

Postgraduate Certificate Biomedical Image Capture and Analysis





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- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: www.techtute.com/us/medicine/postgraduate-certificate/biomedical-image-capture-analysis

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01

Introduction

Developments in image capture and analysis have led to an evolution in the medical sector. Today it is possible to detect many diseases early and treat them with better results, something that was impossible decades ago. Knowing these techniques and handling them skillfully is a matter of necessity for many specialists, which is why this degree was created. Through a complete online program, the graduate will have access to 150 hours of varied content, of the highest quality and developed based on the most modern and effective pedagogical methodology.





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This course will enable you to broaden your knowledge of biomedical imaging and boost your career”

Advances in imaging techniques and processes developed by biomedicine have enabled specialists in different medical fields to improve their diagnoses and treatments, thus benefiting millions of patients. As a consequence of this evolution we find increasingly complex but sophisticated methods with increasingly promising and accurate results.

If a specialist wants to keep up to date with these advances, they have two options: to spend hours and hours searching for quality information and reliable sources or to look for a program that provides everything they need to know, with the guarantee of having the best and most updated content on the subject. TECH opts for the second option and offers graduates the opportunity to pursue a degree that will provide them with everything they need to know not only to update their knowledge, but also to improve and expand it.

This Postgraduate Certificate in Biomedical Image Capture and Analysis delves into the objectives of imaging systems in medicine, as well as the different types: radiology, ultrasound, computed tomography, magnetic resonance imaging and nuclear medicine. In addition, it focuses on image processing, analysis and segmentation. Finally, the program delves into image-guided interventions and *deep learning* and *machine learning* in medical imaging.

A course directed by experts in the field with extensive professional experience and with all the facilities and conveniences that comes with being fully online. The specialist will also have 150 hours of not only theoretical content, but also practical content in the form of real clinical cases, as well as multimedia material and research articles that will allow them to expand on each topic.

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

- ◆ Practical cases presented by experts in Biomedicine
- ◆ The graphic, schematic, and eminently practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice.
- ◆ Practical exercises where 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



Stand out, with this Postgraduate Certificate, among the specialists for your quality in the analysis of ultrasounds, radiological tests, computed tomography and magnetic resonance"

“

Decades of advances in biomedical image capture and analysis in a Postgraduate Certificate that will give you everything you need to know”

Access real clinical cases in which you will be able to visualize the concepts developed during the program

Learn more about image processing from the best experts in the field

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

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

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



02 Objectives

The purpose of this University Course is to provide the specialist with the necessary tools and knowledge that will allow them to easily, fluently and confidently perform image capture and analysis. In addition, TECH as a university has as its main objective to guarantee the best academic experience, so it provides graduates with the most updated information in the sector and offers them the possibility of organizing this Postgraduate Certificate based on their own schedule.



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TECH will help you overcome your goals in less time than you think with its modern program and the best tools”



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



You will improve progressively, but from the first day you will notice how your knowledge will be noticeably expanded”



Specific Objectives

- ◆ 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

03

Course Management

In order to offer the best and most complete academic experience, it is necessary to have a faculty that is up to the task. That is why TECH has selected for this program a group of specialists in biomedical science, with a broad professional background and research experience. They will be available to answer any questions that may arise during the program and will be willing to help whenever necessary.





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The experience of the faculty of this Postgraduate Certificate will guide you to improve and allow you to obtain a more practical and realistic view of image analysis in biomedicine"

Management



Ruiz Díez, Carlos

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

Professors

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.



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Structure and Content

The specialist will have, from the first day, all the contents of this Postgraduate Certificate, which has been selected by the teaching staff based on the most updated information on image capture and analysis in biomedicine. In addition, the program has been adapted to the relearning methodology, thanks to which the graduate will not have to invest hours and hours in memorizing, since the terms are repeated gradually, favoring the acquisition of concepts in a progressive and more productive way.





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You will have at your disposal real clinical cases with which you will be able to put the content into practice In this way you will not only consolidate the concepts, but you will see how far you are able to go with this degree”

Module 1. Biomedical Images

- 1.1. Biomedical Images
 - 1.1.1. Medical Images
 - 1.1.2. Objectives of Imaging Systems in Medicine
 - 1.1.3. Types of Images
- 1.2. Radiology
 - 1.2.1. Radiology
 - 1.2.2. Conventional Radiology
 - 1.2.3. Digital Radiology
- 1.3. Ultrasound
 - 1.3.1. Medical Images 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

05 Methodology

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

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



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

At TECH we use the Case Method

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

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



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

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

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

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



Re-learning Methodology

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

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



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

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

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

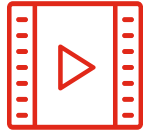
Re-learning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success

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

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



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



Study Material

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

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



Surgical Techniques and Procedures on Video

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



Interactive Summaries

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

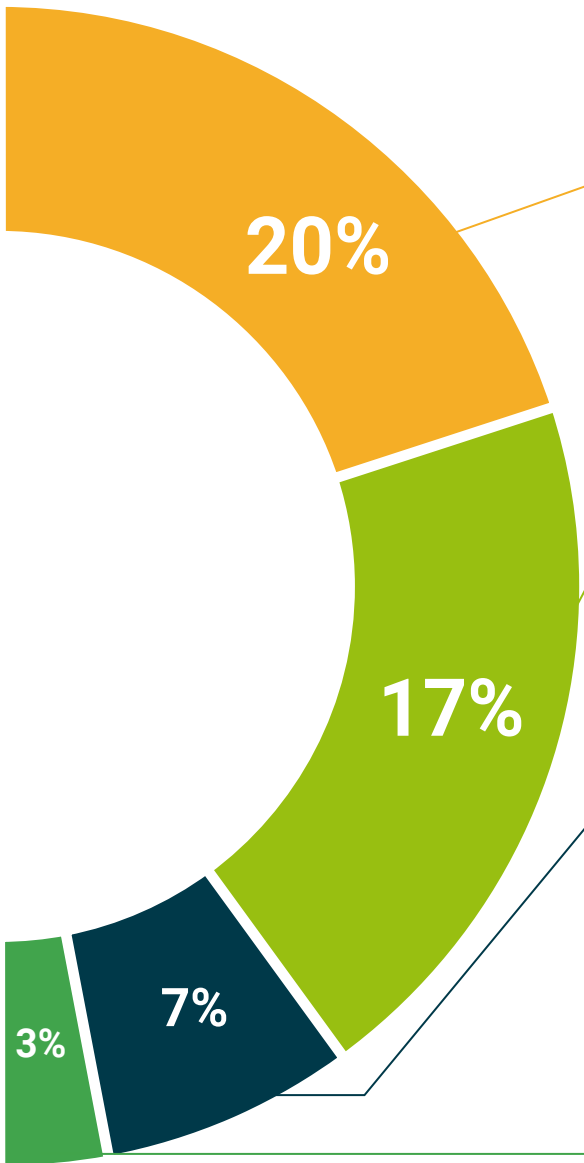
This exclusive multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".



Additional Reading

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





Expert-Led Case Studies and Case Analysis

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



Testing & Retesting

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



Classes

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



Quick Action Guides

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



06

Certificate

The Postgraduate Certificate in Biomedical Image Capture and Analysis guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Technological University.



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

This **Postgraduate Certificate in Biomedical Image Capture and Analysis** contains the most complete and updated scientific program on the market.

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

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

Title: **Postgraduate Certificate in Biomedical Image Capture and Analysis**

ECTS: **6**

Official Number of Hours: **150 hours**



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



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