Professional Master's Degree

Geomatics Engineering and Geoinformation

tech global university

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Professional Master's Degree

Geomatics Engineering and Geoinformation

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/engineering/professional-master-degree/master-geomatics-engineering-geoinformation**

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01

Introduction

The emergence of new technological tools in the digital environment has led to a revolution in Geomatics. This discipline is in charge of managing geographical information, using all types of devices and computer applications. For this reason, it is necessary for professionals working in this area to know about the latest advances, in such a way that, in their daily work, they can incorporate the latest techniques when it comes to collecting, organizing and presenting geographical data. This program offers students the most up-to-date knowledge in the sector, so that they can deepen their understanding of aspects such as mapping with LIDAR technology or photogrammetry with drones. All this, following a 100% online innovative learning system which can be adapted to the professional and personal circumstances of each student.

This program will give you access to the most advanced knowledge in Geomatics and Geoinformation so that you can incorporate the best tools available into your work"

New technological and digital tools have allowed disciplines such as Geomatics to improve their precision and efficacy. The emergence of these disruptive technologies has also led to the emergence of new professional profiles in this area such as the expert surveyor, the GIS specialist or the expert in 2D modeling focused on this sector. For this reason, professionals dedicated to this field must be aware of new innovations in order to be able to incorporate them into their work.

This Professional Master's Degree in Geomatics Engineering and Geoinformation provides in-depth knowledge of these innovations, focusing on areas such as photogrammetry, geopositioning, applied information in this field; especially programming and the design and management of databases, using drones to represent terrain through photographic images, and many more. In this way, professionals will integrate the most innovative techniques into their daily work, allowing them to adapt to transformations in the sector and gain access to the new job positions that have recently emerged.

And all this will be achieved through an online teaching methodology, specially designed so that the professional can combine their work with their studies, without any kind of interruption. In addition, they will be guided throughout the entire process by a first-class teaching staff with extensive experience in this field, while the student enjoys numerous multimedia contents such as interactive summaries, practical exercises or master classes.

This **Professional Master's Degree in Geomatics Engineering and Geoinformation** contains the most complete and up-to-date program on the market. The most important features include:

- Practical cases presented by experts in Topographpy, Civil Engineering and Geomatics
- 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
- 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

Gain in-depth knowledge of aspects such as photogrammetry while you enjoy a teaching methodology that is adapted to you, allowing you to decide when and where to study"

In recent years, many new professional profiles have emerged in the field of Geomatics, such as the expert surveyor. This program gives you all the keys to successfully deal with this transformation"

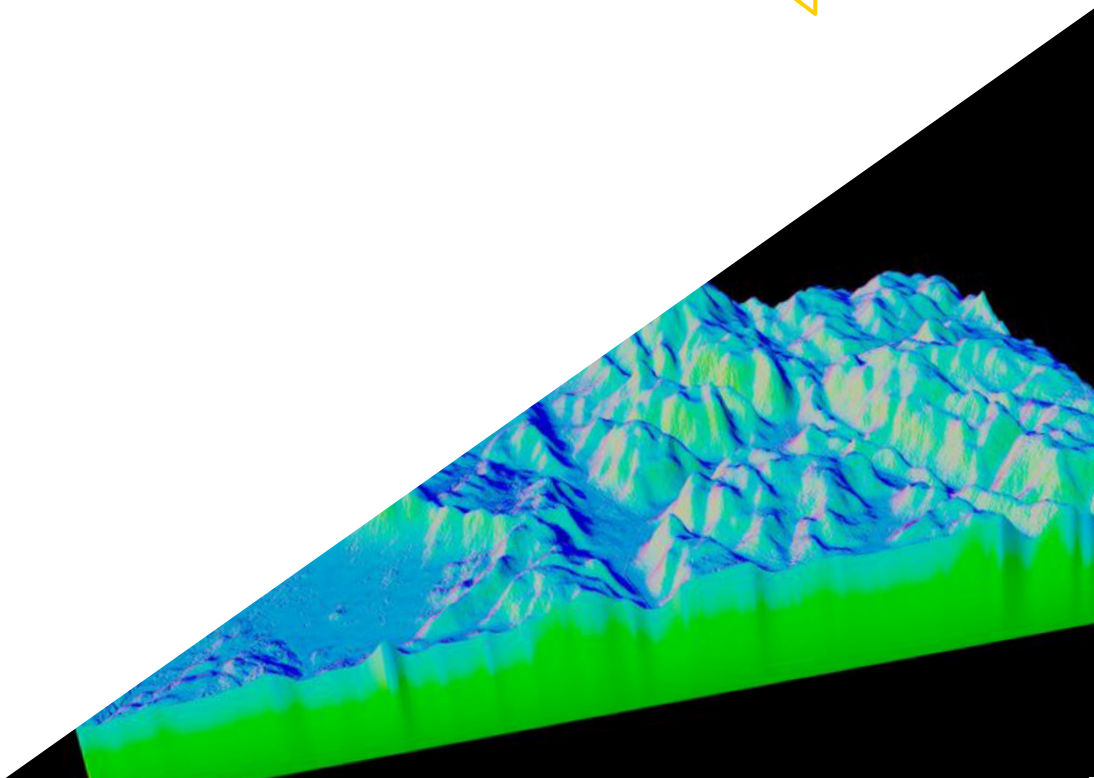
Thanks to this program, you will learn how to use drones map and represent the terrain by means of photographic images.

Know the latest computer tools applied to Geomatics with this Professional Master's Degree.

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

Thanks to multimedia content developed with the latest educational technology, you will be immersed in situated and contextual learning. In other words, a simulated environment that will provide immersive learning, programmed to train for real situations.

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



02

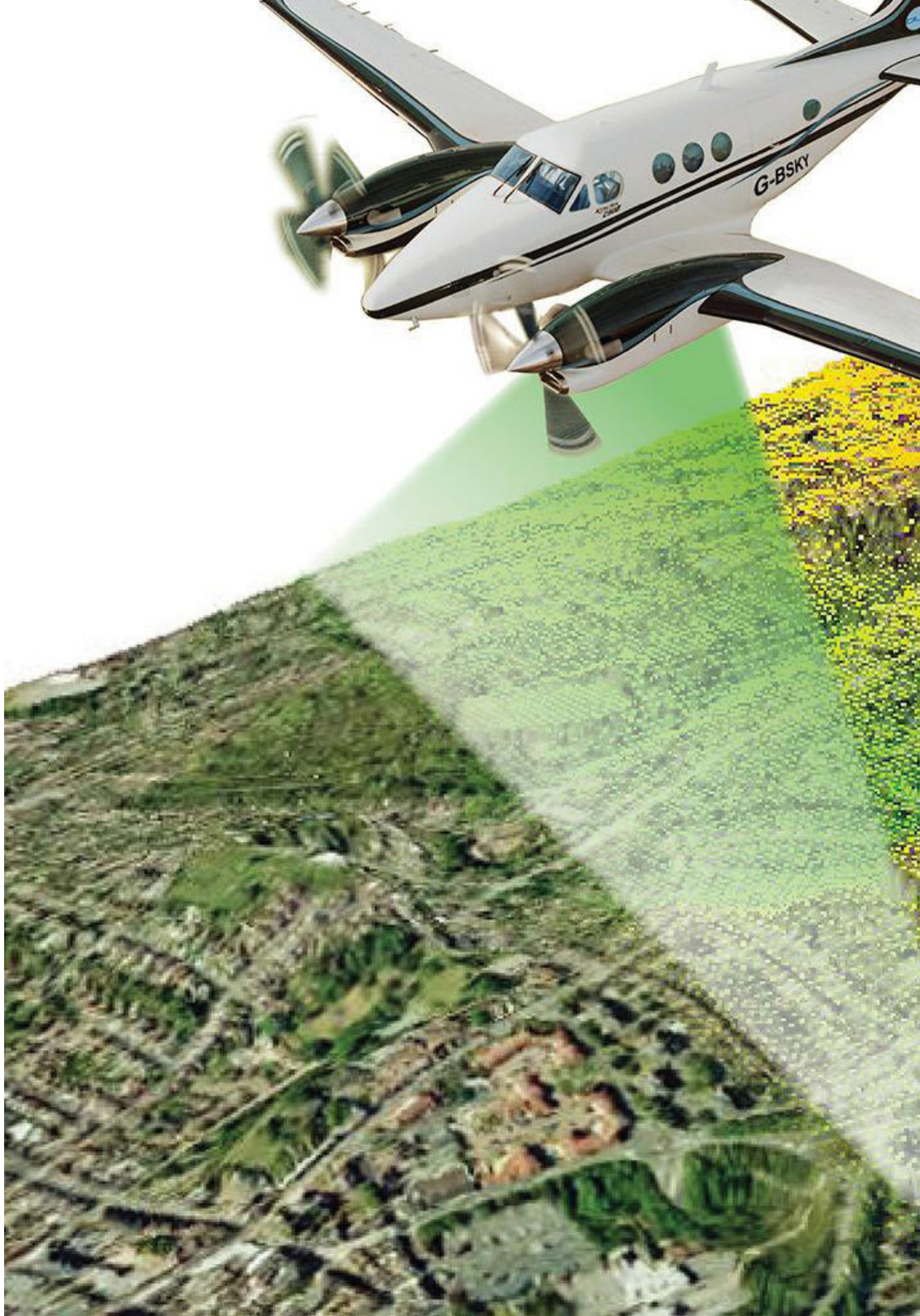
Objectives

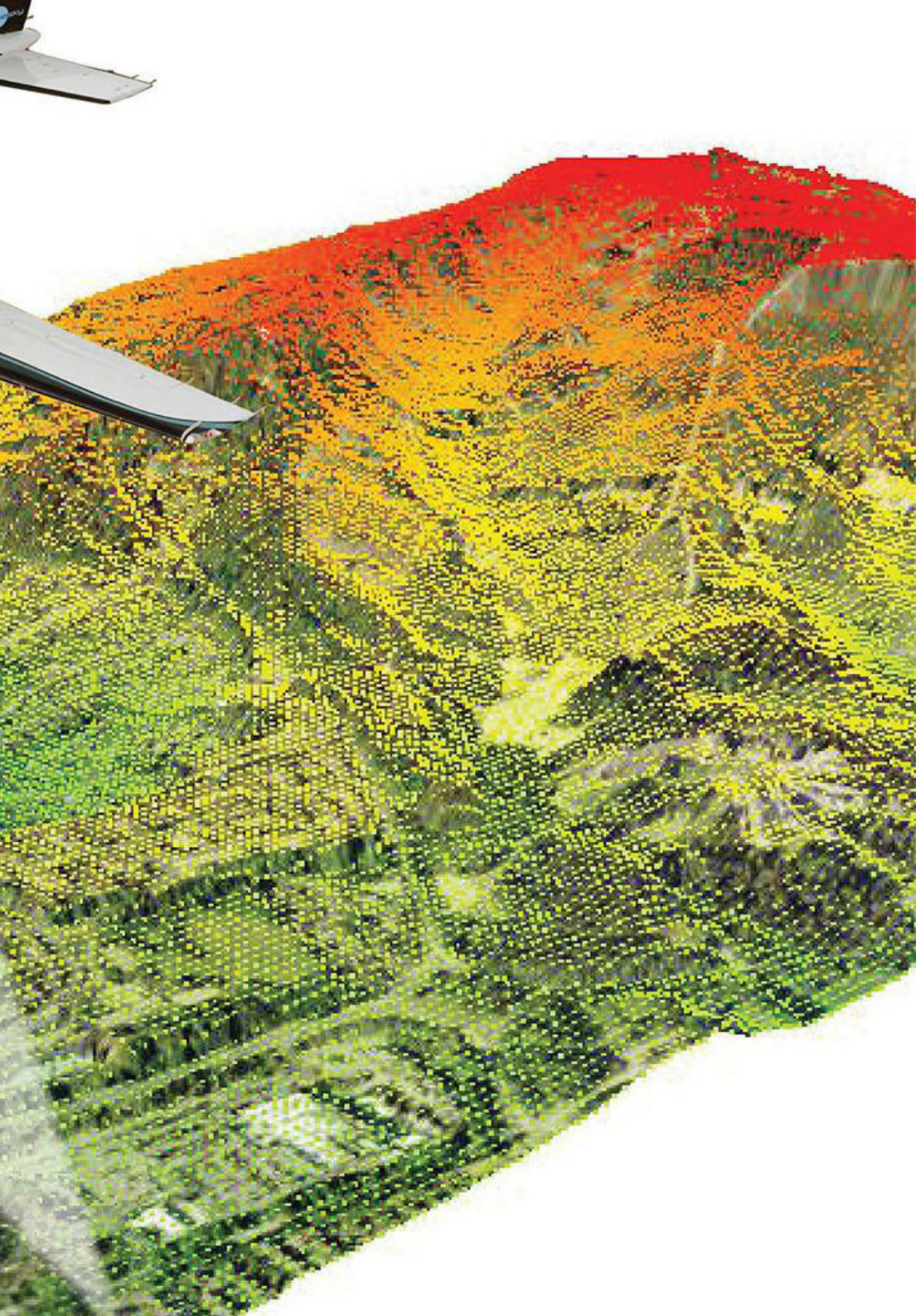
The main objective of this Professional Master's Degree in Geomatics Engineering and Geoinformation is to offer professionals the best and most up-to-date tools to be able to collect, manage and present geographic information. Therefore, upon finishing this program, they will be in possession of knowledge that will allow them to access many civil engineering and topography projects. This is because the professional will have incorporated into their daily practice the most innovative technological and computer tools to develop their work.

Your objective is to gain the best knowledge in order to develop your work in the field of Geomatics and this program offers this to you in a simple and fast way. Don't wait any longer and enroll now"

General Objectives

- Gather knowledge from different disciplines of topography and focus them towards the expert environment
- Determine expert topograhy as a branch of Geomatics
- Analyze the particularities of the cadaster in depth in order to identify the current characteristics that define/compose it
- Evaluate the positioning of urban and land planning within the concept of land, as well as the resources available on the Internet
- Generate specialized knowledge on LIDAR technology
- Analyze the impact of LIDAR data on the technology around us
- Integrate, manage and execute building information modeling projects
- Evaluate the different database engines and their benefits
- Analyze the most used web servers with more projection and prestige
- Evaluate different existing desktop, web and mobile clients
- Analyze different live customers
- Identify the best FrontEnd solutions for specific projects
- Develop the predominant programming languages in Geomatics
- Examine these languages as a means of connection to databases
- Justify the most appropriate environment for the use of one language or the other
- Evaluate the use of each language and its usefulness in painting maps and presenting other results





Specific Objectives

Module 1. Expert Topography

- Analyze the elements of property-oriented surveying
- Develop the concept of expert evidence
- Determine the structure of an expert report
- Establish the requirements for being an expert
- Analyze the performance mode of an expert witness
- Identify the different actors in an expert procedure

Module 2. Mapping with LIDAR Technology

- Analyze LIDAR technology and its multiple applications in today's technology
- Specify the importance of LIDAR technology in geomatics applications
- Classify the different LIDAR mapping systems and their applications
- Define the use of 2D laser scanning as part of LIDAR technologies
- Propose the use of the 2D laser scanner for topographic surveys
- Demonstrate the advantages of the massive Geoinformation acquisition system using 2D laser scanning, as opposed to traditional topographic surveys
- Detail a clear and practical methodology of 2D laser scanning from the planning to a reliable delivery of results
- Examine, by means of real case studies, the use of 2D laser scanners in various sectors: mining, construction, civil engineering, deformation control or earthworks
- Recapitulate the impact of LIDAR technologies on current and future surveying

Module 2. 2D Modelling and BIM Technology

- Determine how to proceed to capture with photographs the desired object to be modeled
- Obtain and analyze point clouds from these photographs using various specific photogrammetry software
- Process the different point clouds available, eliminating noise, georeferencing them, adjusting them and applying the mesh densification algorithms that best suit reality
- Editing, smoothing, filtering, merging and analysis of 2D meshes resulting from the alignment and reconstruction of point clouds
- Specify the application parameters for curvature, spacing and environmental occlusion meshes
- Create an animation of the rendered mesh, textured and according to the set IPO curves
- Prepare and set up the model for 2D printing
- Identify the parts of a BIM project and present the 2D model as a base element for the BIM environment software

Module 3. Photogrammetry with Drones

- Develop the strengths and limitations of a drone for mapping purposes
- Identify the reality of the surface to be represented, on the ground
- Provide topographical accuracy by means of conventional topography, prior to the photogrammetric flight
- Identify the actual volume where we are going to work in order to minimize any risk
- Control at all times the trajectory of the drone based on the programmed parameters
- Ensure the correct copying of files to minimize the risk of file loss
- Configure the best restitution of the flight according to the desired results
- Download, filter and clean the results obtained from the flight with the required accuracy
- Present the cartography in the most common formats according to the client's needs

Module 4. Geographical Information Systems

- Analyze the elements, process steps and storage essential to the management of a GIS
- Develop georeferenced cartographic maps with overlapping layers from various sources from various sources using GIS software
- Evaluate the topological problems that occur in processes with vector models
- Spatially analyze the different layers required for the project, developing studies of affected areas or specific space searches
  or other working environments
- Present projects analyzed by pixel functions and surfaces in raster layers to determine information of interest
- Work with digital terrain models and modeling, representing and visualizing territorial information on and below the earth's surface
- Consult routes and navigation tracks interacting in mobile device environments

Module 6. Backend for GIS

- Generate specialized knowledge about Apache server to share results online
- Evaluating Nginx server as an alternative to Apache server
- Analyze the Tomcat server as an application server and other application servers
- Browse MySQL, Postgres and SQLite database engine
- Determine which database engine to choose for a particular project

Module 7. Clients for GIS

- Evaluate the requirements for different clients
- Analyze the capabilities of using different Plugins and the customization capabilities of the clients
- Introduce the different clients and the programming languages they use
- Examine the different options available to a user
- Develop use cases for different customers
- Generate a source of knowledge to discern which client to use for which project

Module 8. Programming for Geomatics

- Configure PHP and examine its usage requirements
- Present the stored data in an attractive way
- Analyze control and iteration structures in different languages
- Determine how to connect to databases located on different servers or in the Cloud
- Examine the possibilities of using languages for web applications and mobile devices
- Develop use cases for the different languages
- Generate a source of knowledge to discern which language to use for which project, server or desktop client

Gain up-to-date and specialized knowledge thanks to this Professional Master's Degree in Geomatics Engineering and Geoinformation"

02

Skills

After finishing this Professional Master's Degree in Geomatics Engineering and Geoinformation, the professional will be in possession of new skills that will bring them closer to the development of activities such as expert surveying, technical positions in geographic information systems, the specialty of ICT applied to geographic information systems or photogrammetry. This will allow them to be up to date on all the latest developments in Geomatics, being able to develop a wide variety of projects in this area.

Develop new skills in the field of Geomatics in a practical and simple way with this specialist course"

General Skills

- Plan, structure and develop expert reports
- Present the range of possibilities of the cadastre's service through the land registry
- Determine the different positioning systems by studying their operation
- Plan a photogrammetric survey according to requirements
- Develop a practical, useful and safe methodology for mapping with drones
- Analyze, filter and edit with topographic rigor, the results obtained
- Present in a clean, intuitive and practical way the cartography or reality represented
- Gather, review and interpret terrain and geographically related information
- Plan, design and execute a demographic or other analysis study linked to geographic information

This Professional Master's Degree will allow you to progress professionally immediately. Enroll now and discover how it's possible"

Specific Skills

- Develop GNSS systems and assess their capabilities
- Study the possible errors in GNSS systems
- Analyze the GNSS results obtained
- Compile LIDAR applications applied to Geomatics and future possibilities
- Examine the practical application of LIDAR by 2D laser scanning as applied to Topography
- Design and develop near object photogrammetry projects
- Generate, measure, analyze and project three-dimensional objects
- Georeferencing and calibrating the project environment
- Define the parameters that need to be known for the elaboration of the various photogrammetric methods
- Prepare the three-dimensional object for 2D printing
- Plan, design and execute a cartographic plan with Geographic Information Systems (GIS)
- Compile, set up and process navigation and GIS systems for implementation on mobile devices
- Develop servers recommended by the Geospatial Foundation
- Identify the best Backend solutions for specific projects

03

Course Management

This Professional Master's Degree in Geomatics Engineering and Geoinformation has a first-class teaching staff that will provide students with all the latest developments in this field. Therefore, the professional who completes this program will master all kinds of technological and computer tools that will allow them to improve the efficiency of their daily work and access to numerous topographic and engineering projects that require the latest advances in Geomatics

An experienced faculty who are up to date with all the advances in Geomatics guide you through the entire learning process"

Management

Mr. Puértolas Salañer, Ángel Manuel

- Application development in .Net environment, Python development, SQL Server database management, system administration. ASISPA
- Topographical Surveyor Study and reconstruction of roads and accesses to towns. Ministry of Defence Embedded with UN forces in Lebanon
- Topographical Surveyor Topography per Project Ministry of Defence
- Topographical Surveyor Georeferencing of the old cadastre of the province of Murcia (Spain). Geoinformation and Systems SL
- Technical Engineer in Topography from the Polytechnic University Valencia
- Master's Degree in Cybersecurity from MF Business School and the Camilo José Cela University
- Web management, server administration and task development and automization in Python Milcom
- Development of applications in .Net environment. SQL Server management Own software support Ecomputer

Professors

Mr. Porto Tapiquén, Carlos Efraín

- Analyst, consultant and cartographer in Geographic Information Systems
- Professor of Geographic Information Systems in the Master's Degree in Territorial Planning
- Instructor of Extension Courses in GIS and Digital Cartography
- Master's Degree in Remote Sensing and GIS
- Degree in Geography from the Universidad Central de Venezuela

Mr. Moll Romeu, Kevin

- Graduate in Geodesic Engineering, Topography and Cartography from the Polytechnic University of Valencia
- Soldier in the Air Force at the Alcantarilla Air Base

Mr. Encinas Pérez, Daniel

- Enusa Advanced Industries Environmental Center Head of the Technical and Topographical Office
- Ortigosa dismantling and excavations Head of Projects and Topography
- Epsa Internacional. Head of Production and Topography
- Palazuelos de Eresma Town Hall Topographic survey for Administration for the Mojón Partial Plan
- Degree in Engineering in Geomatics and Topography from the University of Salamanca
- Master's Degree in Cartographic Geotechnologies applied to Engineering and Architecture from the University of Salamanca (in progress)
- Higher Technician in Development of Urban Planning Projects and Topographic Operations
- RPAS Professional Pilot (Issued by Aerocámaras - AESA)

Mr. Aznar Cabotá, Sergio

- Director de departamento GIS en Idrica
- Analista y Desarrollador GIS en Belike
- Analista y Desarrollador GIS en Aditelsa
- Desarrollador GIS en Visual
- Ingeniero en Geodesia y Cartografía en Valencia por la Universidad Politécnica de Valencia
- Ingeniero técnico en Topografía en Valencia por la Universidad Politécnica de Valencia
- Profesor en la UPV para el título Experto Universitario en Tecnologías Digitales para el Sector Agroalimentario

Mr. Ramo Maicas, Tomás

- Administrator for the Revolotear company Technical director for the development of the use of drones and laser scanners to obtain topography through the handling and filtering of point clouds, meshes and textures applied to mining, construction, architecture and heritage
- Head of Topography at the Revolotear business Company dedicated mainly to photogrammetric surveys with drone Volumetric control of mining fronts and cubing of stockpiles, for the main mining companies
- Chief of Topography in Senegal for the company MOPSA (Marco Group in Senegal). Project design, volume study of materials, edition of plans, field and office topography, for the works of adaptation of the Pakh dam and CSS, in Guiers lake and adaptation of the Neti Yone canal
- Logistics implementation work for the company Blauverd, Korman, in Algeria Site manager and responsible for topography on several building sites, mainly in Algiers, Constantine and Oran
- Technical Engineer in Topography from the School of Geodesy, Cartography and Topography Engineering of the Polytechnic University of Valencia
- Technical Engineer in Topography from the School of Geodesy, Cartography and Topography Engineering of the Polytechnic University of Valencia
- Drone Pilot (RPAS), by FLYSCHOOL AIR ACADEMY aeronautical training center

04

Structure and Content

This Professional Master's Degree in Geomatics Engineering and Geoinformation at TECH has been developed to raise the qualification of engineering professionals to the highest quality standards. To this end, an exhaustive review of relevant subjects such as embedded systems, microelectronics, power converters, biomedical electronics and energy efficiency, among others, is proposed. Issues of great importance to achieve the level of competitiveness in students demanded by today's companies.

The syllabus of this Professional Master's Degree includes relevant information on different areas of electronic systems"

Module 1. Expert Topography

1.1. Classic Topography
- 1.1.1. Total Station
  - 1.1.1.1. Stationing
  - 1.1.1.2. Automatic Monitoring Total Station
  - 1.1.1.3. Measurement without a Prism
- 1.1.2. Coordinate Transformation
- 1.1.3. Topographic Methods
  - 1.1.2.1. Free Stationing
  - 1.1.2.2. Measuring Distance
  - 1.1.2.3. Stakeout
  - 1.1.2.4. Area Calculation
  - 1.1.2.5. Remote Height

1.2. Cartography
- 1.2.1. Cartographic Projections
- 1.2.2. UTM Projection
- 1.2.3. System of UTM Coordinates

1.3. Geodesy
- 1.3.1. Geoid and Ellipsoid
- 1.3.2. The Datum
- 1.3.3. System of Coordinates
- 1.3.4. Types of Elevations
  - 1.3.4.1. Height of the Geoid
  - 1.3.4.2. Ellipsoid
  - 1.3.4.3. Orthometric
- 1.3.5. Geodetic Reference Systems
- 1.3.6. Leveling Networks

1.4. Geopositioning
- 1.4.1. Satellite Positioning
- 1.4.2. Errors
- 1.4.3. GPS
- 1.4.4. GLONAS
- 1.4.5. Galileo
- 1.4.6. Positioning Methods
  - 1.4.6.1. Static
  - 1.4.6.2. Static-Rapid
  - 1.4.6.3. RTK
  - 1.4.6.4. Real Time

1.5. Photogrammetry and LIDAR Techniques
- 1.5.1. Photogrammetry
- 1.5.2. Digital Elevation Model
- 1.5.3. LIDAR
  - 1.5.2.5. Plaintiff and Defendant
- 1.5.3. Parts of the Expert Report

Module 2. Geopositioning

2.1. Geopositioning
- 2.1.1. Geopositioning
- 2.1.2. Objectives of the Positioning
- 2.1.3. Earth Movements
  - 2.1.2.1. Translation and Rotation
  - 2.1.2.2. Precession and Nutation
  - 2.1.2.3. Pole Movements

2.2. Georeferencing Systems
- 2.2.1. Reference Systems
  - 2.2.1.1. International Terrestrial Reference Systems. ITRS
  - 2.2.1.2. Local Reference Systems. ETRS 89 (European Datum)
- 2.2.2. Reference Framework
  - 2.2.2.1. International Territorial Reference Framework. ITRF
  - 2.2.2.2. International GNSS Reference Framework. Materialization of ITRS
- 2.2.3. International Ellipsoids of Revolution GRS-80 and WGS-83

2.3. Positioning Mechanisms or Systems
- 2.3.1. GNSS Positioning
- 2.3.2. Mobile Positioning
- 2.3.3. WLAN Positioning
- 2.3.4. Wi-Fi Positioning
- 2.3.5. Celestial Positioning
- 2.3.6. Submarine Positioning

2.3. GNSS Technologies
- 2.3.1. Types of Satellite According to Orbit
  - 2.3.1.1. Geostations
  - 2.3.1.2. Medium Orbit
  - 2.3.1.3. Low Orbit
- 2.3.2. Multiconstellation GNSS Technologies
  - 2.3.2.1. NAVSTAR Constellation
  - 2.3.2.2. GALILEO Constellation
    - 2.3.2.2.1. Phases and Carrying Out the Project
- 2.3.3. GNSS Clock or Oscillator

2.4. Augmentation Systems
- 2.4.1. Satellite-Based Augmentation System (SBAS)
- 2.4.2. Ground-Based Augmentation System (GBAS)
- 2.4.3. Assisted GNSS (A-GNSS)

2.6. Propagation of the GNSS Signal
- 2.6.1. GNSS Signal
- 2.6.2. Atmosphere and Ionosphere
  - 2.6.2.1. Elements of Wave Propagation
  - 2.6.2.2. Behavior of the GNSS Signal
  - 2.6.2.3. Ionospheric Effect
  - 2.6.2.4. Ionospheric Models
- 2.6.3. Troposphere
  - 2.6.3.1. Tropospheric Refraction
  - 2.6.3.2. Tropospheric Models
  - 2.6.3.3. Tropospheric Delays

2.7. GNSS Error Sources
- 2.7.1. Satellite and Orbit Errors
- 2.7.2. Atmospheric Errors
- 2.7.3. Errors in Signal Reception
- 2.7.4. Errors due to External Devices

2.8. Observation and GNSS Positioning Techniques
- 2.8.1. Observation Methods
  - 2.8.1.1. By Type of Observable
    - 2.8.1.1.1. Code Observable/Pseudo Distances
    - 2.8.1.1.2. Phase Observable
  - 2.8.1.2. According to Receptor Action
    - 2.8.1.2.1. Static
    - 2.8.1.2.2. Kinematic
  - 2.8.1.3. According to Moment in Which the Calculation is Done
    - 2.8.1.2.1. Post-Process
    - 2.8.1.2.2. Real Time
  - 2.8.1.4. According to the Type of Solution
    - 2.8.1.4.1. Absolute
    - 2.8.1.4.2. Relative/ Difference
  - 2.8.1.5. According to Time of Observation
    - 2.8.1.5.1. Static
    - 2.8.1.5.2. Static-Rapid
    - 2.8.1.5.3. Kinematic
    - 2.8.1.5.3. RTK Kinematic
- 2.8.2. Precise Point Positioning PPP
  - 2.8.2.1. Principles
  - 2.8.2.2. Advantages and Disadvantages.

2.8.2.3. Errors and Corrections
2.8.3. Differential GNSS
2.8.3.1. Kinematics in RTK Real Time
2.8.3.2. NTRIP Protocol
2.8.3.3. NMEA Standard
2.8.4. Types of Receptors
2.9. Analysis of Results
2.9.1. Statistical Analysis of Results
2.9.2. Test After Adjustment
2.9.3. Error Detection
2.9.3.1. Internal Reliability
2.9.3.2. Baarda Test
2.9.4. Error Figures
2.10. Positioning of Mobile Devices
2.10.1. A-GNSS Positioning Systems
2.10.2. Location-Based System
2.10.3. Satellite-Based Systems
2.10.4. CELL ID Mobile Phone
2.10.5. Wi-Fi Networks

Module 3. Mapping with LIDAR Technology

3.1. LIDAR Technology
3.1.1. LIDAR Technology
3.1.2. Functioning of the System
3.1.3. Principal Components
3.2. LIDAR Applications
3.2.1. Applications
3.2.2. Classification
3.2.3. Current Implementation
3.3. LIDAR Applied to Geomatics
3.3.1. Mobile Mapping System
3.3.2. Airborne LIDAR
3.3.3. Ground-Based LIDAR. Backpack and Static Scanning
3.4. Topographic Surveys by 2D Laser Scanner
3.4.1. Operation of 2D Laser Scanning for Topography
3.4.2. Error Analysis
3.4.3. General Survey Methodology
3.4.4. Applications
3.5. 2D Laser Scanner Survey Planning
3.5.1. Objectives to Scan
3.5.2. Positioning and Georeferencing Planning
3.5.3. Catch Density Planning
3.6. 2D Scanning and Georeference
3.6.1. Scanner Configuration
3.6.2. Acquisition of Data
3.6.3. Target Reading: Georeferencing
3.7. Initial Management of Geoinformation
3.7.1. Geoinformation Download
3.7.2. Point Cloud
3.7.3. Georeferencing and Export of Point Clouds
3.8. Point Cloud Editing and Application of Results
3.8.1. Processing Point Clouds. Cleaning, Resampling or Simplification
3.8.2. Geometric Extraction
3.8.3. 2D Modelling. Mesh Generation and Texture Application
3.8.4. Analysis. Transversal Sections and Measurements
3.9. Surveys by 2D Laser Scanner
3.9.1. Planning: Precision and Instruments to Use
3.9.2. Fieldwork: Scanning and Georeferencing
3.9.3. Download Processing, Editing and Delivery
3.10. Repercussion of LIDAR Technologies
3.10.1. General Repercussion of LIDAR Technologies
3.10.2. Particular Impact of the 2D Scanner in Topography

Module 4. 2D Modelling and BIM Technology

4.1. 2D Modelling
- 4.1.1. Types of Data
- 4.1.2. Medical history
  - 4.1.2.1. By Contact
  - 4.1.2.2. Without Contact
- 4.1.3. Applications

3.2. The Camera as a Data Acquisition Tool
- 4.2.1. Photographic Cameras
  - 4.2.1.1. Types of Cameras
  - 4.2.1.2. Control Elements
  - 4.2.1.2. Calibration
- 4.2.2. EXIF Data
  - 4.2.2.1. Extrinsic Parameters (2D)
  - 4.2.2.2. Intrinsic Parameters (2D)
- 4.2.3. Taking Photographs
  - 4.2.3.1. Dome Effect
  - 4.2.3.2. Flash
  - 4.2.3.3. Number of Collections
  - 4.2.3.4. Camera - Object Distances
  - 4.2.3.5. Method
- 4.2.3. Necessary Quality

4.3. Collection of Support and Control Points
- 4.3.1. Classic Topography and GNSS Technology
  - 4.2.1.1. Application of Photogrammetry of a Close Object
- 4.3.2. Observation Methods
  - 4.2.2.1. Area Study
  - 4.2.2.2. Justification of the Method
- 4.3.3. Observation Network
  - 4.2.3.1. Planning
- 4.3.3. Precision Analysis

3.4. Generation of a Point Cloud with Photomodeler Scanner
- 4.4.1. Background
  - 4.4.1.1. Photomodeler
  - 4.4.1.2. Photomodeler Scanner
- 4.4.2. Requirements
- 4.4.3. Calibration
- 4.4.4. Smart Matching
  - 4.4.4.1. Obtaining the Dense Point Cloud
- 4.4.5. Creation of a Textured Mesh
- 4.4.6. Creation of a 2D Model from Images with Photomodeler Scanner

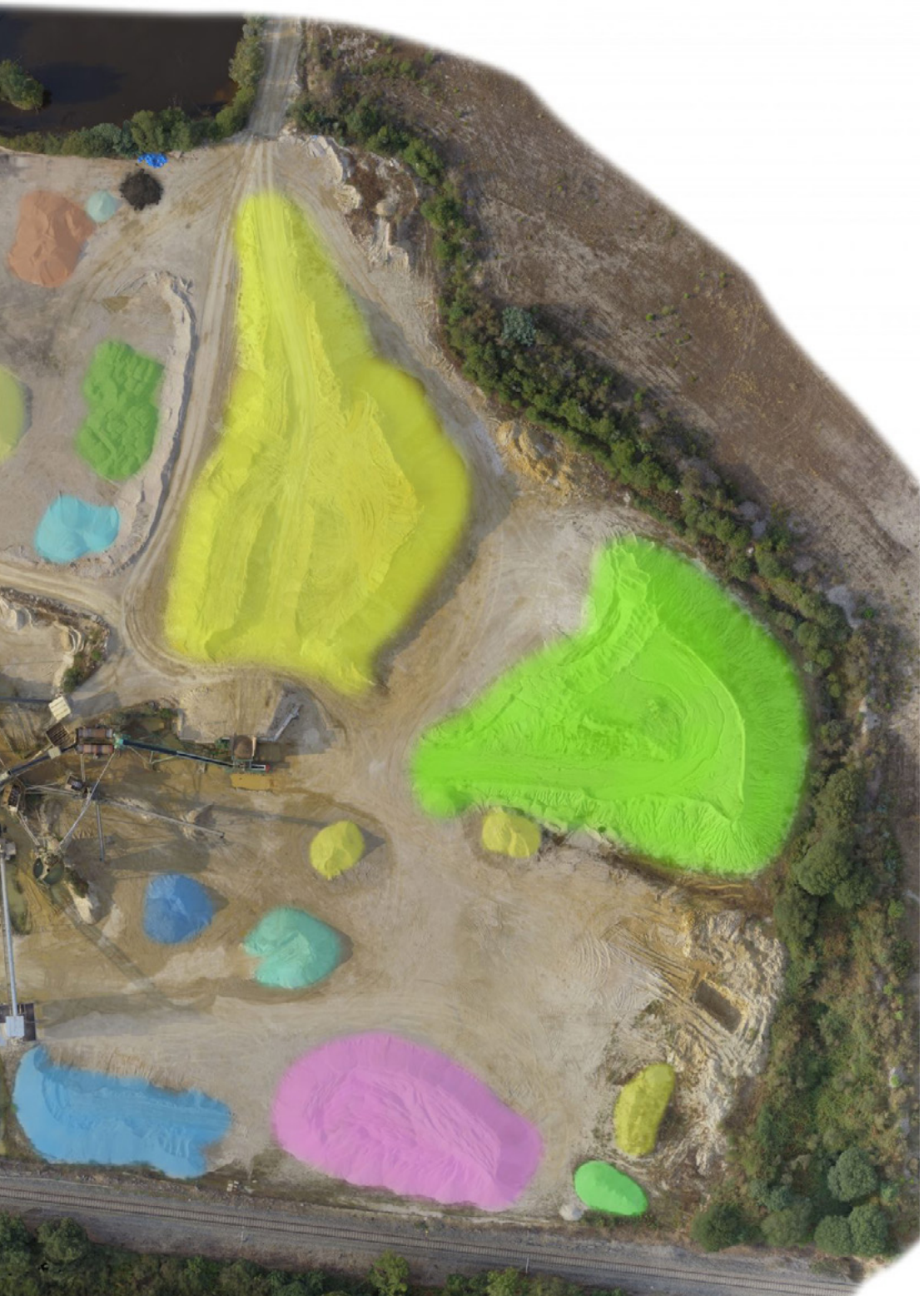
4.5. Generation of a Point Cloud with Structure from Motion
- 4.5.1. Cameras, Point Clouds, Software
- 4.5.2. Methodology
  - 4.5.2.1. Dispersed 2D Map
  - 4.5.2.2. Dense 2D Map
  - 4.5.2.3. Triangular Mesh
- 4.5.3. Applications

4.6. Point Cloud Georeferencing
- 4.6.1. Reference Systems and Coordinate Systems
- 4.6.2. Transformation
  - 3.6.2.1. Parameters
  - 3.6.2.2. Absolute Orientation
  - 3.6.2.4. Support Points
  - 3.6.2.5. Control Points (GCP)
- 4.6.3. 2DVEM

4.7. Meshlab. 2D Mesh Editing
- 4.7.1. Formats
- 4.7.2. Commands
- 4.7.3. Tools
- 4.7.4. 2D Reconstruction Methods

4.8. Blender. Rendering and Animation of 2D Models
- 4.8.1. 2D Production
  - 4.8.1.1. Modeling
  - 4.8.1.2. Materials and Textures
  - 4.8.1.3. Lighting
  - 4.8.1.4. Animation
  - 4.8.1.5. Photorealist Rendering
  - 4.8.1.6. Video Editing
- 4.8.2. Interface
- 4.8.3. Tools
- 4.8.4. Animation
- 4.8.5. Rendering
- 4.8.6. Prepared for 2D Printing

4.9. 2D Printing
- 4.9.1. 2D Printing
  - 4.9.1.1. Background
  - 4.9.1.2. 2D Manufacturing Technology
  - 4.9.1.3. Slicer
  - 4.9.1.4. Materials
  - 4.9.1.5. System of Coordinates
  - 4.9.1.6. Formats
  - 4.9.1.7. Applications
- 4.9.2. Calibration
  - 4.9.2.1. X and Y Axis
  - 4.9.2.2. Z Axis
  - 4.9.2.3. Bed Alignment
  - 4.9.2.4. Flow
- 4.9.3. Cura Printing



4.10. BIM Technologies
- 4.10.1. BIM Technologies
- 4.10.2. Parts of a BIM Project
  - 4.10.2.1. Geometric Information (2D)
  - 4.10.2.2. Project Times (3D)
  - 4.10.2.3. Costs (4D)
  - 4.10.2.4. Sustainability (6D)
  - 4.10.2.5. Operation and Maintenance (7D)
- 4.10.3. Software BIM
  - 4.10.3.1. BIM Viewers
  - 4.10.3.2. BIM Model
  - 4.10.3.3. Construction Planning (3D)
  - 4.10.3.4. Measuring and Budget (4D)
  - 4.10.3.5. Environmental Management and Energy Efficiency (6D)
  - 4.10.3.6. Facility Management (7D)
- 4.10.4. Photogrammetry in the BIM Environment with REVIT

Module 5. Photogrammetry with Drones

5.1. Topography, Mapping and Geomatics
- 5.1.1. Topography, Mapping and Geomatics
- 5.1.2. Photogrammetry

5.2. Structure of the System
- 5.2.1. UAVs (Military Drones), RPAS (Civilian Aircraft) or DRONES
- 5.2.2. Photogrammetric Method with Drones

5.3. Work Planning
- 5.3.1. Study of Airspace
- 5.3.2. Meteorological Previsions
- 5.3.3. Geographic Dimensioning and Flight Configuration

5.4. Field Topography
- 5.4.1. Initial Inspection of the Area of Work
- 5.4.2. Materialization of Supporting Points and Quality Control
- 5.4.2. Complementary Topographic Surveys

5.5. Photogrammetric Flights
- 5.5.1. Planning and Configuration of Flights
- 5.5.2. Field Analysis and Take-Off and Landing Points
- 5.5.2. Flight Review and Quality Control

5.6. Commissioning and Configuration
- 5.6.1. Information Download. Support, Security and Communication
- 5.6.2. Image and Topographic Data Processing
- 5.6.2. Processing, Photogrammetric Restitution and Configuration

5.7. Results Editing and Analysis
- 5.7.1. Interpretation of Results
- 5.7.2. Cleaning, Filtering and Treatment of Point Clouds
- 5.7.3. Obtaining Meshes, Surfaces and Orthomosaics

5.8. Presentation-Representation
- 5.8.1. Mapped. Formats and Common Extensions
- 5.8.2. 2D and 2D Representation. Level Curves, Orthomosaics and MDT
- 5.8.3. Presentation, Diffusion and Storage of Results

5.9. Phases of a Project
- 5.9.1. Planning
- 5.9.2. Fieldwork (Topography and Flights)
- 5.9.3. Download Processing, Editing and Delivery

5.10. Topography with Drones
- 5.10.1. Parts of the Exposed Method
- 5.10.2. Impact or Repercussion on Topography
- 5.10.3. Future Projection of Topography with Drones

Module 6. Geographical Information Systems

6.1. Geographical Information Systems (GIS)
- 6.1.1. Geographical Information Systems (GIS)
- 6.1.2. Differences Between CAD and a GIC
- 6.1.3. Types of Data Visualizers (Heavy or Light Clients)
- 6.1.4. Types of Geographical Data
  - 6.1.4.1. Geographic Information
- 6.1.5. Geographical Representations

6.2. Visualization of Elements in QGIS
- 6.2.1. QGIC Installation
- 6.2.2. Visualization of Data with QGIS
- 6.2.3. Labelled Data with QGIS
- 6.2.4. Overlaying Layers of Different Coverages with QGIS
- 6.2.5. Maps
  - 6.2.5.1. Parts of a Map
- 6.2.6. Printing a Plan with QGIS

6.3. Vector Model
- 6.3.1. Types of Vector Geometries
- 6.3.2. Attribute Tables
- 6.3.3. Topology
  - 6.3.3.1. Topological Rules
  - 6.3.3.2. Application of Topologies in QGIS
  - 6.3.3.2. Application of Database Topologies

6.3. Vector Model. Operators
- 6.3.1. Functional Criteria
- 6.3.2. Spatial Analysis Operators
- 6.3.3. Examples of Geospatial Operations

6.4. Generation of a Data Model with a Database
- 6.4.1. Installation of PostgreSQL and POSTGIS
- 6.4.2. Creation of a Geospatial Database with PGAdmin
- 6.4.3. Elements Creation
- 6.4.4. Geospatial Consultations with POSTGIS
- 6.4.5. Visualization of Elements of a Database with QGIS
- 6.4.6. Maps Server
  - 6.4.6.1. Types and Creation of Maps Server with Geoserver
  - 6.4.6.2. Types of WMS/WFS Data Services
  - 6.4.6.3. Visualization of Services in QGIS

6.5. Raster Model
- 6.5.1. Raster Model
- 6.5.2. Color Bands
- 6.5.3. Storage in Databases
- 6.5.4. Raster Calculator
- 6.6.5. Image Pyramids

6.6. Raster Model. Operations
- 6.6.1. Image Georeferencing
  - 6.6.1.1. Control Points
- 6.6.2. Raster Functionalities
  - 6.6.2.1. Surface Functions
  - 6.6.2.2. Distance Function
  - 6.6.2.3. Reclassification Functions
  - 6.6.2.4. Superposition Analysis Functions
  - 6.6.2.5. Statistical Analysis Functions
  - 6.6.2.6. Selection Functions
- 6.6.3. Loading Raster Data into a Database

6.8. Practical Applications of Raster Data
- 6.8.1. Application in the Agrarian Sector
- 6.8.2. MDE Treatment
- 6.8.3. Automation of Element Classification on a Raster
- 6.8.4. Treatment of LIDAR Data

6.9. Open Data
- 6.9.1. Open Street Maps (OSM)
  - 6.9.1.1. Cartographic Editing and Community
- 6.9.2. Obtaining Free Vector Mapping
- 6.9.3. Obtaining Free Raster Mapping

Module 7. Backend for GIS

7.1. Apache Web Server
- 7.1.1. Apache Web Server
- 7.1.2. Installation
- 7.1.3. Anatomy of the Apache Server
  - 7.1.3.1. Standard Content Folders
  - 7.1.2.2. The
- 7.1.4. Settings
- 7.1.5. Support Programming Languages
  - 7.1.5.1. Php
  - 7.1.5.2. Perl
  - 7.1.5.3. Ruby
  - 7.1.5.4. Others

7.2. Nginx Web Server
- 7.2.1. Nginx Web Server
- 7.2.2. Installation
- 7.2.3. Features

7.3. Tomcat Web Server
- 7.3.1. Tomcat Web Server
- 7.3.2. Installation
- 7.3.3. Maven Plugin
- 7.3.4. Connectors

7.4. GeoServer
- 7.4.1. GeoServer
- 7.4.2. Installation
- 7.4.3. Using the ImageMosiac Plugin

7.5. MapServer
- 7.5.1. MapServer
- 7.5.2. Installation
- 7.5.3. Mapfile
- 7.5.4. MapScript
- 7.5.4. MapCache

7.6. Deegree
- 7.6.1. Deegree
- 7.6.2. Characteristics of Deegree
- 7.6.3. Installation
- 7.6.4. Settings
- 7.6.4. Use

7.7. QGIS Server
- 7.7.1. QGIS Server
- 7.7.2. Installation in Ubuntu
- 7.7.3 Capabilities
- 7.7.4. Settings
- 7.7.5. Use

7.8. PostgreSQL
- 7.8.1. PostgreSQL
- 7.8.2. Installation
- 7.8.3. Posgis
- 7.8.3. PgAdmin

7.9. SQLite
- 7.9.1. SQLite
- 7.9.2. Spatialite
- 7.9.3. Spatialite-gui
- 7.9.4. Spatialite-tools
  - 7.9.4.1. General Tools
  - 7.9.4.2. OSM Tools
  - 7.9.4.3. XML Tools
  - 7.9.4.4. VirtualPG

7.10. MySQL
- 7.10.1. MySQL
- 7.10.2. Spatial Data Types
- 7.10.3. phpMyAdmin

Module 8. Clients for GIS

8.1. Grass GIS
- 8.1.1. Grass GIS
- 8.1.2. Components of the Graphic Interface
- 8.1.3. Commands of the Graphic Interface
- 8.1.4. Processing

8.2. Kosmo Desktop
- 8.2.1. Kosmo Desktop
- 8.2.2. Installation
- 8.2.3. Features

8.3. OpenJump
- 8.3.1. OpenJump
- 8.3.2. Installation
- 8.3.3. Plugins

8.4. QGIS
- 8.4.1. QGIS
- 8.4.2. Installation
- 8.4.3. Orfeo Toolbox

8.5. Tile Mill
- 8.5.1. Tile Mill
- 8.5.2. Installation
- 8.5.2. Map Creation from a CSV

8.6. gvSIG
- 8.6.1. gvSIG
- 8.6.2. Installation
- 8.6.3. Use Cases
- 8.6.4. Script Repository

8.7. uDig
- 8.7.1. uDig
- 8.7.2. Installation
- 8.7.3. Features
- 8.7.4. Use

8.7. Leaflet
- 8.7.1. Leaflet
- 8.7.2. Installation
- 8.7.3. Plugins

8.7. Mapbender
- 8.7.1. Mapbender
- 8.7.2. Features
- 8.7.3. Installation
- 8.7.4. Settings
- 8.7.5. Use

8.10. OpenLayers
- 8.10.1. OpenLayers
- 8.10.2. Features
- 8.10.3. Installation

Module 9. Programming for Geomatics

9.1. Programming for Backend in GIS. PHP Installation and Configuration
- 9.1.1. Programming for Backend in GIS
- 9.1.2. PHP Installation
- 9.1.3. Configuration: The php.ini File

8.2. Programming for Backend in GIS. Syntax and Control Structures in PHP
- 9.2.1. Syntax
- 9.2.2. Types of Data
- 9.2.3. Control Structures
  - 9.2.3.1. Simple Selection Structures
  - 9.2.3.2. Iteration Structures - While
  - 9.2.3.3. Intervention Structures - For
- 9.3.4. Functions

8.3. Programming for Backend in GIS. Database and PHP Connections
- 9.3.1. Connections for MySQL Database
- 9.3.2. Connections for PosgreSQL Database
- 9.3.3. Connections for SQLite Database

8.4. Programming in Python for GIS. Installation, Syntax and Functions
- 9.4.1. Programming in Python for GIS
- 9.4.2. Installation
- 9.4.3. Variables
- 9.4.4. Expressions and Operators
- 9.4.5. Functions
- 9.4.6. Work with Strings
  - 9.3.6.1. Formatting Strings
  - 9.3.6.2. Arguments
  - 9.3.6.3. Common Expressions

8.5. Programming in Python for GIS. Control Structures and Error Treatment
- 9.5.1. Simple Selection Structures
- 9.5.2. Iteration Structures - While
- 9.5.3. Intervention Structures - For
- 9.5.4. Error Treatment

8.6. Programming in Python for GIS. Access to Databases
- 9.6.1. MySQL Database Access
- 9.6.2. PostgreSQL Database Access
- 9.6.3. SQLite Access to Databases

8.7. Programming in R for GIS. Installation and Basic Syntax
- 9.7.1. Programming in R for GIS
- 9.7.2. Packet Installation
- 9.7.3. Basic R Syntax

8.8. Programming in R for GIS. Control Structures and Functions
- 9.8.1. Simple Selection Structures
- 9.8.2. Loops
- 9.8.3. Functions
- 9.8.4. Types of Data
  - 9.8.4.1. Lists
  - 9.8.4.2. Vectors
  - 9.8.4.3. Factors
  - 9.8.4.4. Dataframes

8.8. Programming in R for GIS. Access to Databases
- 9.8.1. Connection to Mysql with Rstudio
- 9.8.2. Integrating PostgreSQL - PostGIS in R
- 9.8.3. Use of JDBC in R

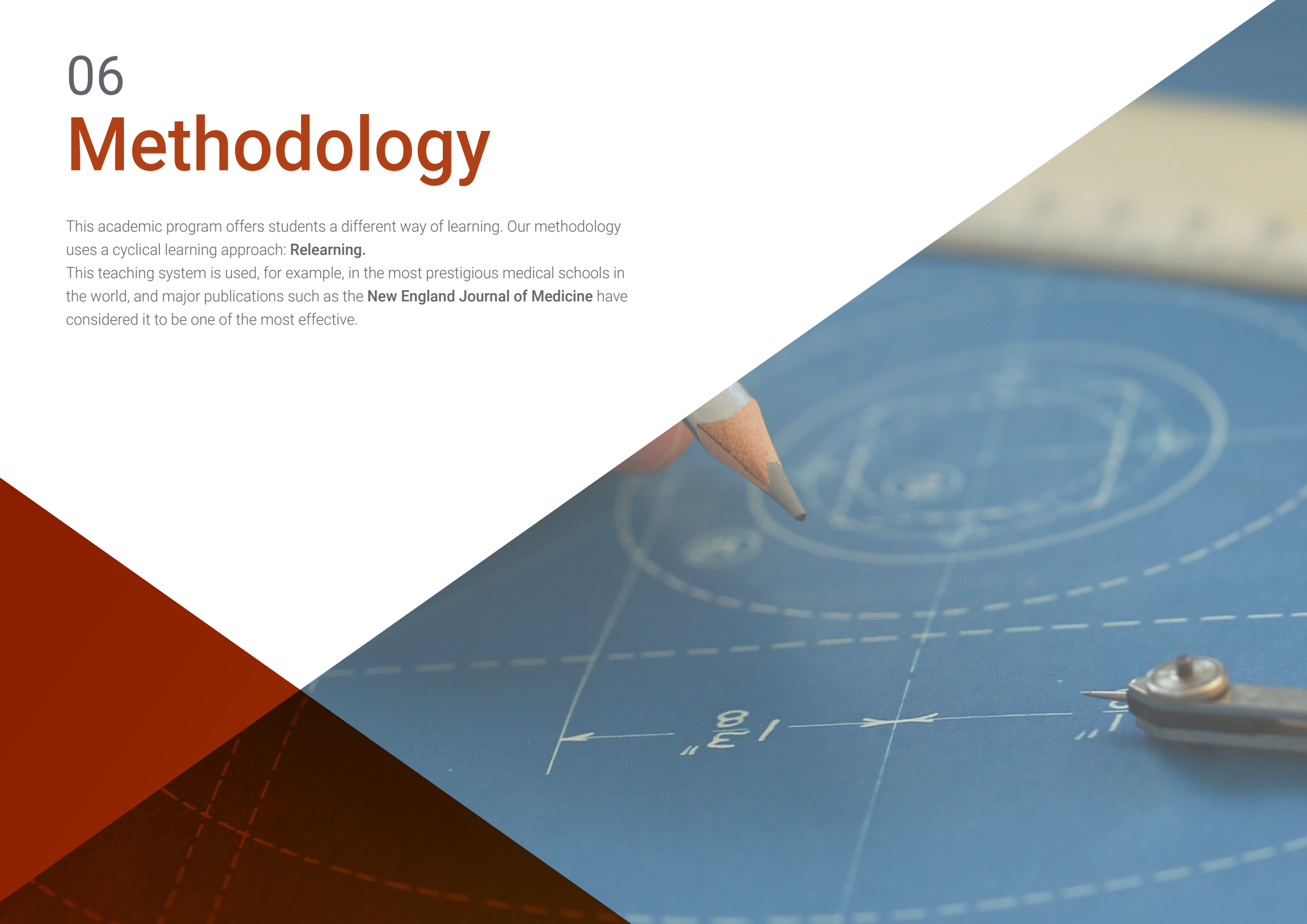
8.8. Programming in Javascript for GIS
- 9.8.1. Programming in Javascript for GIS
- 9.8.2. Features
- 9.8.3. NodeJS

06

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 1923, 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

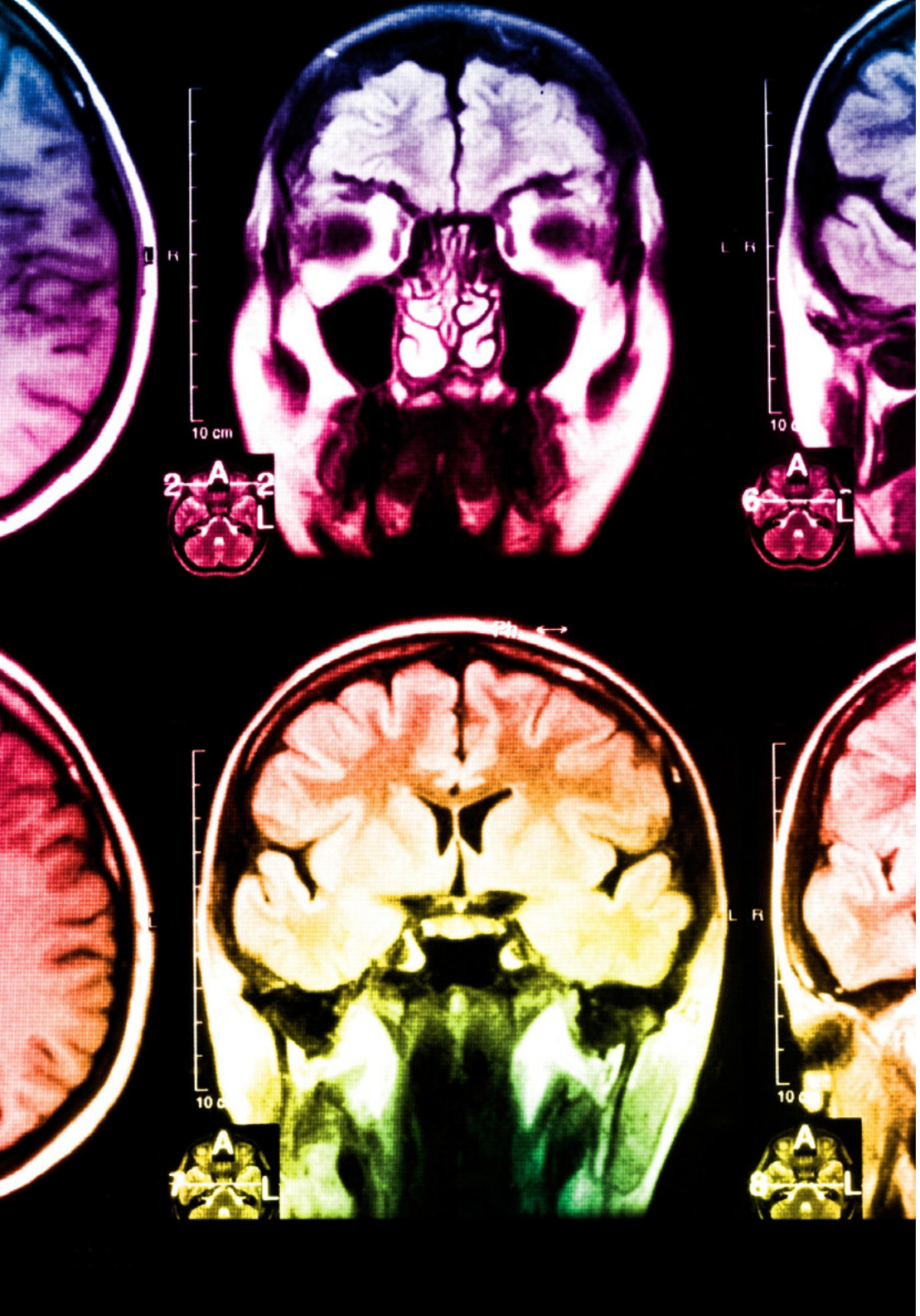
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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 640,000 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 32.4 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.

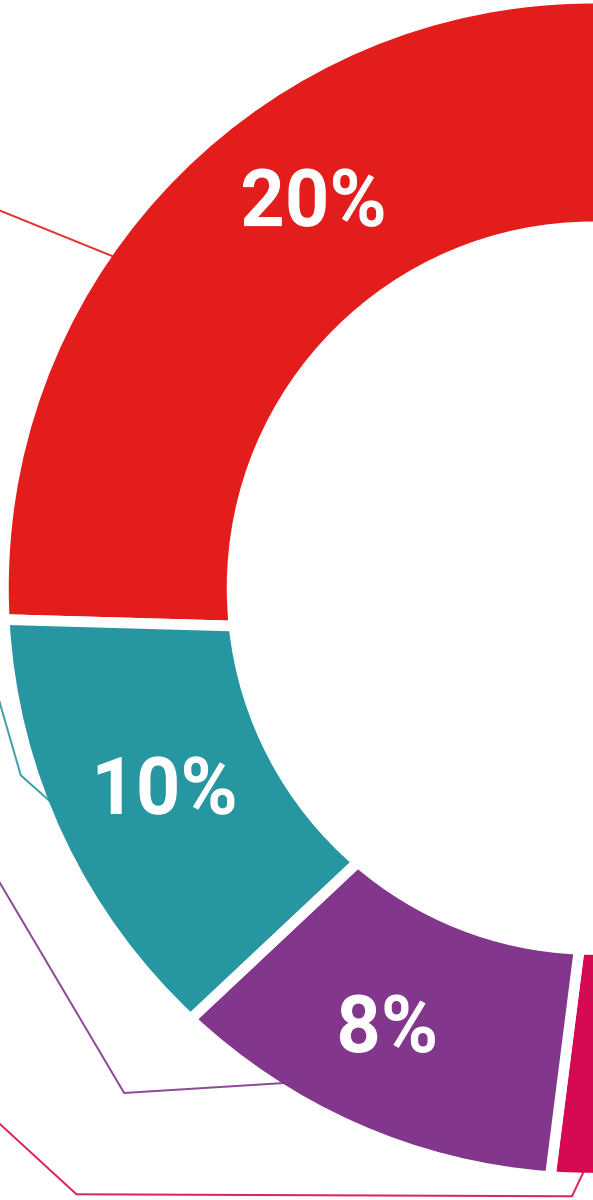
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

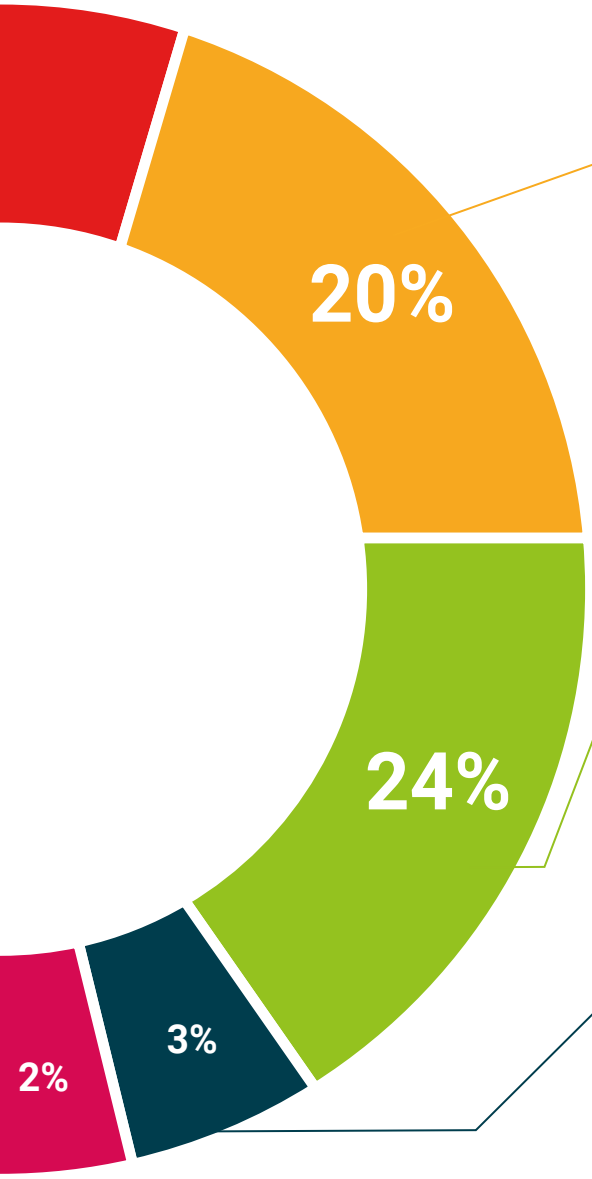
Practising Skills and Abilities

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.

07

Certificate

The Professional Master's Degree in Geomatics Engineering and Geoinformation guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree issued by TECH Global University.

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 **Professional Master's Degree diploma in Geomatics Engineering and Geoinformation** 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 2002. 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.

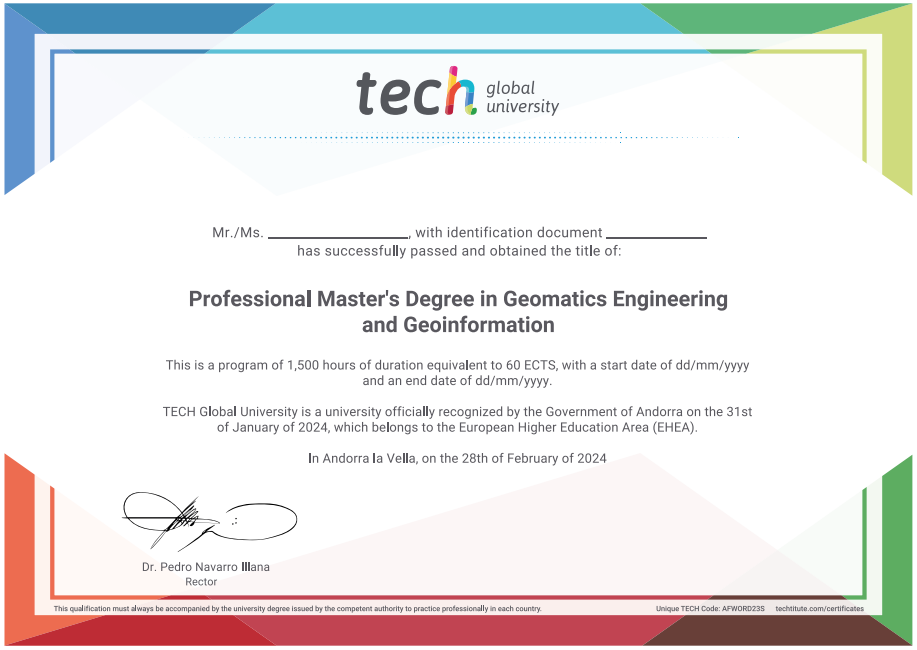
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Geomatics Engineering and Geoinformation**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Professional Master's Degree in Geomatics Engineering and Geoinformation

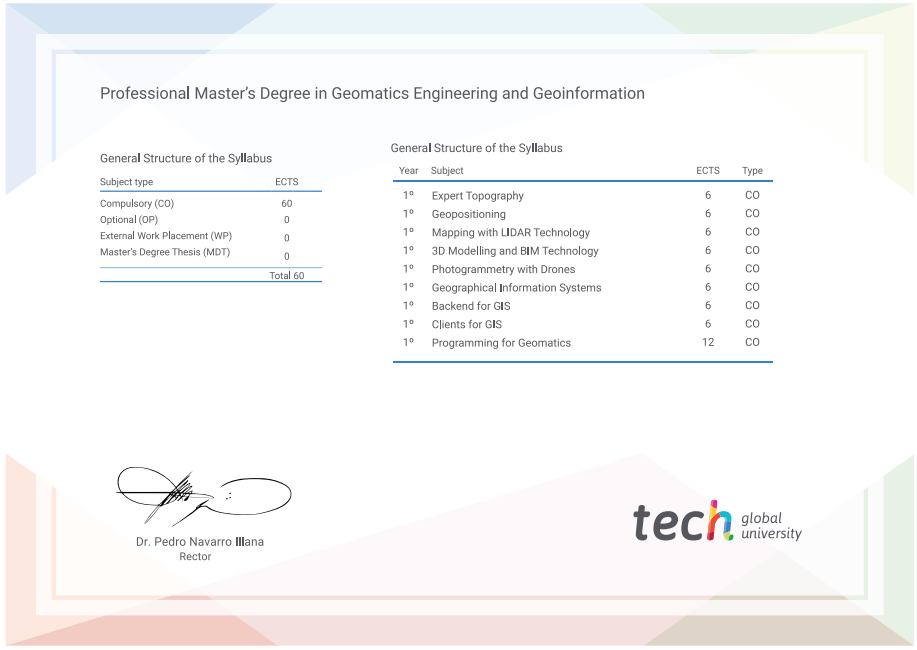
This is a program of 1,500 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

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


Professional Master's Degree in Geomatics Engineering and Geoinformation

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 60

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Expert Topography	6	CO
1º	Geopositioning	6	CO
1º	Mapping with LIDAR Technology	6	CO
1º	3D Modelling and BIM Technology	6	CO
1º	Photogrammetry with Drones	6	CO
1º	Geographical Information Systems	6	CO
1º	Backend for GIS	6	CO
1º	Clients for GIS	6	CO
1º	Programming for Geomatics	12	CO

Dr. Pedro Navarro Illana
Rector

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

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Professional Master's Degree

Geomatics Engineering and Geoinformation

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree

Geomatics Engineering and Geoinformation

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