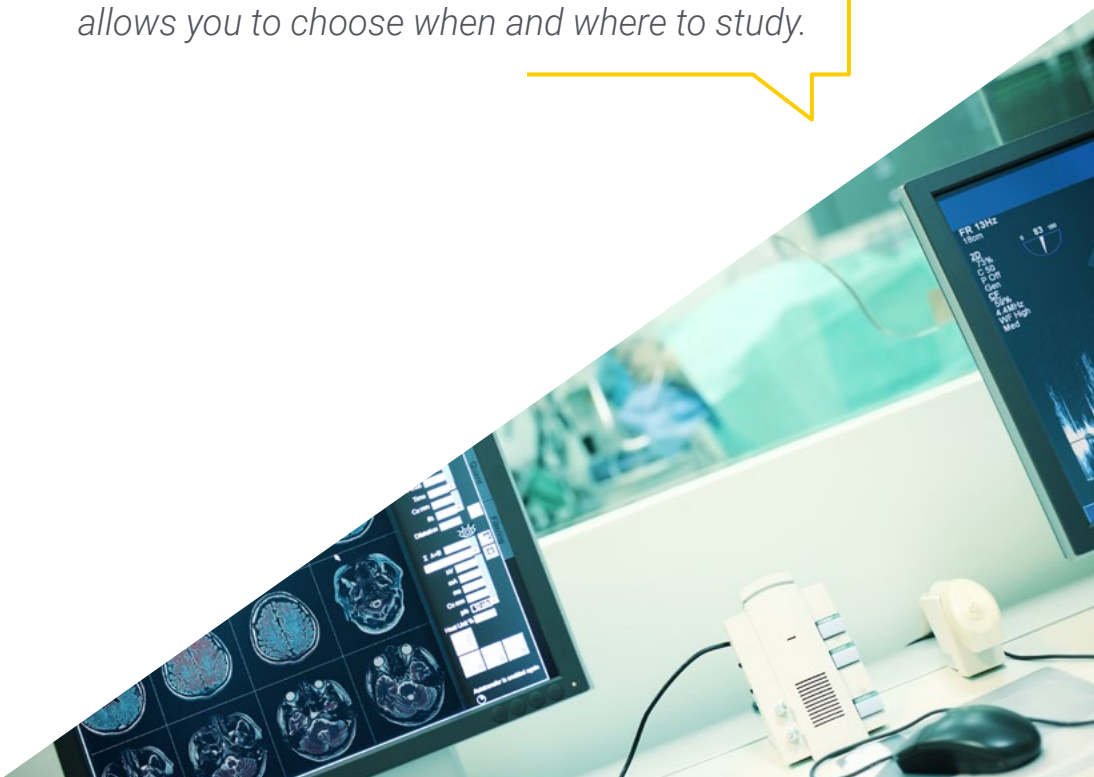
Delve into Nanotechnology and medical devices and become a specialist in demand by prestigious engineering and medical services companies.

TECH has designed a 100% online teaching system to allow you to continue your professional work without interruptions, since it allows you to choose when and where to study.

The program includes in its teaching staff, professionals from the sector who contribute their work experience to this program, in addition to recognized specialists from leading companies and prestigious universities.

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

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



02

Objectives

The main objective of this Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring is to provide the professional with the most advanced and up-to-date knowledge in this booming field, so that they can integrate it into their professional practice, thereby becoming a great specialist. At the end of the program, students will be in a position to improve their professional outlook thanks to the new procedures they have learned.

Enroll now and achieve your goal of updating your knowledge and specializing in this relevant and booming area"

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

Module 1. Biomedical Imaging

- 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 2. 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 supportive
- Establish the different types of biosensors and their use for each diagnostic case
- Deepen understanding of the physical/electrochemical functioning of the different types of biosensors
- Examine the importance of biosensors in modern medicine

Module 3. 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

This is the future of engineering: this program will make you a highly sought-after professional"

03

Course Management

This Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring has a teaching staff made up of specialists in this area who are familiar with the latest advances in diagnosis and monitoring of patients and pathologies through technology. As a result, professionals will establish contact with professors who will provide them with the most advanced knowledge in this complex field of engineering.

The best teachers and the best learning methodology now at your disposal"

Management

Mr. Ruiz Díez, Carlos

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

Professors

Ms. Ruiz Díez, Sara

- Member of the Neural Rehabilitation Group, Instituto Cajal del CSIC
- Responsible for illustrations for Corto tratado de angiología y cirugía vascular, by Dr. Ruiz Grande
- Degree in Biomedical Engineering from the Polytechnic University of Madrid
- Specialty in Biomaterials, Biomechanics and Medical Devices

Mr. Somolinos Simón, Francisco Javier

- Biomedical engineer and researcher at the Bioengineering and Telemedicine Group of the Polytechnic University of Madrid
- Degree in Biomedical Engineering from the Polytechnic University of Madrid
- Master's Degree in Management and Development of Biomedical Technologies, Carlos III University of Madrid
- Doctoral student in Biomedical Engineering

Dr. Vásquez Cevallos, Leonel

- Advisor in the preventive and corrective maintenance and sale of medical equipment and software. Received medical imaging equipment maintenance training, Seoul, South Korea. Director of the Telemedicine Cayapas research project. Knowledge transfer and management manager. Officegolden
- 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 Academic Training in Ecuador
- Teachers at Polytechnic University of Madrid
- Teacher at Escuela Superior Politécnica del Litoral. Equator
- Lecturer at the University of Guayaquil
- Lecturer at Technological University of Business in Guayaquil

Take the plunge and get up to date on the latest developments in Diagnostic Engineering and Clinical Monitoring"

04

Structure and Content

This Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring is divided into 3 specialized modules, through which the engineer will learn about the latest advances in medical image storage and transmission systems, image generation and detection in nuclear medicine, image analysis and segmentation, image-guided surgeries and the manufacture of biosensor prototypes, among others.

You won't find more up-to-date content in Diagnostic Engineering than in this program. Don't miss this opportunity and enroll”

Module 1. Biomedical Imaging

1.1. Biomedical Imaging
- 1.1.1. Medical Imaging
- 1.1.2. Objectives of Imaging Systems in Medicine
- 1.1.3. Types of Imaging

1.2. Radiology
- 1.2.1. Radiology
- 1.2.2. Conventional Radiology
- 1.2.3. Digital Radiology

1.3. Ultrasound
- 1.3.1. Medical Imaging with Ultrasound
- 1.3.2. Training and Image Quality
- 1.3.3. Doppler Ultrasound
- 1.3.4. Implementing and New Technologies

1.4. Computerized Tomography
- 1.4.1. CT Imaging Systems
- 1.4.2. Reconstruction and CT Image Quality
- 1.4.3. Clinical Applications

1.5. Magnetic Resonance
- 1.5.1. Magnetic Resonance Imaging (MRI)
- 1.5.2. Resonance and Nuclear Magnetic Resonance
- 1.5.3. Nuclear Relaxation
- 1.5.4. Tissue Contrast and Clinical Applications

1.6. Nuclear medicine
- 1.6.1. Generation and Image Detection
- 1.6.2. Image Quality
- 1.6.3. Clinical Applications

1.7. Image Processing
- 1.7.1. Noise
- 1.7.2. Intensification
- 1.7.3. Histograms
- 1.7.4. Magnification
- 1.7.5. Processing

1.8. Analysis and Image Segmentation
- 1.8.1. Segmentation
- 1.8.2. Segmentation by Region
- 1.8.3. Edge Detection Segmentation
- 1.8.4. Generation of Biomodels from Images

1.9. Image-Guided Interventions
- 1.9.1. Visualization Methods
- 1.9.2. Image-Guided Surgeries
  - 1.9.2.1. Planning and Simulation
  - 1.9.2.2. Surgical Visualization
  - 1.9.2.3. Virtual Reality
- 1.9.3. Robotic Vision

1.10. Deep Learning and Machine Learning in Medical Imaging
- 1.10.1. Types of Recognition
- 1.10.2. Supervised Techniques
- 1.10.3. Unsupervised Techniques

Module 2. Biomedical Technologies: Biodevices and Biosensors

2.1. Medical Devices
- 2.1.1. Product Development Methodology
- 2.1.2. Innovation and creativity
- 2.1.3. CAD Technologies

2.2. Nanotechnology
- 2.2.1. Medical Nanotechnology
- 2.2.2. Nanostructured Materials
- 2.2.3. Nano-Biomedical Engineering

2.3. Micro and Nanofabrication
- 2.3.1. Design of Micro and Nano Products
- 2.3.2. Techniques
- 2.3.3. Tools for Manufacturing

2.4. Prototypes
- 2.4.1. Additive Manufacturing
- 2.4.2. Rapid Prototyping
- 2.4.3. Classification
- 2.4.4. Applications
- 2.4.5. Study Cases
- 2.4.6. Conclusions

2.5. Diagnostic and Surgical Devices
- 2.5.1. Development of Diagnostic Methods
- 2.5.2. Surgical Planning
- 2.5.3. Biomodels and Instruments Made With 3D Printing
- 2.5.4. Device-Assisted Surgery

2.6. Biomechanic Devices
- 2.6.1. Prosthetics
- 2.6.2. Intelligent Materials
- 2.6.3. Orthotics

2.7. Biosensors
- 2.7.1. The Biosensor
- 2.7.2. Sensing and Transduction
- 2.7.3. Medical Instrumentation for Biosensors

2.8. Typology of Biosensors (I): Optic Sensors
- 2.8.1. Reflectometry
- 2.8.2. Interferometry and Polarimetry
- 2.8.3. Evanescent Field
- 2.8.4. Fiber Optic Probes and Guides

2.9. Typology of Biosensors (II): Physical, Electrochemical and Acoustic Sensors
- 2.9.1. Physical Sensors
- 2.9.2. Electrochemical Sensors
- 2.9.3. Acoustic Sensors

2.10. Integrated Systems
- 2.10.1. Lab-on-a-Chip
- 2.10.2. Microfluids
- 2.10.3. Medical Application

Module 3. Digital Health Applications in Biomedical Engineering

3.1. Digital Health Applications
- 3.1.1. Medical Hardware and Software Applications
- 3.1.2. Software Applications: Digital Health Systems
- 3.1.3. Usability of Digital Health Systems

3.2. Medical Image Storage and Transmission Systems
- 3.2.1. Image Transmission Protocol: DICOM
- 3.2.2. Medical Image Storage and Transmission Server Installation: PAC System

3.3. Relational Database Management for Digital Health Applications
- 3.3.1. Relational Database, Concept and Examples
- 3.3.2. Database Language
- 3.3.3. Database with MySQL and PostgreSQL
- 3.3.4. Applications: Connection and Uses in Web Programming Language

3.4. Digital Health Applications Based on Web Development
- 3.4.1. Web Application Development
- 3.4.2. Web Development Model, Infrastructure, Programming Languages and Working Environments
- 3.4.3. Examples of Web Applications with Different Languages: PHP, HTML, AJAX, CSS Javascript, AngularJS, NodeJS
- 3.4.4. Development of Applications in Web Frameworks: Symfony and Laravel
- 3.4.5. Development of Applications in Content Management Systems, CMS: Joomla and WordPress

3.5. WEB Applications in a Hospital Environment or Clinical Center
- 3.5.1. Applications for Patient Management: Reception, Appointments and Collections
- 3.5.2. Applications for Medical Professionals: Consultations or Medical Care, Medical History, Reports, etc
- 3.5.3. Web and Mobile Applications for Patients: Scheduling Requests, Monitoring, etc

3.6. Telemedicine Applications
- 3.6.1. Service Architecture Models
- 3.6.2. Telemedicine Applications: Telemedicine, Telecardiology and Teledermatology
- 3.6.3. Rural Telemedicine

3.7. Applications with the Internet of Medical Things, IoMT

3.7.1. Models and Architectures
3.7.2. Medical Data Acquisition Equipment and Protocols
3.7.3. Applications: Patient Monitoring
3.8. Digital Health Applications Using Artificial Intelligence Techniques
3.8.1. Machine Learning
3.8.2. Computing Platforms and Development Environments
3.8.3. Examples
3.9. Digital Health Applications with BigData
3.9.1. Digital Health Applications with Big Data
3.9.2. Technologies Used in Big Data
3.9.3. Use Cases of Big Data in Digital Health
3.10. Factors Associated with Sustainable Digital Health Applications and Future Trends
3.10.1. Legal and Regulatory Framework
3.10.2. Good Practices in the Development of Digital Health Application Projects
3.10.3. Future Trends in Digital Health Applications

The most expert faculty, coupled with advanced knowledge and its teaching method, make this program the best for the engineer who wishes to delve into the methods of clinical diagnosis and monitoring"

05

Methodology

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

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

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

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

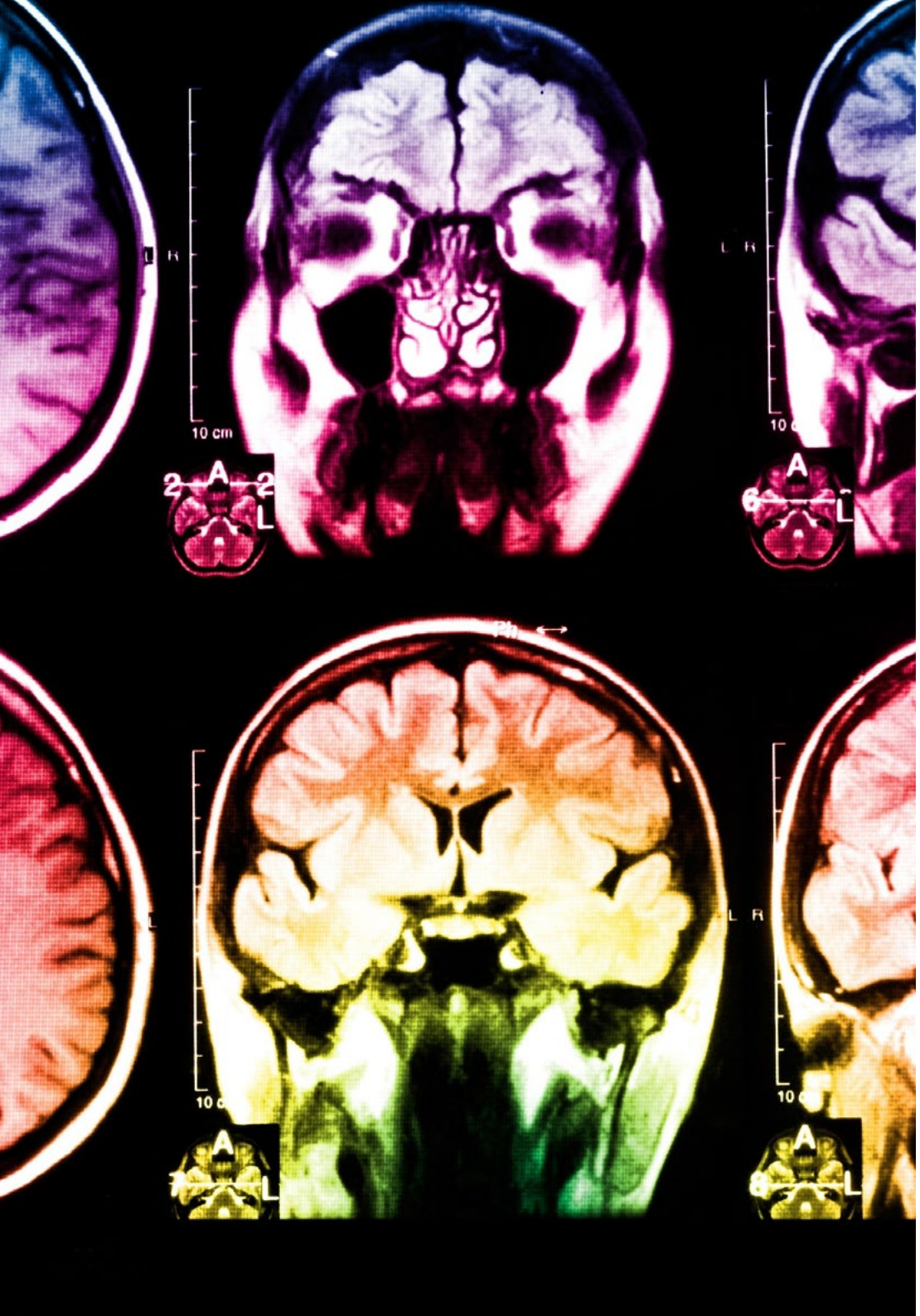
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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

In 2019, we obtained the best learning results of all online universities in the world.

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

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

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

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

Study Material

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

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

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

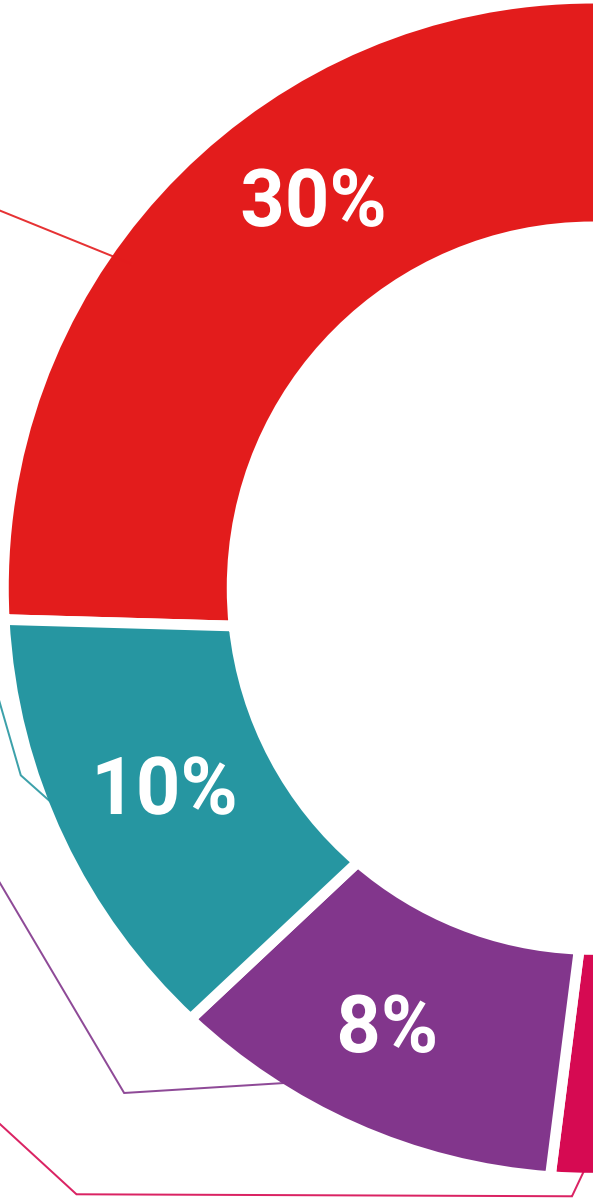
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

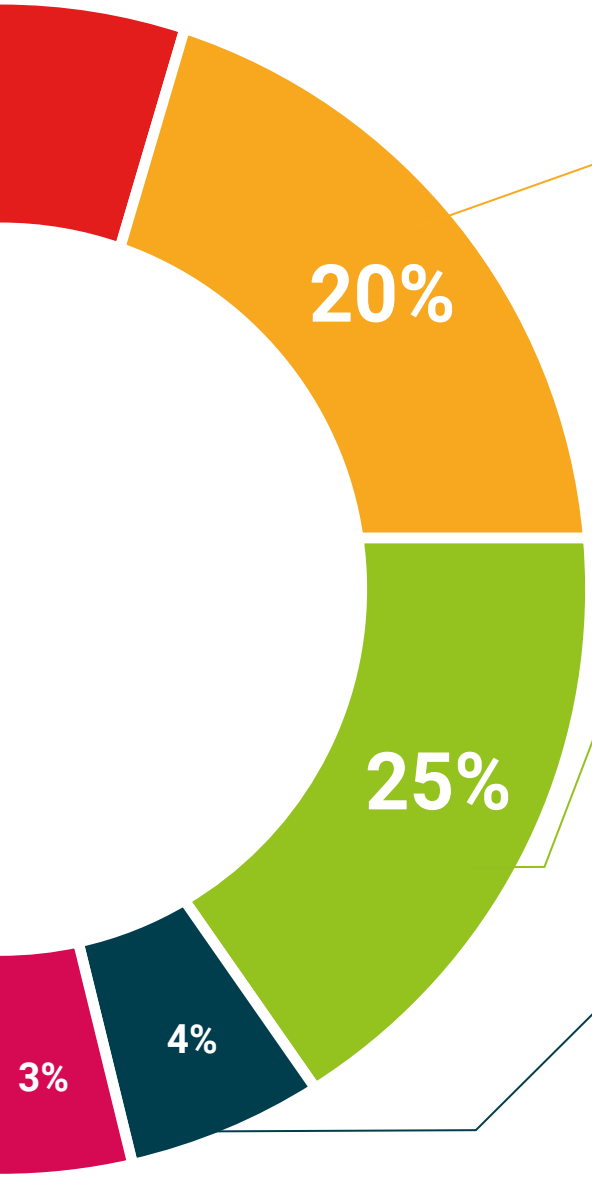
Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

Additional Reading

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





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Interactive Summaries

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

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

Testing & Retesting

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

06

Certificate

The Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.

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

This **Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring** contains the most complete and up-to-date educational program on the market.

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

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

Title: **Postgraduate Diploma in Diagnostic Engineering and Clinical Monitoring**

Official Nº of Hours: **450 h.**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Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Diagnostic Engineering and Clinical Monitoring

This is a qualification awarded by this University, equivalent to 450 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro

Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country.

Unique TECH Code: AFWORD23S techtitute.com/certificates

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

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