

# Postgraduate Certificate Medical Bioinformatics



## Postgraduate Certificate Medical Bioinformatics

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

Website: [www.techtitute.com/us/engineering/postgraduate-certificate/medical-bioinformatics](http://www.techtitute.com/us/engineering/postgraduate-certificate/medical-bioinformatics)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Course Management

---

*p. 12*

04

Structure and Content

---

*p. 16*

05

Methodology

---

*p. 20*

06

Certificate

---

*p. 28*

# 01

# Introduction

As technology advances in the biomedical field, the dependence of this field on Computer Engineering is increasing. It is becoming increasingly common for physicians and computer engineers to join forces to create specialized software and tools to analyze human genetics, genomic data sequencing and medical big data. As a result, this TECH program was created with the objective of offering a reliable update on everything related to Medical Bioinformatics. Prepared by expert teachers in the field, the professional will find educational material adapted both to the most current scientific theory and to the most successful professional practice of today.



“

*Delve into the requirements of  
Modern Bioinformatics and give  
your career a quality boost"*

Informatics is already one of the most powerful allies for physicians around the world. With specialized programs, huge amounts of data can be managed and classified, not only for cutting-edge scientific studies, but also for the physician's own day-to-day work. Thanks to information technology, it is possible to have a complete and navigable history of each patient, with all kinds of information available instantly.

This is possible in part because Computer Engineering itself has adapted to the demands of doctors who have also benefited from advances in big data management or data visualization. Therefore, engineers have a great opportunity to obtain a modern, in-demand specialization that can significantly boost their own careers.

This is where this TECH Postgraduate Certificate comes into play, which has been developed precisely to delve into all the latest issues of Medical Bioinformatics. This university program is the perfect starting point to consolidate and further develop knowledge on topics such as data analysis, data mining, artificial intelligence or sustainable bioinformatics.

A great 100% online opportunity that does not require classroom attendance or adherence to a scheduled timetable. The engineers themselves decide when and where to take on the course workload, and are able to download the entire syllabus from the very beginning of the program.

This **Postgraduate Certificate in Medical Bioinformatics** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ 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 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



*Get up to date with entire units dedicated to Machine Learning for Medical Bioinformatics, data analysis with Python programming and virtual work environments specific to this field"*



*Reinforce your value proposition with a university qualification that will demonstrate your desire to continue growing and improving in a highly specialized field"*

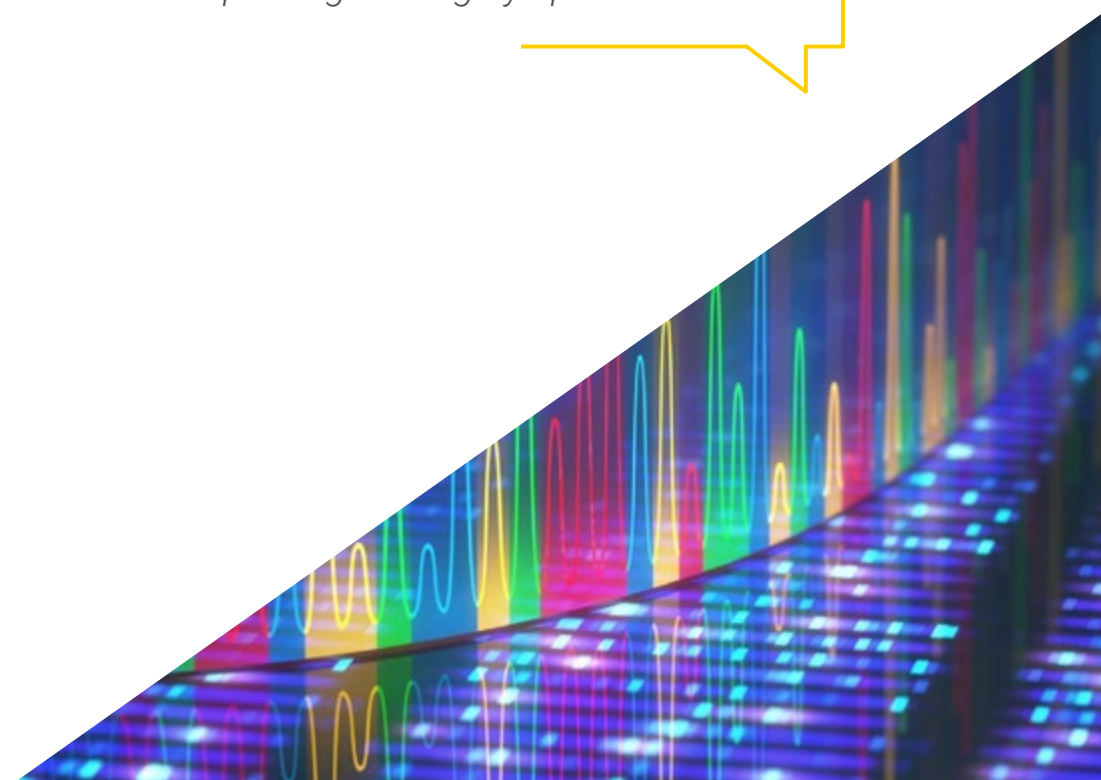
The program's teaching staff includes professionals from sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

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

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

*You have the freedom to adapt the syllabus to your own pace, allowing you to balance it with other personal or professional responsibilities.*

*Reinforce your value proposition with a university qualification that will demonstrate your desire to continue growing and improving in a highly specialized field.*



# 02 Objectives

Since Medical Bioinformatics is a subject that requires special dedication, given that it combines two particularly qualified branches, the objective of this program is to offer a compilation of the most up-to-date knowledge and postulates in a convenient and accessible format. This way, the engineering professional can have access to a complete update without having to put aside their current responsibilities.







“

*You will have the most ambitious professional goals you could ever set for yourself within your reach”*



## 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 the post-processing and management of acquired images
- ◆ Use and design biomedical information management systems
- ◆ Analyze current digital health applications and design biomedical applications in a hospital setting or clinical center



## Specific Objectives

---

- ◆ Develop 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 *Big 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

“

*You have the backing of a technical and support team that will help you throughout the entire program”*

03

# Course Management

Since Medical Bioinformatics is a very specific specialty, TECH has relied on professionals with first-hand knowledge of it to write the contents. This guarantees not only an adaptation to the highest quality standards, but also an adaptation of all the material to the demands of the market itself, which provides the professional with a unique vision on all the specific issues of this specialty.

```
... = modifier_ob
... (modifier_ob)) # modifier_ob
... = 0
... text.selected_objects[0]
... objects[one.name].select = 1
...
print("please select exactly two objects, the last one")
... OPERATOR CLASSES ...
```

“

*You will be able to access real cases and first-hand educational material offered by expert professionals in Medical Bioinformatics"*

## International Guest Director

Awarded by the Academy of Radiology Research for his contribution to the understanding of this area of science, Dr. Zahi A Fayad is considered a prestigious Biomedical Engineer. In this sense, most of his line of research has focused on both the detection and prevention of Cardiovascular Diseases. In this way, he has made multiple contributions in the field of Multimodal Biomedical Imaging, promoting the correct use of technological tools such as Magnetic Resonance Imaging or Positron Emission Computed Tomography in the health community.

In addition, he has an extensive professional background that has led him to occupy relevant positions such as the Director of the Institute of Biomedical Engineering and Imaging at Mount Sinai Medical Center, located in New York. It should be noted that he combines this work with his facet as a Research Scientist at the National Institutes of Health of the United States government. He has written more than 500 exhaustive clinical articles on subjects such as drug development, the integration of the most avant-garde techniques of Multimodal Cardiovascular Imaging in clinical practice or non-invasive in vivo methods in clinical trials for the development of new therapies to treat Atherosclerosis. Thanks to this, his work has facilitated the understanding of the effects of Stress on the immune system and Cardiac Pathologies significantly.

On the other hand, this specialist leads 4 multicenter clinical trials funded by the US pharmaceutical industry for the creation of new cardiovascular drugs. His objective is to improve therapeutic efficacy in conditions such as Hypertension, Heart Failure or Stroke. At the same time, it develops prevention strategies to raise public awareness of the importance of maintaining healthy lifestyle habits to promote optimal cardiac health.



## Dr. A Fayad, Zahi

---

- ♦ Director of the Institute for Biomedical Engineering and Imaging at Mount Sinai Medical Center, New York
- ♦ Chairman of the Scientific Advisory Board of the National Institute of Health and Medical Research at the European Hospital Pompidou AP-HP in Paris, France
- ♦ Principal Investigator at Women's Hospital in Texas, United States
- ♦ Associate Editor of the "Journal of the American College of Cardiology"
- ♦ Ph.D. in Bioengineering from the University of Pennsylvania
- ♦ B.S. in Electrical Engineering from Bradley University
- ♦ Founding member of the Scientific Review Center of the National Institutes of Health of the United States government

“

*Thanks to TECH, you will be able to learn with the best professionals in the world”*

## Management



### 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

### 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





# 04

## Structure and Content

To help the professional optimize their studies, TECH incorporates the most efficient educational methodology in its programs. Relearning, a method pioneered by TECH, ensures that the professional acquires an essential understanding of key concepts gradually and repeatedly. The engineer will also find a large amount of complementary material in this Postgraduate Certificate, including summaries of each unit and complementary readings on Medical Bioinformatics.





“

*The exercises proposed throughout the syllabus will help you understand the more complex theoretical terms much better”*

## Module 1. Medical Bioinformatics

- 1.1. Medical Bioinformatics
  - 1.1.1. Computing in Medical Biology
  - 1.1.2. Medical Bioinformatics
    - 1.1.2.1. Bioinformatic Applications
    - 1.1.2.2. Computer Systems, Networks and Medical Databases
    - 1.1.2.3. Applications of Medical Bioinformatics in Human Health
- 1.2. Computer Equipment and Software Required in Bioinformatics
  - 1.2.1. Scientific Computing in Biological Sciences
  - 1.2.3. The Computer
  - 1.2.4. Hardware, Software and Operating Systems
  - 1.2.5. Workstations and Personal Computers
  - 1.2.6. High-Performance Computing Platforms and Virtual Environments
  - 1.2.7. Linux Operating System
    - 1.2.7.1. Linux Installation
    - 1.2.7.2. Using the Linux Command Line Interface
- 1.3. Data Analysis Using R Programming Language
  - 1.3.1. Language R Statistical Programming
  - 1.3.2. Installation and Uses of R
  - 1.3.3. Data Analysis Methods With R
  - 1.3.4. R Applications in Medical Bioinformatics
- 1.4. Data Analysis Using R Programming Language
  - 1.4.1. Multipurpose Programming Language Python
  - 1.4.2. Installation and Uses of Python
  - 1.4.3. Data Analysis Methods with Python
  - 1.4.4. Python Applications in Medical Bioinformatics
- 1.5. Methods of Human Genetic Sequence Analysis
  - 1.5.1. Human Genetics
  - 1.5.2. Techniques and Methods for Sequencing Analysis of Genomic Data
  - 1.5.3. Sequence Alignments
  - 1.5.4. Tools for Detection, Comparison and Modeling of Genomes
- 1.6. Data Mining in Bioinformatics
  - 1.6.1. Phases of Knowledge Discovery in Databases, KDD
  - 1.6.2. Processing Techniques
  - 1.6.3. Knowledge Discovery in Biomedical Databases
  - 1.6.4. Human Genomics Data Analysis
- 1.7. Artificial Intelligence and Big Data Techniques in Medical Bioinformatics
  - 1.7.1. Machine Learning for Medical Bioinformatics
    - 1.7.1.1. Supervised Learning: Regression and Classification
    - 1.7.1.2. Unsupervised Learning Clustering and Association Rules
  - 1.7.2. Big Data
  - 1.7.3. Computing Platforms and Development Environments
- 1.8. Applications of Bioinformatics for Prevention, Diagnosis and Clinical Therapies
  - 1.8.1. Disease-Causing Gene Identification Procedures
  - 1.8.2. Procedure to Analyze and Interpret the Genome for Medical Therapies
  - 1.8.3. Procedures to Assess Genetic Predispositions of Patients for Prevention and Early Diagnosis
- 1.9. Medical Bioinformatics Workflow and Methodology
  - 1.9.1. Creation of Workflows to Analyze Data
  - 1.9.2. Application Programming Interfaces, APIs
    - 1.9.2.1. R and Python Libraries for Bioinformatics Analysis
    - 1.9.2.2. Bioconductor: Installation and Uses
  - 1.9.3. Uses of Bioinformatics Workflows in Cloud Services
- 1.10. Factors Associated with Sustainable Bioinformatics Applications and Future Trends
  - 1.10.1. Legal and Regulatory Framework
  - 1.10.2. Good Practices in the Development of Medical Bioinformatics Projects
  - 1.10.3. Future Trends in Bioinformatics Applications



“

*You will have detailed videos and interactive summaries of all the units of this Postgraduate Certificate, made by the teachers themselves”*

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 Certificate in Medical Bioinformatics 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 training program and receive your university qualification without having to travel or fill out laborious paperwork”*

This program will allow you to obtain your **Postgraduate Certificate in Medical Bioinformatics** endorsed by **TECH Global University**, the world's largest online university.

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

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

Title: **Postgraduate Certificate in Medical Bioinformatics**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**





future

health confidence people

education information tutors

guarantee accreditation teaching

institutions technology learning

community commitment

personalized service innovation

knowledge present quality

online training

development languages

virtual classroom

**tech** global  
university

Postgraduate Certificate

Medical Bioinformatics

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

# Postgraduate Certificate Medical Bioinformatics

```
True
True
z = False
= "MIRROR_Z":
d.use_x = False
_mod.use_y = False
for_mod.use_z = True

#selection at the end -add back the deselected mirror modifier object
mirror_ob.select= 1
modifier_ob.select=1
bpy.context.scene.objects.active = modifier_ob
print("Selected" + str(modifier_ob)) # modifier ob is the active ob
#mirror_ob.select = 0
#me = bpy.context.selected_objects[0]
#bpy.data.objects[me.name].select = 1
```