

# Postgraduate Certificate

## GIS in Environmental Modeling



## Postgraduate Certificate GIS in Environmental Modeling

- » Modality: online
- » Duration: 12 weeks
- » Certificate: TECH Global University
- » Credits: 12 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtitute.com/us/engineering/postgraduate-certificate/gis-environmental-modeling](http://www.techtitute.com/us/engineering/postgraduate-certificate/gis-environmental-modeling)

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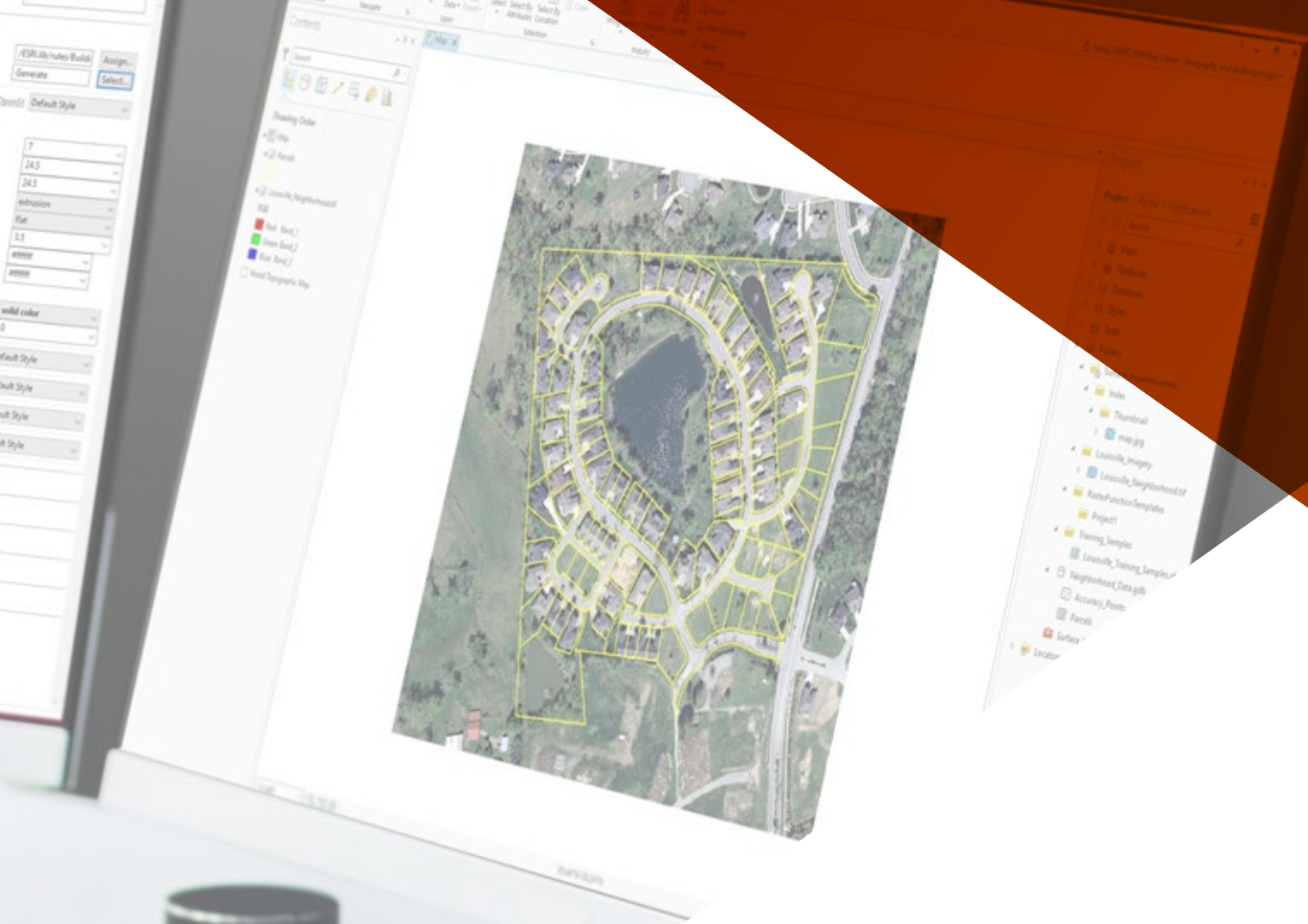
# 01

# Introduction

New technologies have favored the development of geographic information systems allowing, thanks to their use, to improve decision making in the evolution of a fire or to control environmental disasters. This potential requires engineering professionals to master the software and techniques used to analyze spaces and organize layers of information through the use of maps and 3D scenes. This knowledge is essential for the development of projects and is provided in this program designed by TECH. Thus, through innovative didactic resources, the graduates will acquire the essential learning on the application of database topologies, the use of QGIS software or the modeling of environmental systems. All this in a 100% online format that can be accessed whenever you want, from any electronic device with Internet connection.







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*With this GIS Postgraduate Certificate in Environmental Modeling you will get a step further in your professional career in the field of Engineering”*

Prevention and safety management in the event of natural disasters are fundamental for human beings. For this reason, many technology companies have made significant efforts to develop systems that make it possible to analyze different situation models using different techniques. The result is the boost in the use of geographic information systems for forecasting, for example, the development of a fire, the impact of volcanic eruption lava flows or urban management.

Thanks to this progress, engineering professionals have tremendously useful tools for the effective implementation of their projects. Likewise, the continuous innovations in this field make their knowledge indispensable to advance in any career path. For this reason, TECH has created this Postgraduate Certificate in GIS Environmental Modeling, which seeks to provide students with the essential learning they need to thrive in their field.

A program taught exclusively online and with innovative didactic resources, with which you can easily delve into geographic databases, the most widely used computer programs today, as well as the resolution of environmental problems through a GIS. Also, thanks to the Relearning method, based on the reiteration of content, you can delve in a much more agile way through the use of mathematical models in Environmental Sciences.

The professionals are, therefore, before an excellent opportunity to advance in their field of work with a university program, which can be taken whenever you want, from a computer or tablet with Internet connection. In addition, this Postgraduate Certificate is flexible, as it allows students to distribute the course load according to their needs and to make it compatible with their personal responsibilities.

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

- ◆ The development of case studies presented by experts of Environmental Engineering
- ◆ The graphic, schematic and eminently practical contents of the book provide technical and practical information on those 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



*Obtain in only 12 weeks the most advanced and current knowledge about Geographic Information Systems and their use for the improvement of the environment”*

“ *This academic option will take you in a much more dynamic way to learn about the different practical applications of raster data”*

*Enroll now in a 100% online Postgraduate Certificate, designed for demanding professionals who wish to combine quality education with their responsibilities.*

*Thanks to the knowledge acquired on modeling, you will be able to provide solutions to the different existing environmental problems.*

The program includes, in its teaching staff, professionals from the sector who bring to this program the experience of their work, in addition to recognized specialists from prestigious reference societies and universities.

Its multimedia content, developed with the latest educational technology, will provide the professionals with situated and contextual learning, i.e., a simulated environment that will provide an immersive education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professionals must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, students will be assisted by an innovative interactive video system created by renowned and experienced experts.



# 02 Objectives

The multiple existing applications and the continuous technological development through geographic information systems have been taken into account in the preparation of this Postgraduate Certificate. Thus, the professionals who attends this program will obtain the most exhaustive knowledge on the elaboration of maps through the most outstanding softwares, as well as the main types of analysis in systems in Environmental Sciences. The case studies provided by the specialists of this program will serve to bring students closer to a reality, which they will be able to integrate into their daily practice.





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*With this course you will be able to assess any environmental risk with the help of the most commonly used computer tools”*



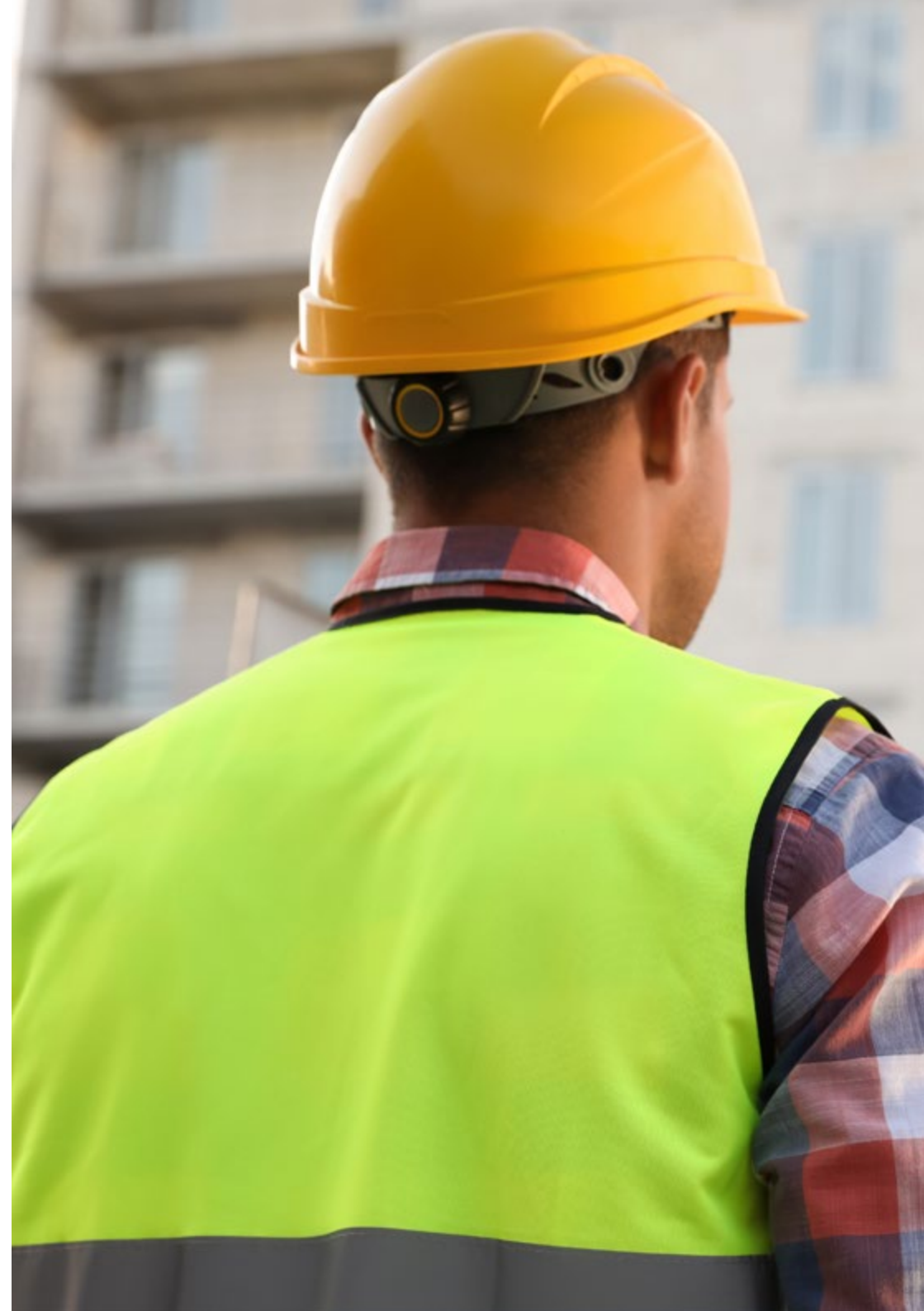
## General Objectives

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- ◆ Analyze some classical environmental models in detail
- ◆ Master the main tools used in GIS
- ◆ Study the mathematical expression of some general behaviors
- ◆ Know how to verify and validate a model by comparison with experimental data



*This program will allow you to master the QGIS software with which you will be able to create, visualize, analyze and publish geospatial information”*





## Specific Objectives

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- ◆ Generally introduce geographic databases
- ◆ Know the database work procedures
- ◆ Solve environmental problems with the help of a GIS
- ◆ Prevent and plan for environmental risk using these computer tools
- ◆ Describe the concept of model and study the use of mathematical models in environmental sciences
- ◆ Understand the difference between discrete and continuous models
- ◆ Distinguish between spatially homogeneous and heterogeneous models
- ◆ Explain potential problems in building and validating models and sensitivity analyses



# 03

## Structure and Content

The course of study of this university program has been designed to offer in only 6 weeks, the most relevant technical information about GIS in environmental models. To do this, students will have video summaries of each topic, videos in detail, complementary readings and case studies. All this designed specifically for this program in which they will be able to acquire the necessary knowledge for the elaboration of maps, which contribute to a better management of environmental events or real-time location of urban spaces.







“

*A specialized teaching team has developed simulations of case studies that will lead you to a better understanding of the applications of Graphic Information Systems”*

## Module 1. Geographical Information Systems

- 1.1. Geographic Information Systems (GIS)
  - 1.1.1. Geographical Information Systems (GIS)
  - 1.1.2. Differences Between CAD and a GIC
  - 1.1.3. Types of Data Visualizers (Heavy or Light Clients)
  - 1.1.4. Types of Geographical Data
  - 1.1.5. Geographic Information
  - 1.1.6. Geographical Representations
- 1.2. Visualization of Elements in QGIS
  - 1.2.1. QGIC Installation
  - 1.2.2. Visualization of Data with QGIS
  - 1.2.3. Labelled Data with QGIS
  - 1.2.4. Overlaying Layers of Different Coverages with QGIS
  - 1.2.5. Maps
    - 1.2.5.1. Parts of a Map
  - 1.2.6. Printing a Plan with QGIS
- 1.3. Vector Model
  - 1.3.1. Types of Vector Geometries
  - 1.3.2. Attribute Tables
  - 1.3.3. Topology
    - 1.3.3.1. Topological Rules
    - 1.3.3.2. Application of Topologies in QGIS
    - 1.3.3.3. Application of Database Topologies
- 1.4. Vector Model. Operators
  - 1.4.1. Functional Criteria
  - 1.4.2. Spatial Analysis Operators
  - 1.4.3. Examples of Geospatial Operations
- 1.5. Generation of a Data Model with a Database
  - 1.5.1. Installation of PostgreSQL and POSTGIS
  - 1.5.2. Creation of a Geospatial Database with PGAdmin
  - 1.5.3. Elements Creation
  - 1.5.4. Geospatial Consultations with POSTGIS
  - 1.5.5. Visualization of Elements of a Database with QGIS
  - 1.5.6. Maps Server
    - 1.5.6.1. Types and Creation of Maps Server with Geoserver
    - 1.5.6.2. Types of WMS/WFS Data Services
    - 1.5.6.3. Visualization of Services in QGIS
- 1.6. Raster Model
  - 1.6.1. Raster Model
  - 1.6.2. Color Bands
  - 1.6.3. Storage in Databases
  - 1.6.4. Raster Calculator
  - 1.6.5. Image Pyramids
- 1.7. Raster Model. Surgery
  - 1.7.1. Image Georeferencing
    - 1.7.1.1. Control Points
  - 1.7.2. Raster Functionalities
    - 1.7.2.1. Surface Functions
    - 1.7.2.2. Distance Function
    - 1.7.2.3. Reclassification Functions
    - 1.7.2.4. Superposition Analysis Functions
    - 1.7.2.5. Statistical Analysis Functions
    - 1.7.2.6. Selection Functions
  - 1.7.3. Loading Raster Data into a Database
- 1.8. Practical Applications of Raster Data
  - 1.8.1. Application in the Agrarian Sector
  - 1.8.2. Treatment of Digital Assessment Models
  - 1.8.3. Automation of Element Classification on a Raster
  - 1.8.4. Treatment of LIDAR Data

- 1.9. Regulations
  - 1.9.1. Cartography Standards
    - 1.9.1.1. OGC
    - 1.9.1.2. ISO
    - 1.9.1.3. CEN
    - 1.9.1.4. AENOR
    - 1.9.1.5. State Cartography
  - 1.9.2. Inspire
    - 1.9.2.1. Principles
    - 1.9.2.2. Annexes
  - 1.9.3. Lisige
- 1.10. Open Data
  - 1.10.1. Open Street Maps (OSM)
    - 1.10.1.1. Cartographic Editing and Community
  - 1.10.2. Obtaining Free Vectorial Cartography
  - 1.10.3. Obtaining Free Raster Cartography
- 2.5. Parameter Estimation, Model Validation and Sensitivity Analysis
  - 2.5.1. Estimate
  - 2.5.2. Validation
  - 2.5.3. Sensitivity Analysis
- 2.6. Algorithm and Programming
  - 2.6.1. Flowcharts and Language
  - 2.6.2. Forrester Diagrams
- 2.7. Applications
  - 2.7.1. Formulating and Implementing Simple Models: Surface Radiation
  - 2.7.2. Generalized Linear Models in the Environment
  - 2.7.3. DaisyWorld: Work Method
- 2.8. Mathematical Concepts in Modeling
  - 2.8.1. Random Variables
  - 2.8.2. Probability Models
  - 2.8.3. Regression Models
  - 2.8.4. Models in Differential Equations
- 2.9. Conditions, Iterations and Repeatability
  - 2.9.1. Definition of Concepts
  - 2.9.2. Applying Iterations and Repeatability to Environmental Models
- 2.10. Functions and Recursion
  - 2.10.1. Function Construction to Obtain Reusable Modular Codes
  - 2.10.2. Introducing Recursion as a Programming Technique

## Module 2. Modeling Environmental Systems

- 2.1. Models, Computation and Environment
  - 2.1.1. Introduction to Scale and Complexity Problems
  - 2.1.2. Presenting Alternatives to Computer Modeling and Environmental Simulation Processes
- 2.2. Introduction to R
  - 2.2.1. Program R
  - 2.2.2. R Applications in Modeling
- 2.3. Systems and Systems Analysis
  - 2.3.1. Main Types of Systems Analysis in Environmental Sciences
- 2.4. Models and Modeling
  - 2.4.1. Types of Models
  - 2.4.2. Components
  - 2.4.3. Modeling Phases



*Advance your professional career with a Postgraduate Certificate that will allow you to apply environmental systems modeling in your projects"*

04

# 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.



05

# Certificate

The Postgraduate Certificate in GIS in Environmental Modeling guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.





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*Successfully complete this 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 GIS in Environmental Modeling** 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 GIS in Environmental Modeling**

Modality: **online**

Duration: **12 weeks**

Accreditation: **12 ECTS**



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

**tech** global  
university

## Postgraduate Certificate GIS in Environmental Modeling

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