

# Postgraduate Certificate Biomedical and Healthcare Data Engineering





## Postgraduate Certificate Biomedical and Healthcare Data Engineering

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

Website: [www.techtitute.com/us/engineering/postgraduate-certificate/biomedical-healthcare-data-engineering](http://www.techtitute.com/us/engineering/postgraduate-certificate/biomedical-healthcare-data-engineering)

# Index

01

Introduction

---

p. 4

02

Objectives

---

p. 8

03

Course Management

---

p. 12

04

Structure and Content

---

p. 16

05

Methodology

---

p. 20

06

Certificate

---

p. 28

# 01

# Introduction

The world of Big Data is now a reality. Multiple facets of daily and professional life have benefited from advanced data management, driving a reality in which engineers are the most in-demand professionals. This makes programs like this one offered by TECH essential in any professional career that seeks specialization or further training in topics as important as the management of Biomedical and Healthcare Data. Thanks to a team of competent teachers, TECH has developed a comprehensive university program that is also offered in a 100% online format.



“

*Acquire up-to-date knowledge in Biomedical and Healthcare Data Engineering from the best professionals in the sector”*

In a field as sensitive as Biomedical and Healthcare Data Engineering, a multitude of factors must be taken into account. Not only the very usefulness that databases should have for the physicians themselves, but also their potential vulnerabilities to cyberattacks and how to protect them effectively.

This Postgraduate Certificate delves into the legal foundations and regulatory standards in force, also ensuring strict compliance with the General Data Protection Regulation.

It also reviews the different conceptual models of hospital databases, the design of relational databases and the SQL language used in them.

All this in a convenient online format that allows the engineer to take on the workload at their own pace. From the first day of the program, all the content is available on the virtual campus, which greatly facilitates the study process.

This **Postgraduate Certificate in Biomedical and Healthcare Data Engineering** contains the most complete and up-to-date educational 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 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



*Choose the time, place and manner in which to take on the entire workload. At TECH, you make all the important decisions"*

“

*Add this Postgraduate Certificate to your professional profile and get a significant advantage, demonstrating your continuous academic updating efforts”*

The program's teaching staff includes professionals from the sector who contribute their work experience to this program, in addition to 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.

*Update your knowledge on data analysis and database integration in medical records.*

*Rely on the world's largest online academic institution, TECH.*



# 02

# Objectives

The aim of this program is to provide the engineering professional with an exhaustive and comprehensive update on data management in healthcare environments. For this purpose, professionals with extensive practical and academic experience in this field have been chosen, which gives the program an even higher level of quality, since it combines the most effective theory with the most up-to-date practical knowledge.







“

*Your goals and TECH's goals are the same: to get you to the professional place you deserve"*



## General Objectives

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- ◆ 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

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- ◆ Data Structure
- ◆ Analyze Relational Systems
- ◆ Develop conceptual data modeling
- ◆ Designing and standardizing a relational database
- ◆ Examine functional dependencies between data
- ◆ Generate specialized knowledge on big data
- ◆ Deepen understanding of the ODMS architecture
- ◆ Learn about data integration in medical record systems
- ◆ Analyze the bases and restrictions

“

*Register today and don't miss out on the best keys to data management in healthcare environments”*

03

# Course Management

TECH only trusts the best professionals for the development of its academic programs, which means that they must make every effort to offer quality content that meets the highest demands of engineers. Therefore, professionals who take this degree will find a syllabus full of examples and educational resources to support all teaching.





“

*You will have personalized advice from professionals who know firsthand what you need to successfully complete this program"*

## 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. Travesí Bugallo, Blanca

- ◆ U4Impact University Coordinator
- ◆ Marketing at GIANTHEALTH EVENT
- ◆ 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
- ◆ Coordinator of the Bioengineering course at the Technological Campus of ICAI



# 04

## Structure and Content

TECH's pioneering educational methodology, Relearning, is of great help to professional engineers who embark on this program. Thanks to the progressive and natural repetition of the most important contents, the teaching load is greatly reduced. This means that the professional does not have to invest enormous amounts of time in the study of the most complex terminology and can expand their horizons with all the complementary material available.





“

*Real cases, practical exercises and detailed videos will give you a better context for the entire"*

## Module 1. Biomedical and Healthcare Databases

- 1.1. Hospital Databases
  - 1.1.1. Data Bases
  - 1.1.2. The Importance of Data
  - 1.1.3. Data in a Clinical Context
- 1.2. Conceptual Modeling
  - 1.2.1. Data Structure
  - 1.2.2. Systematic Data Model
  - 1.2.3. Data Standardization
- 1.3. Relational Data Model
  - 1.3.1. Advantages and Disadvantages.
  - 1.3.2. Formal Languages
- 1.4. Designing from Relational Databases
  - 1.4.1. Functional Dependence
  - 1.4.2. Relational Forms
  - 1.4.3. Standardization
- 1.5. SQL Language
  - 1.5.1. Relational Model
  - 1.5.2. Object-Relationship Model
  - 1.5.3. XML-Object-Relationship Model
- 1.6. NoSQL
  - 1.6.1. JSON
  - 1.6.2. NoSQL
  - 1.6.3. Differential Amplifiers
  - 1.6.4. Integrators and Differentiators
- 1.7. MongoDB
  - 1.7.1. ODMS Architecture
  - 1.7.2. NodeJS
  - 1.7.3. Mongoose
  - 1.7.4. Aggregation



- 1.8. Data Analysis
  - 1.8.1. Data Analysis
  - 1.8.2. Qualitative Analysis
  - 1.8.3. Quantitative Analysis
- 1.9. Legal Foundations and Regulatory Standards
  - 1.9.1. General Data Protection Regulation
  - 1.9.2. Cybersecurity Considerations
  - 1.9.3. Regulations Applied to Health Data
- 1.10. Integration of Databases in Medical Records
  - 1.10.1. Medical History
  - 1.10.2. HIS Systems
  - 1.10.3. HIS Data

**“** You will be able to download the entire syllabus from day one, and you can even study it from other devices such as tablets or smartphones”

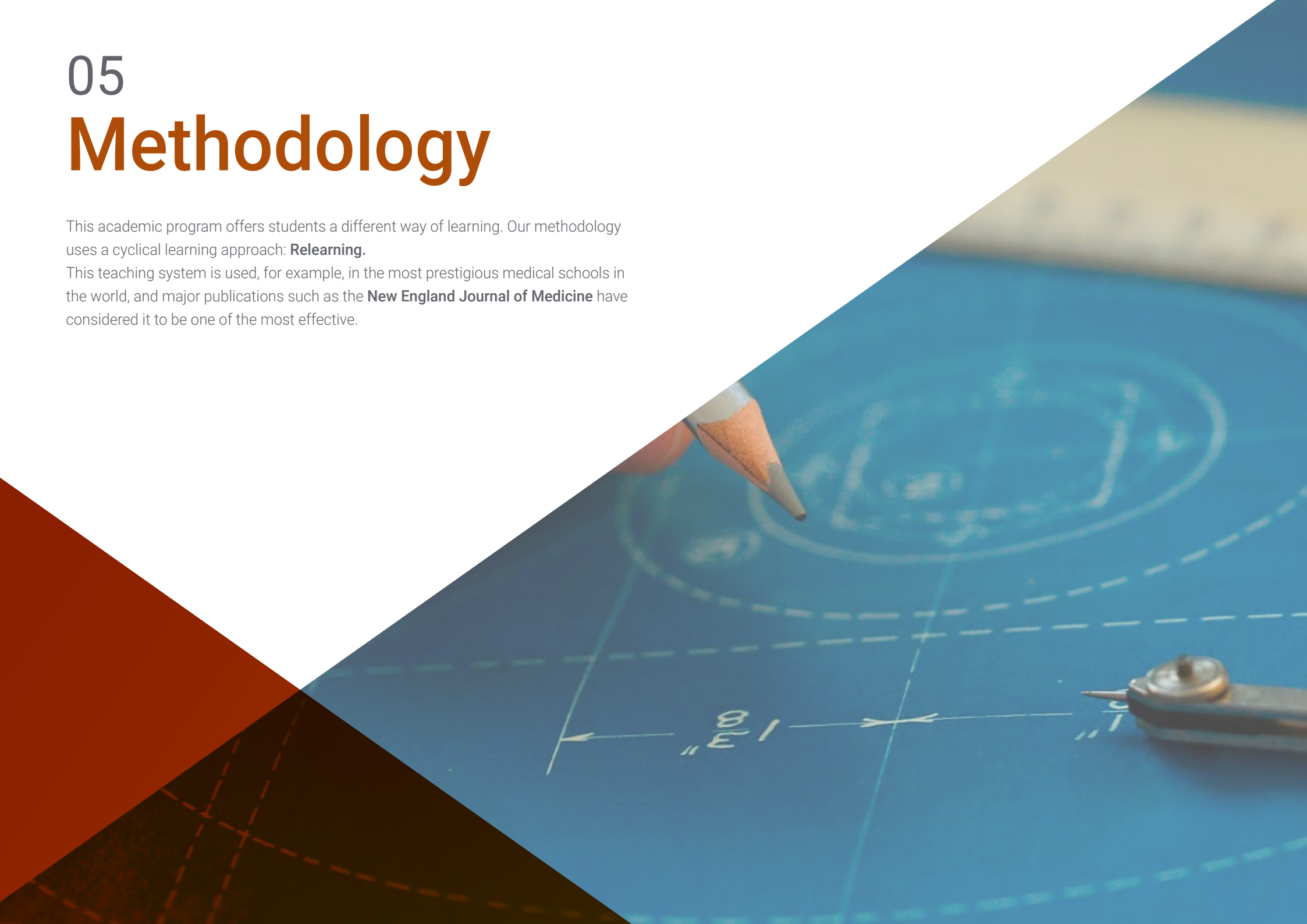


05

# 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.*



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

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.



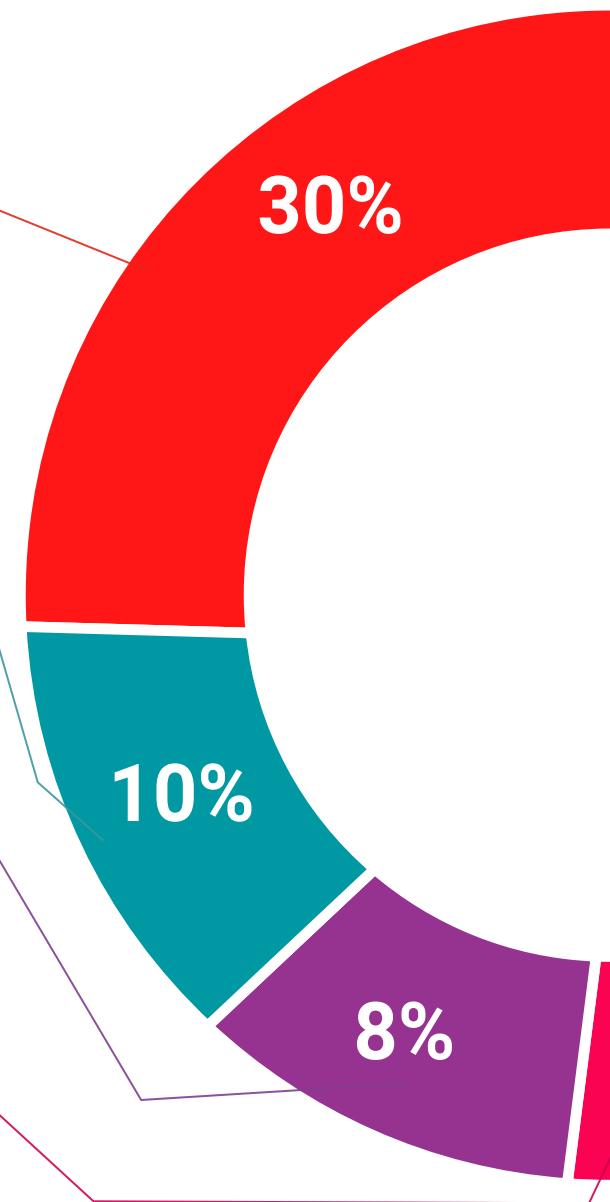
### Practising Skills and Abilities

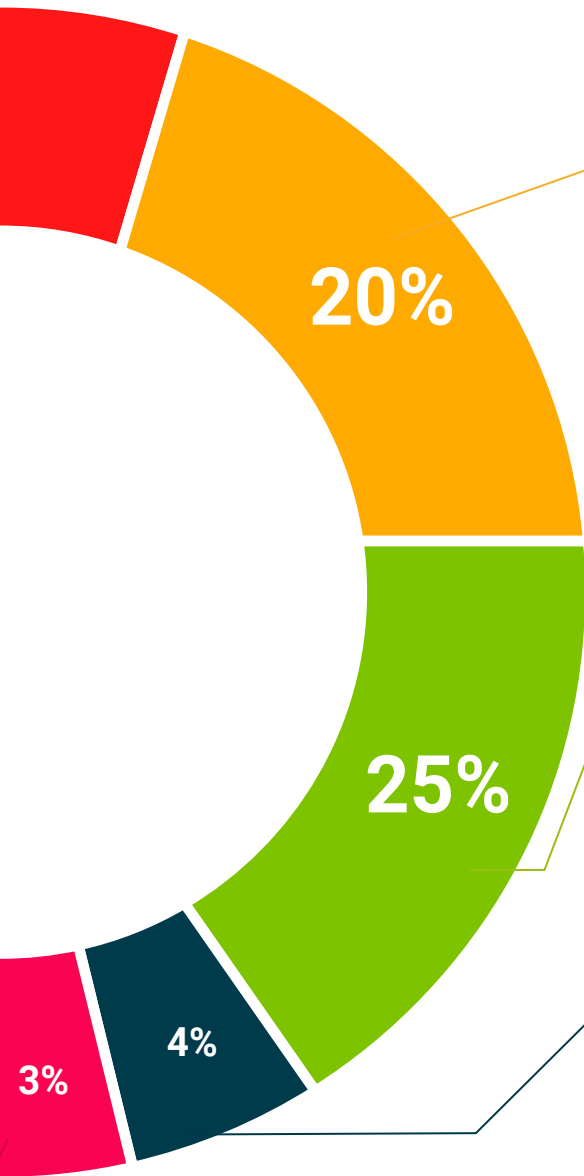
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### 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 Biomedical and Healthcare Data Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.



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

This **Postgraduate Certificate in Biomedical and Healthcare Data Engineering** contains the most complete and up-to-date program on the market.

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

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

Title: **Postgraduate Certificate in Biomedical and Healthcare Data Engineering**  
Official N° of Hours: **150 h.**



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

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



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

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