Hybrid Professional Master's Degree
Geotechnics and Foundations

tech global university

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Hybrid Professional Master's Degree

Geotechnics and Foundations

Modality: **Hybrid (Online + Internship)**
Duration: **12 months**
Certificate: **TECH Global University**
Accreditation: **60 + 4 ECTS**
Website: **www.techtitute.com/us/engineering/hybrid-professional-master-degree/hybrid-professional-master-degree-geotechnics-foundations**

Index

01

Introduction

In foundation engineering, design optimization has become a key aspect to ensure the stability and durability of structures. In view of the advent of Industry 4.0, this field has been enriched with the implementation of technological tools that optimize these processes. For example, advanced simulation allows modeling the behavior of soil and structures under different loading conditions and environmental factors. These devices provide crucial data to evaluate slope stability and soil settlement. In view of this, it is essential for engineers to acquire advanced skills to get the most out of these instruments. For this reason, TECH has developed a revolutionary degree that brings together the most cutting-edge procedures in this field.

Thanks to this Hybrid Professional Master's Degree, you will design the safest foundations and ensure that buildings remain stable"

A recent report published by the World Health Organization estimates that more than 60% of the global population will live in urban areas in the coming years. This underlines the urgency of implementing effective geotechnical solutions to ensure the stability of structures in increasingly complex environments subject to extreme climatic variations. Faced with this situation, engineering professionals must incorporate into their daily practice the most sophisticated technologies to improve both the accuracy in the evaluation of soil behavior and to optimize the design of foundations.

Faced with this scenario, TECH is launching a pioneering Hybrid Professional Master's Degree in Geotechnics and Foundations. Designed by authentic references in this field, the study plan will delve into subjects ranging from the behavior of soils or rocks to ground reconnaissance and shallow foundations. In this way, graduates will develop advanced skills to design safe and efficient foundations, considering different types of loading and ground conditions. In addition, engineers will master specialized software to model the behavior of soils and structures under different scenarios.

Regarding the methodology of this university degree, it consists of two stages. The first is theoretical and is taught in a convenient 100% online format. In addition, TECH uses its disruptive Relearning system to guarantee a progressive and natural learning, which does not require investing extra efforts like the traditional memorization. Afterwards, the program includes a practical stay of 3 weeks in a reference entity linked to Geotechnics and Foundations. This will allow graduates to take what they have learned to the practical field, in a real work scenario in the company of a team of experienced professionals in this area.

This **Hybrid Professional Master's Degree in Geotechnics and Foundations** contains the most complete and up-to-date scientific program on the market. The most important features include:

- Development of more than 100 case studies presented by experts in Civil and Geotechnical Engineering
- Their graphic, schematic and practical contents provide essential information on those disciplines that are indispensable for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- Its special emphasis on innovative methodologies
- All of this will be complemented by 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
- Furthermore, you will be able to carry out an internship in one of the best companies

Are you looking to incorporate into your daily praxis the most innovative methodologies for excavation? Achieve it through this very complete university degree"

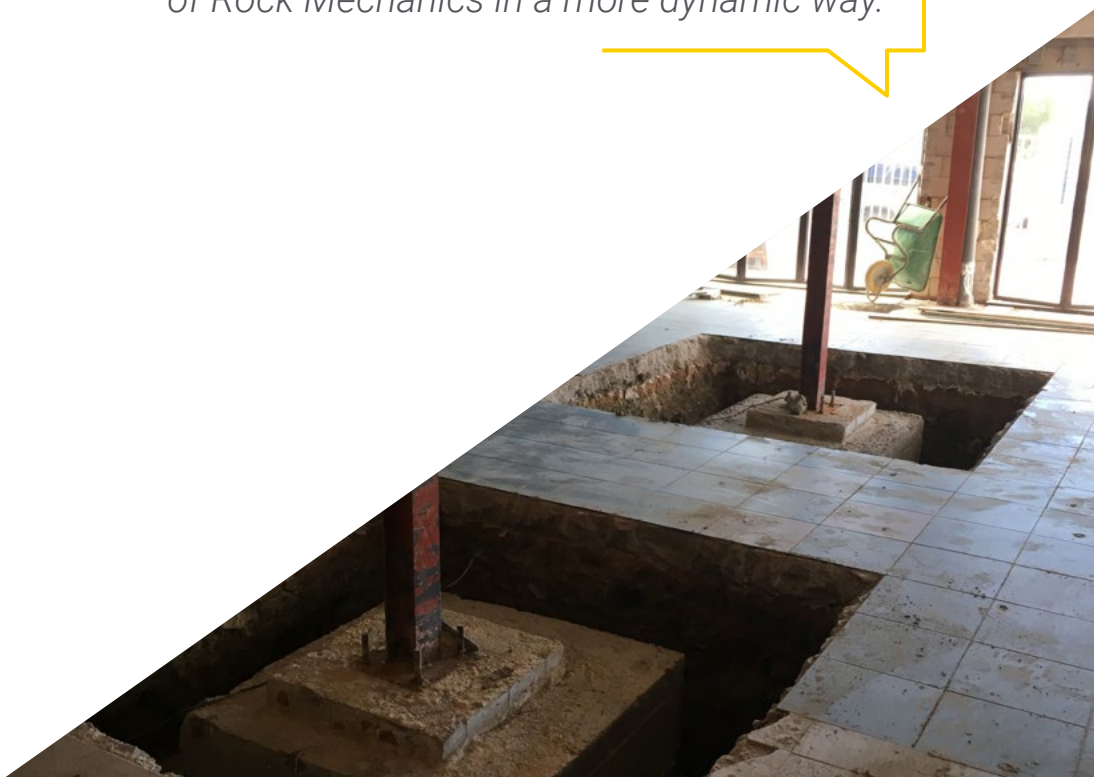
You will carry out an intensive internship of 3 weeks in a prestigious institution, where you will obtain all the knowledge you need to grow professionally"

You will be able to download the entire syllabus from the first day of the program and can study it comfortably from your smartphone or tablet of choice.

The interactive summaries of each topic will allow you to consolidate the concepts of Rock Mechanics in a more dynamic way.

In this Hybrid Professional Master's Degree proposal, of professionalizing character and blended learning modality, the program is aimed at updating engineering professionals who want to delve into the latest advances in the field of Geotechnics and Foundations. The contents are based on the latest scientific evidence, and oriented in a didactic way to integrate theoretical knowledge into the practice of Geotechnics and Foundations.

Thanks to its multimedia content elaborated with the latest educational technology, it will allow the engineering professional a situated and contextual learning, that is to say, a simulated environment that will provide an immersive learning programmed to specialize in real situations. This program is designed around Problem-Based Learning, whereby the physician must try to solve the different professional practice situations that arise during the course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

Why Study this Hybrid Professional Master's Degree?

With urban growth and the expansion of infrastructure on a global scale, there is a constant demand for professionals specialized in Geotechnics and Foundations. Companies are looking for engineers capable of building safe and efficient foundations. To take advantage of these opportunities, experts need to keep abreast of the latest techniques in this field. In order to help them with this task, TECH has created this pioneering degree, which combines the most recent updates in areas such as the behavior of water in the ground, deep foundations and slope stability with a practical stay in a distinguished entity.

In this way, the student will get a complete overview of the most current panorama in Geotechnics and Foundations. In addition, during this period they will be guided by real experts in the field.

An academic proposal designed to elevate you to the pinnacle of Geotechnics and Foundations"

1. Updating from the latest technology available

New technologies are completely revolutionizing the field of Geotechnics and Foundations. For example, advanced sensors allow continuous monitoring of the behavior of soils and structures in real time. This is crucial for the early detection of changes in geotechnical conditions, which helps to prevent failures. With the objective of bringing the specialist closer to these tools, TECH presents this Internship Program with which the professional will enter a prestigious entity, equipped with the latest technology in the field of Geotechnics and Foundations.

2. Gaining in-depth knowledge from the experience of top specialists

This Hybrid Professional Master's Degree is taught by distinguished experts in the field of Geotechnics and Foundations. In the first phase of the program, the teachers will be in charge of providing students with their personalized guidance. Then, during the practical stay, the graduates will have the support of real professionals based in the institution that will host them for this type of training.

3. Entering first-class professional environments

In its firm commitment to provide the most complete academic itineraries in the market, TECH carefully selects the institutions that will host its students during the 3-week practical training included in this degree. These companies have a high prestige, thanks to their staff of employees and their high specialization in the field of Geotechnics and Foundations.

4. Combining the best theory with state-of-the-art practice

This revolutionary program completely breaks several schemes in the current educational market, where university programs with little focus on theoretical training abound. Far from this, TECH develops a disruptive learning model, under a theoretical-practical approach that facilitates the access of engineering professionals to reference institutions.

5. Expanding the boundaries of knowledge

Through this university degree, TECH offers engineers the opportunity to expand their professional horizons from an international perspective. This is possible thanks to the wide range of contacts and collaborators available at TECH, the world's largest online university.

You will have full practical immersion at the center of your choice"

03

Objectives

Thanks to this comprehensive university program, engineering professionals will stand out for their solid understanding of soil and rock behavior.

Graduates will master the principles of geotechnical exploration and characterization of geotechnical materials. At the same time, they will handle numerical analysis tools for the evaluation of slope stability, bearing capacity of foundations, and other advanced geotechnical analyses.

You will apply nonlinear elastic and elastoplastic to simulate soil behavior"

General Objective

- Through this Hybrid Professional Master's Degree in Geotechnics and Foundations, graduates will have a comprehensive knowledge of soil and rock behavior. Likewise, engineers will develop advanced skills to build deep foundations, considering both static and dynamic loads and applying the corresponding regulations. In addition, professionals will apply the most innovative ground improvement techniques, including the use of geosynthetics to optimize soil bearing capacity and stability

You will gain valuable lessons learned through real-world case studies in simulated learning environments"

Specific Objectives

Module 1. Soil and Rock Behavior

- Establish the main differences between dynamic and static characterization and behavior of soils and rocks
- Present the most important geotechnical parameters in both cases and their most commonly used constitutive relationships
- Detailed knowledge of the different behaviors of terrain and the most commonly used elastic and plastic models for all types of terrain
- Make a presentation of the most common stress cases in practice Soil behavior at different degrees of saturation, swelling and compaction in soils The fundamental principles of these constraints and their application throughout the development of terrain dynamics and statics are the application parts and objectives for this module

Module 2. Terrain Survey: Characterization and Auscultation

- Define the characteristics to be contained in a specific geotechnical study applied to each particular soil and application requirements
- Establish the concepts included in the most important international standards for sampling and field testing, making a comparison of each one of them
- Acquire in-depth knowledge of the data obtained in field surveys and their interpretation
- Recognize the need to complement field tests with other complementary tests, such as dynamic and static penetration tests

- Acquire the necessary knowledge regarding drilling fluids, both for field testing and for other types of drilling Characteristics, applications, performance, etc.
- Delve into the practical utility of permeability tests, identifying their fields of application and their convenience
- Make special emphasis on the correct planning of a geotechnical survey campaign, establishing the timing and performance of each phase
- Extend in a practical way the knowledge of laboratory tests Not in terms of definition, which is a known fact, but in terms of being able to foresee the results to be obtained and to identify inappropriate results and malpractice in their execution
- Establish the usefulness of geophysical survey systems
- As far as auscultation is concerned, the main objective of the subject is the recognition of the elements to be auscultated and their actual application on site

Module 3. Behavior of Water in the Terrain

- Identify the presence of water in the behavior of soils and acquiring a correct knowledge of the different storage functions and characteristic curves
- Discuss the terms of effective and total pressures and determine the exact influence of effective and total pressures on the loadings of the land
- Identify the most common errors regarding the use of these terms of effective and total pressures, and show practical applications of these concepts that are of great importance
- Apply knowledge of the behavior of semi-saturated soils in data collection and sample analysis, with regard to laboratory tests: drained and undrained tests
- Determine the uses of soil compaction as a measure to reduce soil saturation Correct handling of the compaction curve by analyzing the most common errors and their applications
- Analyze the most common saturation processes such as swelling, suction and liquefaction in soils, describing the characteristics of the processes and their consequences in soils
- Apply all these concepts to the modeling of stresses and their variation according to the degree of saturation of the soil
- Know in detail the applications of saturation in surface works and saturation removal processes in superficial linear works
- Correctly define zonal hydrogeology in a project or work, determine the concepts that should encompass its study and the long-term consequences it may have on structural elements
- Go in detail into the definition of preconsolidation processes as a way to provide soils with improved mechanical properties by reducing soil saturation

Module 4. Seismicity Mechanics of the Continuous Medium and Constitutive Models Application to Soil and Rocks

- Delve into the particularities of the terrain, discretizing between soils and rocks, and of the instantaneous behavior under seismic loads
- Analyze the most important regulations in the field of seismics, especially in areas of the planet where earthquakes are frequent and of significant magnitude

- Analyze the changes that the seismic action produces in the identifying parameters of the terrain and to observe how they evolve depending on the type of seismic action
- Delve into the different practical methodologies for the analysis of ground behavior under seismic conditions Both semi-empirical simulations as well as complex finite element modeling
- Quantify the impact of seismic disturbances on foundations, both in terms of their definition in the design and final sizing
- Apply all of these conditions to both shallow and deep foundations
- Perform a sensitivity analysis of the above-mentioned behaviors in containment structures and in the most common elements of subway excavations
- Apply the study of seismic wave disturbances to other elements that can propagate along the ground, such as the study of noise and vibration transmission in the ground

Module 5. Land Treatment and Improvement

- Acquire a thorough knowledge of the different types of existing land treatments
- Analyze the range of existing typologies and their correspondence with the improvement of the different properties
- Know precisely the variables that are found in the processes of land improvement by injection Consumption, requirements, advantages and disadvantages
- Present, in an extensive way, gravel column treatments as elements of land treatment of relatively little use, but with remarkable technical applications
- In-depth presentation of soil treatments by chemical treatment and freezing, as little-known treatments, but with very good spot applications
- Define the applications of preloading (preconsolidation), which was covered in a previous module, as an element of soil treatment to accelerate the evolution of soil behavior
- Complete the knowledge of one of the most used ground treatments in subway works, such as micropile umbrellas, defining applications different from the usual ones and the characteristics of the process
- Deal in detail with soil decontamination as a land improvement process, defining the typologies that can be used

Module 6. Slope Analysis and Stability

- Define the loads to which each part of the slope is subjected and the operations that can be carried out on them
- Investigate the potential mechanisms of slope failure and the analysis of practical cases of this type of failure
- Determine the sensitivity or susceptibility of slopes to different mechanisms or triggering factors, including external effects such as the presence of water, the effect of rainfall, earthquakes, etc
- Compare the effectiveness of different remediation or stabilization options and their effect on slope stability

- Learn more about the different options for improving and protecting slopes, from the point of view of structural stability and the conditions to which they may be subjected during their service life
- Design optimal slopes in terms of safety, reliability and economy
- Review the application of slopes in hydraulic works as a major part of the design and use of major slopes
- Detail the calculation methodologies associated with finite elements currently in use for the design of this type of elements

Module 7. Superficial Foundations

- Analyze the trends in the different international design standards, contemplating their differences in terms of criteria, and the different safety coefficients used
- Recognize the different actions present in shallow foundations, both those that require and those that contribute to the stability of the element
- Establish a sensitivity analysis of the behavior of the foundations in the evolution of this type of loads
- Identify the different types of improvement of foundations already in use, classifying them according to the type of foundation, the soil on which it is located and the age at which it was built
- Break down, in a comparative way, the costs of the use of this type of foundations and their influence on the rest of the structure
- Identify the most common types of surface foundation failures and their most effective corrective measures

Module 8. Deep foundations

- Acquire a detailed knowledge of piles as deep foundation elements, analyzing all their characteristics, construction typologies, auscultation capacity, types of failure, etc
- Review other deep foundations of more specific use, for special structures, pointing out those types of projects in which they are used and with very particular practical cases
- Analyze the major enemies of this type of foundations, such as negative friction or loss of tip resistance, among others
- Have a high degree of knowledge of deep foundation repair methodologies and auscultation , both initial execution and repairs
- Measure and size in a correct way and according to the particular characteristics of the work, the appropriate deep foundations
- Complete the study of deep foundations with the upper bracing elements and their grouping, with a clear development of the structural dimensioning of the pile caps

Module 9. Retaining Structures: Walls and Barriers

- Define and acquire a complete knowledge of the loads that the soil produces on the retaining structures
- Extend this knowledge with the analysis of the interaction of surface loads, lateral loads and seismic loads that may occur in the soil adjacent to this type of structures
- Go through the different types of retaining structures, from the most common continuous screens and piles, to other elements of more specific use such as sheet piling or Soldier-Piles
- Deal with the deformational behavior of the backside of these elements, both in the short and long term With special interest in the calculation of surface seating in deep barriers
- Learn more about the sizing and behavior of bracing structures, struts and anchors
- Analyze with current finite element calculation methods the most common safety coefficients in this type of structures as well as their correlation applying statistical reliability concepts

Module 10. Tunnel and Mining Engineering

- Establish the different most common methodologies for tunnel excavation, both those excavated by conventional methods and those excavated by mechanical means
- Be clear about the classification of these methodologies according to the type of terrain, excavation diameters and end use of tunnels and galleries
- Apply the very different soil and rock behaviors defined in other modules of this master's degree to tunnel and gallery excavation
- Recognize the design constraints of the supports and revetments, and understand more deeply their relationship with rock mechanical classifications and soil typologies
- Adapt all these conditions to other types of deep excavation such as shafts, subway connections, interactions with other structures, etc
- Analyze the mining excavation with the particularities it has due to the depth of its actions
- Detailed knowledge of the interaction of deep excavations on the surface Perform an approach to seat calculation in different phases
- Establish a concrete relationship between seismic disturbances and the stress-strain behavior of tunnels and galleries, as well as to identify how this type of disturbance modifies the supports and linings

04

Skills

Upon completion of this Hybrid Professional Master's Degree, graduates will acquire advanced skills to construct deep and shallow foundations using both advanced methodologies and specialized software. Accordingly, engineers will be able to manage risks associated with geotechnical projects, including landslides, differential settlement and erosion. At the same time, professionals will handle state-of-the-art monitoring systems to evaluate different geotechnical structures.

You will incorporate into your standard procedures state-of-the-art techniques for terrain improvement, including dynamic compaction and soil injections"

General Skills

- Master the global environment of geotechnical engineering and foundations, from the international context, markets, to project development, operation and maintenance plans and sectors such as insurance and asset management
- Know how to apply acquired knowledge and problem-solving skills in current or unfamiliar environments within broader contexts related to Geotechnics
- Be able to integrate knowledge and get a deep vision of the different uses of Geotechnics, as well as the importance of its use in today's world
- Know how to communicate design, development and management concepts of the different systems of civil engineering
- Understand and internalize the scope of digital and industrial transformation applied to foundation systems for efficiency and competitiveness in today's market
- Be able to perform critical analysis, evaluation and synthesis of new and complex ideas related to the field of Civil Engineering
- Be able to promote, in professional contexts, technological, social or cultural progress within a knowledge-based society

Specific Skills

- Perform a safe approach to a construction site that has geotechnical components
- Master the concepts necessary to identify the actions to be taken, the tasks to be coordinated, or the corrective decisions to be made, after a very exhaustive review of the casuistry that can be generated by Geotechnical Engineering
- Know in depth the practical and concrete data, so that the subject matter and the way of dealing with each of the topics creates a reference base
- The program is academically designed to provide a deep knowledge, starting from advanced concepts already acquired in the world of Civil Engineering and from a practical application point of view, of the most important geotechnical aspects that can be found in different types of civil works
- Understand the specific behavior of soils and rocks
- Know how to differentiate the types of terrain

You will be highly qualified to identify, assess and manage geotechnical risks associated with civil engineering projects"

05

Course Management

For the design and delivery of this Hybrid Professional Master's Degree, TECH has enlisted the services of true references in the field of Geotechnics and Foundations. These experts have an extensive professional background, where they have been part of recognized institutions in this sector. Thanks to this, they have created a myriad of didactic contents that stand out for their excellent quality. Undoubtedly, a guarantee for the students, since they will enter into a high intensity experience that will elevate their careers as engineers to the highest level.

The most outstanding professionals in Geotechnics and Foundations have joined forces in this program to provide you with the most professionally applicable knowledge in this field"

Management

Dr. Estébanez Aldonza, Alfonso

- Civil Engineer, Specialist in Geotechnics and Tunnels and Technical Director of Alfestal Engineering
- Project Manager in the Department of Tunnels and Underground Works in Inarsa SA
- Assistant Technician in the Geology and Geotechnical Department of Intecsa-Inarsa
- International Consultant and Project Manager at D2
- PhD student in Roads, Canals and Ports at the School of Engineering of the Polytechnic University of Madrid in the Department of Land Engineering
- Civil Engineer from the Polytechnic University of Madrid
- Course of Health and Safety Coordinator in Construction Works registered by the CAM Nº 3508

Professors

Mr. Sandin Sainz-Ezquerra, Juan Carlos

- SOFiSTiK Customer Service and Support Manager
- WTT & Mega Projects Engineer DYWIDAG
- Head of the Structures Department at Alfestal Ingeniería
- Civil Structural Engineer at TPF Getinsa Euroestudios SL
- Structural Calculation Engineer at Paymascotas
- Director of the Structures Department at Alfestal Ingeniería
- Civil Engineer by the Superior Technical School of Civil Engineering of the Polytechnic University of Madrid

Mr. Clemente Sacristan, Carlos

- Civil Engineer, Linear Works Manager
- Site Manager at Construcciones y obras Llorente SA and in the construction company Collosa
- Collaborator in Alfestal Engineering
- Construction Manager at Coprosa
- Executive at BALGORZA SA
- Course on Occupational Risk Prevention for Construction Company Managers
- Advanced Course in Management of Large Turnkey Projects (EPC
- Degree in Civil Engineering from the Polytechnic University of Madrid

Ms. Lope Martín, Raquel

- Geological Engineer
- Manager in the Technical Department of Prointec
- Geological Engineer from the Complutense University of Madrid
- Course on Geotechnics Applied to Building Foundations
- Course on Technical Control for Damage Insurance, Geotechnics, Foundations and Structures

06

Educational Plan

The didactic materials that make up this university degree have been designed by a prestigious teaching staff, made up of specialists in Geotechnics and Foundations. Thanks to this, students will have access to a syllabus that stands out both for its quality and for adapting to the needs of the current labor market. Composed of 10 specialized modules, the syllabus will delve into aspects ranging from the behavior of soils or rocks to treatments for ground improvement and tunnel engineering. In this way, graduates will develop competencies that will enable them to design deep foundations considering static and dynamic loads.

You will handle the most sophisticated geotechnical modeling software to evaluate slope stability and bearing capacity of foundations"

Module 1. Soil and Rock Behavior

1.1. Principle Fundamentals and Magnitudes
- 1.1.1. Ground as a Three-phase System
- 1.1.2. Types of Tensional States
- 1.1.3. Constitutive Quantities and Relationships

1.2. Semi-saturated Soils
- 1.2.1. Soil Compaction
- 1.2.2. Water in Porous Environment
- 1.2.3. Stress in Soil
- 1.2.4. Behavior of Water in Soil and Rocks

1.3. Behavior Models in Soils
- 1.3.1. Constitutive Models
- 1.3.2. Non-Linear Elastic Models
- 1.3.3. Elastoplastic Models
- 1.3.4. Basic Formulation of Critical State Models

1.4. Soil Dynamics
- 1.4.1. Behavior After Vibrations
- 1.4.2. Soil-structure Interaction
- 1.4.3. Soil Effect on Structures
- 1.4.4. Behavior in Soil Dynamics

1.5. Expansive Soils
- 1.5.1. Saturation Processes Swelling and Collapse
- 1.5.2. Collapsible Soils
- 1.5.3. Soil Behavior Under Swelling

1.6. Rock Mechanics
- 1.6.1. Mechanical Properties of Rocks
- 1.6.2. Mechanical Properties of Discontinuities
- 1.6.3. Applications of Rock Mechanics

1.7. Characterization of the Rock Massif
- 1.7.1. Characterization of the Properties of Massifs
- 1.7.2. Deformity Properties of Massifs
- 1.7.3. Post-breakage Characterization of the Massif

1.8. Rock Dynamics
- 1.8.1. Crust Dynamics
- 1.8.2. Rock Elasticity-Plasticity
- 1.8.3. Rock Elasticity Constants

1.9. Discontinuities and Instabilities
- 1.9.1. Geomechanics of Discontinuities
- 1.9.2. Water in Discontinuities
- 1.9.3. Discontinuity Families

1.10. Limit States and Loss of Equilibrium
- 1.10.1. Natural Stress in Terrain
- 1.10.2. Types of Breakages
- 1.10.3. Flat Break and Wedge Break

Module 2. Terrain reconnaissance: characterization and auscultation

2.1. Geotechnical Study
- 2.1.1. Terrain Recognition
- 2.1.2. Content of the Geotechnical Study
- 2.1.3. On-site Testing and Trials

2.2. Standards for the Execution of Tests
- 2.2.1. Basis of Testing Standards
- 2.2.2. Comparison of International Standards
- 2.2.3. Results and Interactions

2.3. Field Probes and Reconnaissance
- 2.3.1. Probes
- 2.3.2. Static and Dynamic Penetration Tests
- 2.3.3. Permeability Tests

2.4. Identification Tests
- 2.4.1. Status Tests
- 2.4.2. Resistance Tests
- 2.4.3. Expansivity and Aggressivity Tests

2.5. Considerations Prior to Proposing Geotechnical Surveys
- 2.5.1. Perforation Program
- 2.5.2. Geotechnical Performance and Scheduling
- 2.5.3. Geological Factors

2.6. Perforation Fluids
- 2.6.1. Variety of Perforation Fluids
- 2.6.2. Fluid Characteristics: Viscosity
- 2.6.3. Additives and Applications

2.7. Geological-geotechnical Testing, Geomechanical Stations
- 2.7.1. Test Typology
- 2.7.2. Determination of Geomechanical Stations
- 2.7.3. Characterization at Great Depth

2.8. Pumping Wells and Pumping Tests
- 2.8.1. Typology and Means Required
- 2.8.2. Test Planning
- 2.8.3. Interpretation of the Results

2.9. Geophysical Investigation
- 2.9.1. Seismic Methods
- 2.9.2. Electric Methods
- 2.9.3. Interpretation and Results

2.10. Auscultation
- 2.10.1. Superficial and Firm Auscultation
- 2.10.2. Auscultation of Movements, Stresses and Dynamics
- 2.10.3. Application of New Technologies in Auscultation

Module 3. Behavior of Water in the Terrain

3.1. Partially Saturated Soils
- 3.1.1. Storage Function and Characteristic Curve
- 3.1.2. Condition and Properties of Semi-saturated Soils
- 3.1.3. Characterization of Partially Saturated Soils in Modeling

3.2. Effective and Total Pressure
- 3.2.1. Total, Neutral and Effective Pressure
- 3.2.2. Darcy's Law in Terrain
- 3.2.3. Permeability

3.3. Drainage Incidence in Tests
- 3.3.1. Drained and Undrained Shear Tests
- 3.3.2. Drained and Undrained Consolidation Tests
- 3.3.3. Post-rupture Drainage

3.4. Soil Compaction
- 3.4.1. Principle Fundamentals in Compaction
- 3.4.2. Compaction Methods
- 3.4.3. Tests, Trials and Results

3.5. Saturation Processes
- 3.5.1. Swelling
- 3.5.2. Suction
- 3.5.3. Liquefaction

3.6. Stresses in Saturated Soils
- 3.6.1. Tensional Spaces in Saturated Soils
- 3.6.2. Evolution and Transformation in Stresses
- 3.6.3. Associated Displacements

3.7. Application to Roads and Plains
- 3.7.1. Compaction Values
- 3.7.2. Bearing Capacity of the Soil
- 3.7.3. Specific Tests

3.8. Hydrogeology in Structures
- 3.8.1. Hydrogeology in Different Soil Types
- 3.8.2. Hydrogeology Model
- 3.8.3. Problems that Groundwater Can Cause

3.9. Compressibility and Preconsolidation
- 3.9.1. Compressibility in Soils
- 3.9.2. Preconsolidation Pressure Terms
- 3.9.3. Water Table Oscillations in Preconsolidation

3.10. Fluid Analysis
- 3.10.1. One-dimensional Flow
- 3.10.2. Critical Hydraulic Gradient
- 3.10.3. Flow Modelling

Module 4. Seismicity Mechanics of the Continuous Medium and Constitutive Models Application to Soil and Rocks

4.1. Seismic Response of Soils
- 4.1.1. Seismic Effect in Soils
- 4.1.2. Non-lineal Behaviour in Soils
- 4.1.3. Induced Effects Due to Seismic Action

4.2. Seismic Study in Regulations
- 4.2.1. Properties of Seismic Regulations
- 4.2.2. Interaction Between International Standards
- 4.2.3. Comparison of Parameters and Validations

4.3. Estimated Ground Motion under Seismic Conditions
- 4.3.1. Predominant Frequency in a Stratum
- 4.3.2. Jake's Thrust Theory
- 4.3.3. Nakamura Simulation

4.4. Earthquake Simulation and Modeling
- 4.4.1. Semiempirical Formulas
- 4.4.2. Simulations in Finite Element Modeling
- 4.4.3. Analysis of Results

4.5. Seismicity in Foundations and Structures
- 4.5.1. Modulus of Elasticity in Earthquakes
- 4.5.2. Variation in the Stress-strain Relationship
- 4.5.3. Specific Rules for Piles

4.6. Seismicity in Excavations
- 4.6.1. Influence of Earthquakes on Earth Pressure
- 4.6.2. Typologies of Equilibrium Losses in Earthquakes
- 4.6.3. Measures for Control and Improvement of Excavation in Earthquakes

4.7. Site Studies and Seismic Hazard Calculations
- 4.7.1. General Criteria of Design
- 4.7.2. Seismic Danger in Structures
- 4.7.3. Special Seismic Construction Systems for Foundations and Structures

4.8. Liquefaction in Saturated Granular Soils
- 4.8.1. Liquefaction Phenomenon
- 4.8.2. Reliability of Calculations Against Liquefaction
- 4.8.3. Evolution of Parameters in Liquefactive Soils

4.9. Seismic Resilience in Soils and Rocks
- 4.9.1. Fragility Curves
- 4.9.2. Seismic Risk Calculations
- 4.9.3. Estimation of Soil Resistance

4.10. Transmission of Other Types of Waves in the Field Sound Through Ground
- 4.10.1. Vibrations Present in the Ground
- 4.10.2. Transmission of Waves and Vibrations in Different Types of Soil
- 4.10.3. Disturbance Transmission Modeling

Module 5. Land Treatment and Improvement

5.1. Objectives. Movements and Property Enhancement
- 5.1.1. Internal and Global Property Enhancement
- 5.1.2. Practical Objectives
- 5.1.3. Improvement of Dynamic Behaviors

5.2. Improvement by High Pressure Mixing Injection
- 5.2.1. Typology of Soil Improvement by High-pressure Grouting
- 5.2.2. Characteristics of Jet-Grouting
- 5.2.3. Injection Pressures

5.3. Gravel Columns
- 5.3.1. Overall Use of Gravel Columns
- 5.3.2. Quantification of Land Property Improvements
- 5.3.3. Indications and Contraindications of Use

5.4. Improvement by Impregnation and Chemical Injection
- 5.4.1. Characteristics of Injections and Impregnation
- 5.4.2. Characteristics of Chemical Injections
- 5.4.3. Method Limitations

5.5. Freezing
- 5.5.1. Technical and Technological Aspects
- 5.5.2. Different Materials and Properties
- 5.5.3. Application and Limitation Fields

5.6. Preloading, Consolidations and Compactions
- 5.6.1. Preloading
- 5.6.2. Drained Preloading
- 5.6.3. Control During Ejection

5.7. Improvement by Drainage and Pumping
- 5.7.1. Temporary Drainage and Pumping
- 5.7.2. Utilities and Quantitative Improvement of Properties
- 5.7.3. Behavior After Restitution

5.8. Micropile Umbrellas
- 5.8.1. Ejection and Limitations
- 5.8.2. Resistant Capacity
- 5.8.3. Micropile Screens and Grouting

5.9. Comparison of Long-term Results
- 5.9.1. Comparative Analysis of Land Treatment Methodologies
- 5.9.2. Treatments According to Their Practical Application
- 5.9.3. Combination of Treatments

5.10. Soil Decontamination
- 5.10.1. Physicochemical Processes
- 5.10.2. Biological Processes
- 5.10.3. Thermal Processes

Module 6. Slope Analysis and Stability

6.1. Slope Stability and Calculations
- 6.1.1. Factors Affecting Slopes Stability
- 6.1.2. Slope Foundation Stability
- 6.1.3. Slope Body Stability

6.2. Factors That Influence Stability
- 6.2.1. Geotechnical Stability
- 6.2.2. Conventional Slope Loads
- 6.2.3. Accidental Slope Loads

6.3. Ground Slopes
- 6.3.1. Stability in Ground Slopes
- 6.3.2. Elements Influencing Stability
- 6.3.3. Calculation Methods

6.4. Rock Slopes
- 6.4.1. Stability in Rock Slopes
- 6.4.2. Elements Influencing Stability
- 6.4.3. Calculation Methods

6.5. Foundation and Slope Base
- 6.5.1. Important Land Requirements
- 6.5.2. Typology of Foundations
- 6.5.3. Base Land Considerations and Improvements

6.6. Breakages and Discontinuities
- 6.6.1. Typologies of Slope Instability
- 6.6.2. Characteristic Detection of Stability Losses
- 6.6.3. Short and Long-Term Stability Improvement

6.7. Slope Protection
- 6.7.1. Parameters That Influence Stability Improvement
- 6.7.2. Short and Long-Term Slope Protection
- 6.7.3. Temporal Validity of Each Type of Protection Element

6.8. Slopes in Dams with Loose Material
- 6.8.1. Particular Features of Slopes in Dams
- 6.8.2. Slope Behavior Under Loose Materials Dam Loads
- 6.8.3. Auscultation and Monitoring of Slope Evolution

6.9. Dikes in Maritime Works
- 6.9.1. Particular Features of Slopes in Maritime Works
- 6.9.2. Slope Behavior Under Maritime Works
- 6.9.3. Auscultation and Monitoring of Slope Evolution

6.10. Simulation and Comparative Software
- 6.10.1. Simulations for Slopes in Rock and Soil
- 6.10.2. Bi-dimensional Calculations
- 6.10.3. Finite Element Modeling and Long-Term Calculations

Module 7. Superficial Foundations

7.1. Footings and Foundation Slabs
- 7.1.1. Most Common Types of Footings
- 7.1.2. Rigid and Flexible Footings
- 7.1.3. Large Shallow Foundations

7.2. Design Criteria and Regulations
- 7.2.1. Factors that Affect Footing Design
- 7.2.2. Elements Included in International Foundation Regulations
- 7.2.3. General Comparison Between Normative Criteria for Shallow Foundations

7.3. Actions Carried Out on Foundations
- 7.3.1. Actions in Buildings
- 7.3.2. Actions in Retaining Structures
- 7.3.3. Terrain Actions

7.4. Foundation Stability
- 7.4.1. Bearing Capacity of the Soil
- 7.4.2. Sliding Stability of the Footing
- 7.4.3. Tipping Stability

7.5. Ground Friction and Adhesion Enhancement
- 7.5.1. Soil Characteristics Influencing Soil-Structure Friction
- 7.5.2. Soil-Structure Friction According to the Foundation Material
- 7.5.3. Soil-Citation Friction Improvement Methodologies

7.6. Foundation Repairs Underlay
- 7.6.1. Need of Foundation Repair
- 7.6.2. Types of Repairs
- 7.6.3. Underlay Foundations

7.7. Displacement in Foundation Elements
- 7.7.1. Displacement Limitation in Shallow Foundations
- 7.7.2. Consideration of Displacement in the Calculation of Shallow Foundations
- 7.7.3. Estimated Calculations in the Short Term And in the Long Term

7.8. Comparative Relative Costs
- 7.8.1. Estimated Value of Foundation Costs
- 7.8.2. Comparison According to Superficial Foundations
- 7.8.3. Estimation of Repair Costs

7.9. Alternative Methods Foundation Pits
- 7.9.1. Semi-deep Superficial Foundations
- 7.9.2. Calculation and Use of Pit Foundations
- 7.9.3. Limitations and Uncertainties About the Methodology

7.10. Types of Faults in Superficial Foundations
- 7.10.1. Classic Breakages and Capacity Loss in Superficial Foundations
- 7.10.2. Ultimate Resistance in Superficial Foundations
- 7.10.3. Overall Capacities and Safety Coefficients

Module 8. Deep Foundations

8.1. Piles: Calculation and Dimensioning
- 8.1.1. Types of Piles and Their Application to Each Structure
- 8.1.2. Limitations of Piles Used as Foundations
- 8.1.3. Pile Calculation as Elements of Deep Foundations

8.2. Alternative Deep Foundations
- 8.2.1. Other Types of Deep Foundations
- 8.2.2. Particularities of Pile Alternatives
- 8.2.3. Specific Works That Require Alternative Foundations

8.3. Pile Groups And Pile Caps
- 8.3.1. Limitations of Piles Used as Individual Elements
- 8.3.2. Pile Caps of Pile Groups
- 8.3.3. Limitations of Pile Groups and Interactions Between Piles

8.4. Negative Friction
- 8.4.1. Fundamental Principles and Influence
- 8.4.2. Consequences of Negative Friction
- 8.4.3. Calculation And Mitigation of Negative Friction

8.5. Maximum Capacity and Structural Limitations
- 8.5.1. Individual Structural Topping of Piles
- 8.5.2. Maximum Capacity of Pile Groups
- 8.5.3. Interaction With Other Structures

8.6. Faults in Deep Foundations
- 8.6.1. Structural Instability in Deep Foundations
- 8.6.2. Bearing Capacity of the Terrain
- 8.6.3. Maximum Ground Capacity

8.7. Deep Foundation Repairs
- 8.7.1. Interventions on Ground
- 8.7.2. Interventions on Foundations
- 8.7.3. Unconventional Systems

8.8. Pole-Piles in Large Structures
- 8.8.1. Special Needs in Special Foundations
- 8.8.2. Mixed Pole-Piles: Types and Uses
- 8.8.3. Mixed Foundations in Special Structures

8.9. Sonic Continuity and Auscultation Checks
- 8.9.1. Pre-execution Inspections
- 8.9.2. Checking the Condition of the Casting: Sonic Checks
- 8.9.3. Auscultation of Foundations During Service

8.10. Dimension Software for Foundations
- 8.10.1. Individual Pile Simulations
- 8.10.2. Modeling of Pile Caps and Structural Assemblies
- 8.10.3. Finite Element Methods in the Modeling of Deep Foundations

Module 9. Retaining Structures: Walls and Barriers

9.1. Ground Thrusts
- 9.1.1. Ground Thrusts Present in Retention Structures
- 9.1.2. Impact of Surface Loads on Thrusts
- 9.1.3. Modeling of Seismic Loads in Retaining Structures

9.2. Pressure Modulus and Ballast Coefficients
- 9.2.1. Determination of Geological Properties Influencing within Retaining Structures
- 9.2.2. Spring Type Models of Simulation in Retention Structures
- 9.2.3. Pressure Modulus and Ballast Coefficient as Elements of Soil Resistance

9.3. Walls: Types and Foundations
- 9.3.1. Types of Walls and Behavior Differences
- 9.3.2. Particularities of Each Types With Regard to Calculation and Limitation
- 9.3.3. Factors That Affect Inside the Foundation of the Walls

9.4. Continuous Sheet Piles, Sheet Piling and Pile Barriers
- 9.4.1. Basic Differences in the Application of Each of the Barrier Types
- 9.4.2. Individual Characteristics in Each Type
- 9.4.3. Structural Limitations of Each Type

9.5. Design and Pile Calculations
- 9.5.1. Pile Barriers
- 9.5.2. Pile Barrier Use Limitations
- 9.5.3. Planning, Performance and Execution Details

9.6. Design and Continuous Barrier Calculations
- 9.6.1. Continuous Sheets
- 9.6.2. Limitation of the Use of Continuous Barriers
- 9.6.3. Planning, Performance and Execution Details

9.7. Anchoring and Bracing
- 9.7.1. Movement-Limiting Elements in Retaining Structures
- 9.7.2. Types of Anchoring and Limiting Elements
- 9.7.3. Control of Injections and Injection Materials

9.8. Ground Movements in Containment Structures
- 9.8.1. Stiffness of Each Type of Retaining Structure
- 9.8.2. Movement Limitations in the Ground
- 9.8.3. Empirical and Finite Element Computational Methods for Motions

9.9. Decrease of Hydrostatic Pressure
- 9.9.1. Hydrostatic Loads in Retaining Structures
- 9.9.2. Behavior of Retention Structures According to Long-Term Hydrostatic Pressure
- 9.9.3. Drainage and Waterproofing of Structures

9.10. Reliability in the Calculation of Retaining Structures
- 9.10.1. Statistical Calculation in Retaining Structures
- 9.10.2. Safety Coefficients for the Design Criterion
- 9.10.3. Types of Faults in Retaining Structures

Module 10. Tunnel and Mining Engineering

10.1. Excavation Methods
- 10.1.1. Application of Methodologies According to Geology
- 10.1.2. Excavation Methodologies According to Length
- 10.1.3. Construction Risks of Tunnel Excavation Methodologies

10.2. Tunnels in Rock-Tunnels in Soil
- 10.2.1. Basic Differences in Tunnel Excavation According to Grounds
- 10.2.2. Problems in the Excavation of Tunnels in Soil
- 10.2.3. Problems Encountered in the Excavation of Rock Tunnels

10.3. Tunnels With Conventional Methods
- 10.3.1. Conventional Excavation Methodologies
- 10.3.2. Excavation Ability in Grounds
- 10.3.3. Yields According to Methodology and Geotechnical Characteristics

10.4. Tunnels With Mechanical Methods (TBM)
- 10.4.1. Types of TBM
- 10.4.2. Tunnel Supports in Tunnels Excavated With TBM
- 10.4.3. Yields According to Methodology and Geomechanical Characteristics

10.5. Microtunnels
- 10.5.1. Range of Use of Microtunnels
- 10.5.2. Methodologies According to the Objectives and Geology
- 10.5.3. Coatings and Limitations of Microtunnels

10.6. Support and Coatings
- 10.6.1. General Support Calculation Methodology
- 10.6.2. Sizing of Final Coatings
- 10.6.3. Long Term Behavior of Coatings

10.7. Wells, Galleries and Connections
- 10.7.1. Well and Gallery Sizing
- 10.7.2. Connections and Provisional Breakages of Tunnels
- 10.7.3. Auxiliary Elements in the Excavation of Shafts, Galleries and Connections

10.8. Mining Engineering
- 10.8.1. Particular Characteristics of Mining Engineering
- 10.8.2. Particular Types of Excavation
- 10.8.3. Particular Planning for Mining Excavations

10.9. Ground Movements Seating
- 10.9.1. Movement Stages in Tunnel Excavations
- 10.9.2. Semiempirical Methods for the Determination of Tunnel Seating
- 10.9.3. Finite Element Calculation Methodologies

10.10. Seismic and Hydrostatic Loads in Tunnels
- 10.10.1. Influence of Hydraulic Loads in Support Coatings
- 10.10.2. Long-Term Hydrostatic Loads in Tunnels
- 10.10.3. Seismic Modeling and its Impact on Tunnel Design

You will develop advanced skills in the integrated management of geotechnical projects, including planning, resource coordination and quality control

07

Clinical Internship

After passing the online theoretical period, this program includes a Practical Training phase in a reference entity linked to the sector. Internship Program in a reference entity linked to the Geotechnical and Foundations sector. During this itinerary, the graduates will have at their disposal the support of a tutor the support of a tutor, who will accompany them during the whole process, both in the preparation the whole process, both in the preparation and in the development of the internship.

Carry out your practical stay in a recognized entity, where you will be able to apply in practice all your knowledge in Geotechnics and Foundations"

Graduates of this Hybrid Professional Master's Degree will have the opportunity to carry out an intensive Internship Program, lasting 3 weeks, in a reference company with extensive experience in the field of Geotechnics and Foundations. So, from Monday to Friday, in days of 8 consecutive hours, the graduates will work in a real business scenario, where they will be able to develop their skills in this field.

During the course of this on-site stay, students will be tutored by a professional in this industry, who will ensure compliance with all the objectives for which this program has been designed. In this sense, his extensive knowledge in this field will enable students to progress in the labor market with immediacy.

Undoubtedly, engineers are facing an excellent opportunity to learn by working in a field highly demanded by companies, which requires constant updating in order to offer high quality services.

The practical education will be carried out with the active participation of the student performing the activities and procedures of each area of competence (learning to learn and learning to do), with the accompaniment and guidance of teachers and other training partners that facilitate teamwork and multidisciplinary integration as transversal competencies for the praxis of Geotechnics and Foundations (learning to be and learning to relate).

The procedures described below will be the basis of the practical part of the program, and their implementation will be subject to the center's own availability and workload, the proposed activities being the following:

Module	Practical Activity
Rock and Soil Mechanics	Carry out geotechnical field studies to collect data on soil and rock conditions, using techniques such as drilling, sampling and in-situ testing
	Analyze soil and rock samples in the laboratory in order to determine physical, chemical and mechanical properties relevant to construction
	Predict geotechnical hazards such as landslides, settlement, or scour that may affect the stability of structures
	Design suitable foundations for structures, considering the geotechnical characteristics of the soil and the loads they will support
Water Management of the Terrain	Use specialized software to model and simulate the hydrologic cycle, including precipitation, runoff and water storage in the soil
	Plan drainage systems to efficiently manage surface water and groundwater
	Evaluate flood mitigation measures, such as levees or reservoirs to protect vulnerable areas
	Analyze water quality in surface water bodies, identifying pollutants and recommending treatment strategies
Techniques to Optimize Terrains	Implement measures to stabilize natural and man-made slopes, preventing landslides or erosion
	Develop strategies to mitigate soil erosion, including retaining walls and revegetation techniques
	Plan earthworks such as embankments, fills or retaining structures: ensuring their long-term stability and durability
	Apply monitoring systems to assess changes in soil properties over time and take corrective action as needed
Retaining Structures	Perform detailed designs of retaining walls, considering factors such as terrain geometry, applied loads and soil properties
	Conduct geotechnical studies to investigate soil stability and determine the parameters required for the design of retaining structures
	Perform structural calculations to ensure the stability of retaining structures under different loading conditions
	Conduct periodic inspections to ensure that materials meet established standards and specifications

Civil Liability Insurance

This institution's main concern is to guarantee the safety of the students and other collaborating agents involved in the internship process at the company. Among the measures dedicated to achieve this is the response to any incident that may occur during the entire teaching-learning process.

To this end, this entity commits to purchasing a civil liability insurance policy to cover any eventuality that may arise during the course of the internship at the center.

This liability policy for interns will have broad coverage and will be taken out prior to the start of the practical training period. That way professionals will not have to worry in case of having to face an unexpected situation and will be covered until the end of the internship program at the center.

General Conditions of the Internship Program

The general terms and conditions of the internship agreement for the program are as follows:

1. TUTOR: During the Hybrid Professional Master's Degree, students will be assigned with two tutors who will accompany them throughout the process, answering any doubts and questions that may arise. On the one hand, there will be a professional tutor belonging to the internship center who will have the purpose of guiding and supporting the student at all times. On the other hand, they will also be assigned with an academic tutor whose mission will be to coordinate and help the students during the whole process, solving doubts and facilitating everything they may need. In this way, the student will be accompanied and will be able to discuss any doubts that may arise, both clinical and academic.

2. DURATION: The internship program will have a duration of three continuous weeks, in 8-hour days, 5 days a week. The days of attendance and the schedule will be the responsibility of the center and the professional will be informed well in advance so that they can make the appropriate arrangements.

3. ABSENCE: If the students does not show up on the start date of the Hybrid Professional Master's Degree, they will lose the right to it, without the possibility of reimbursement or change of dates. Absence for more than two days from the internship, without justification or a medical reason, will result in the professional's withdrawal from the internship, therefore, automatic termination of the internship. Any problems that may arise during the course of the internship must be urgently reported to the academic tutor.

4. CERTIFICATION: Professionals who pass the Hybrid Professional Master's Degree will receive a certificate accrediting their stay at the center.

5. EMPLOYMENT RELATIONSHIP: the Hybrid Professional Master's Degree shall not constitute an employment relationship of any kind.

6. PRIOR EDUCATION: Some centers may require a certificate of prior education for the Hybrid Professional Master's Degree. In these cases, it will be necessary to submit it to the TECH internship department so that the assignment of the chosen center can be confirmed.

7. DOES NOT INCLUDE: The Hybrid Professional Master's Degree will not include any element not described in the present conditions. Therefore, it does not include accommodation, transportation to the city where the internship takes place, visas or any other items not listed.

However, students may consult with their academic tutor for any questions or recommendations in this regard. The academic tutor will provide the student with all the necessary information to facilitate the procedures in any case.

08

Where Can I Do the Internship?

TECH's philosophy is to provide the most complete and renewed university degrees in the academic panorama. For this reason, it meticulously chooses the institutions available for the Internship Programs. Thanks to this, students will have the opportunity to carry out their internships in internationally renowned companies and in an environment of excellence. In this way, they will be able to be part of multidisciplinary teams led by experts in Geotechnics and Foundations.

You will carry out your Internship Program in a prestigious company, where you will be surrounded by the best professionals in Geotechnics and Foundations"

The student will be able to complete the practical part of this Hybrid Professional Master's Degree at the following centers:

Cones

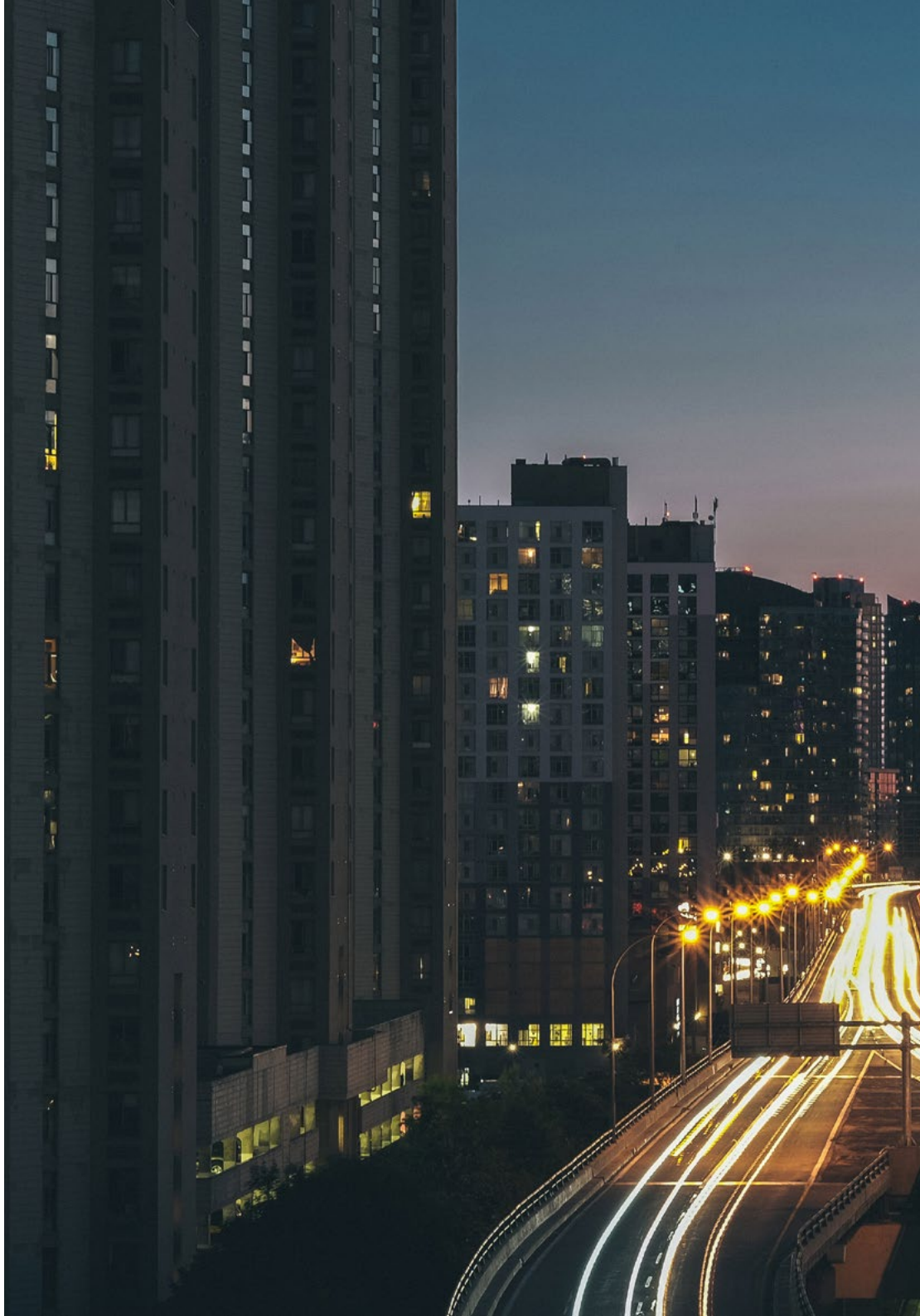
Country
Spain

City
Madrid

Address: Calle Zinc, 3, Humanes de Madrid, 28970. Madrid

A prestigious construction company highly specialized in quality control of materials and geotechnical studies.

Related internship programs:
- Geotechnics and Foundations
-Acoustic Engineering



CSIC

Country
Spain

City
Madrid

Address: Calle Serrrano,117, chamartin, 28006 Madrid

Spanish State Agency for Scientific Research and Technological Development

Related internship programs:
- Geotechnics and Foundations

Delve into the most relevant theory in this field, subsequently applying it in a real work environment"

09

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

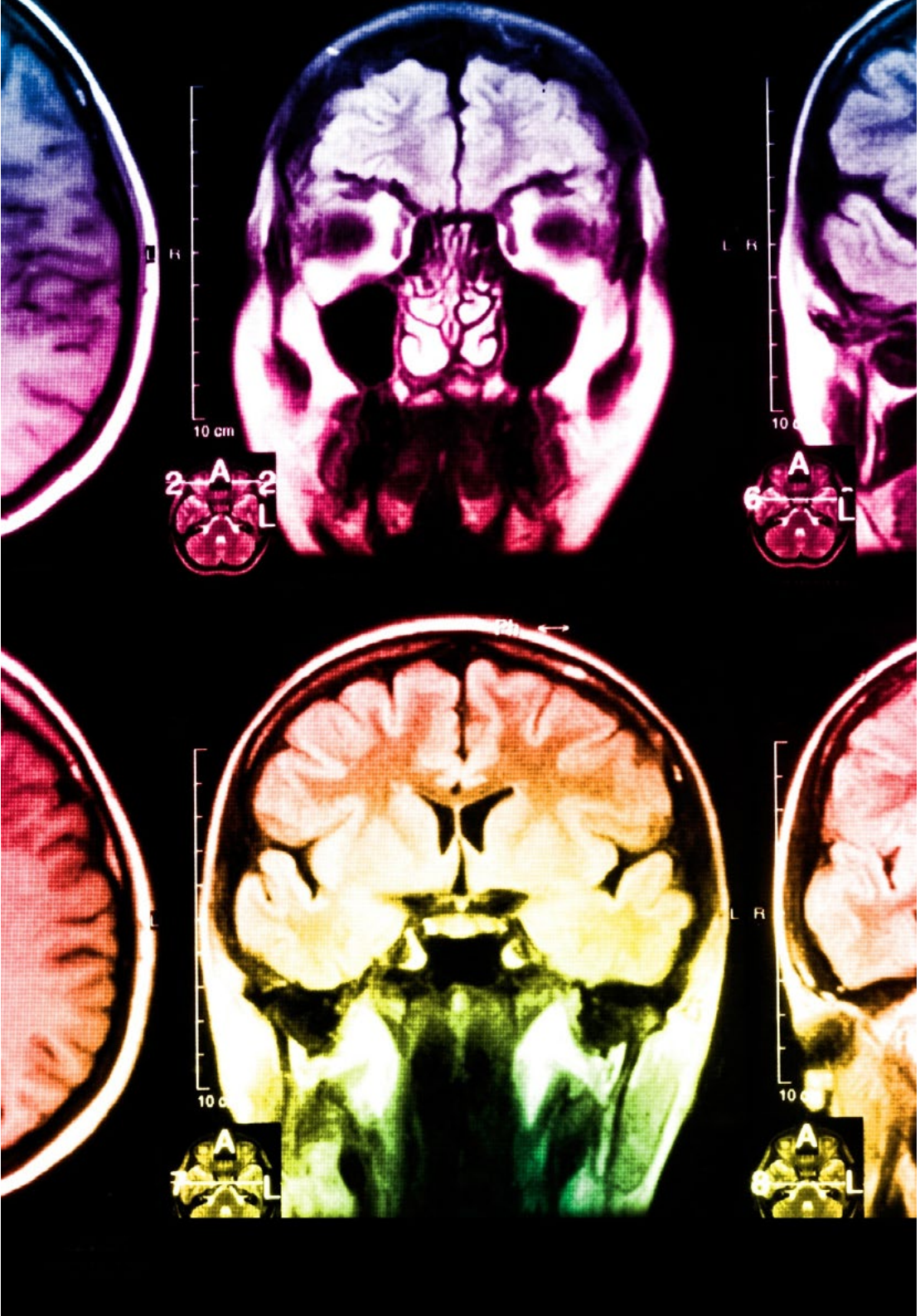
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

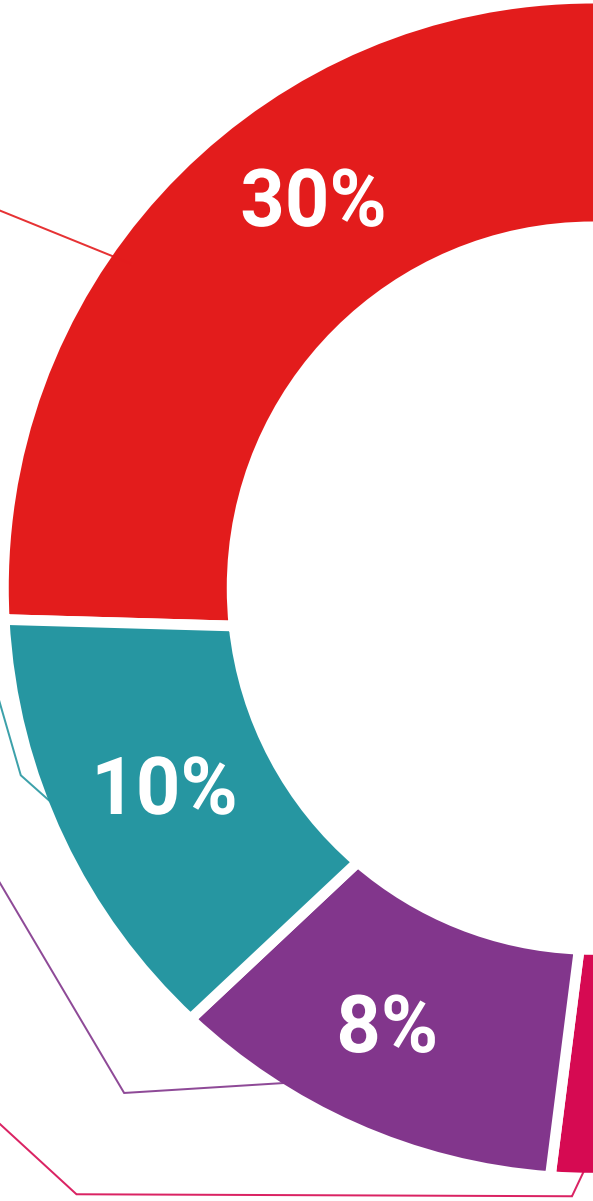
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

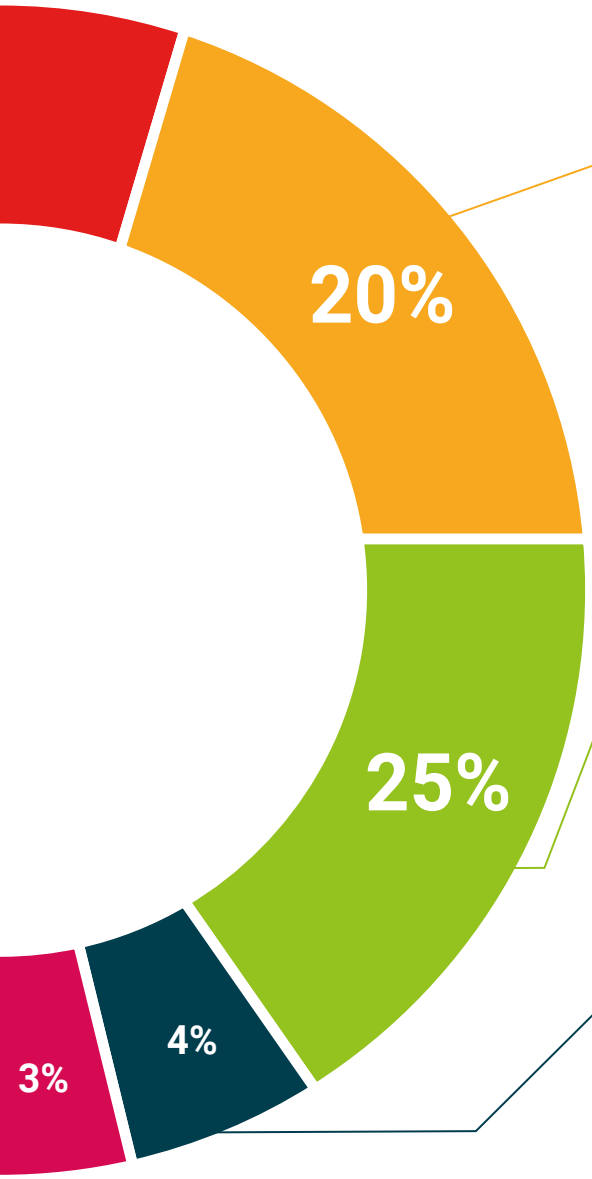
Practising Skills and Abilities

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.

10

Certificate

The Hybrid Professional Master's Degree in Geotechnics and Foundations guarantees students, in addition to the most rigorous and up-to-date education, access to a Hybrid 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 private qualification will allow you to obtain a **Hybrid Professional Master's Degree in Geotechnics and Foundations** 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** private qualification 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: **Hybrid Professional Master's Degree in Geotechnics and Foundations**

Modality: **Hybrid (Online + Internship)**

Duration: **12 months**

Credits **60 + 4 ECTS**

tech global university

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

Hybrid Professional Master's Degree in Geotechnics and Foundations

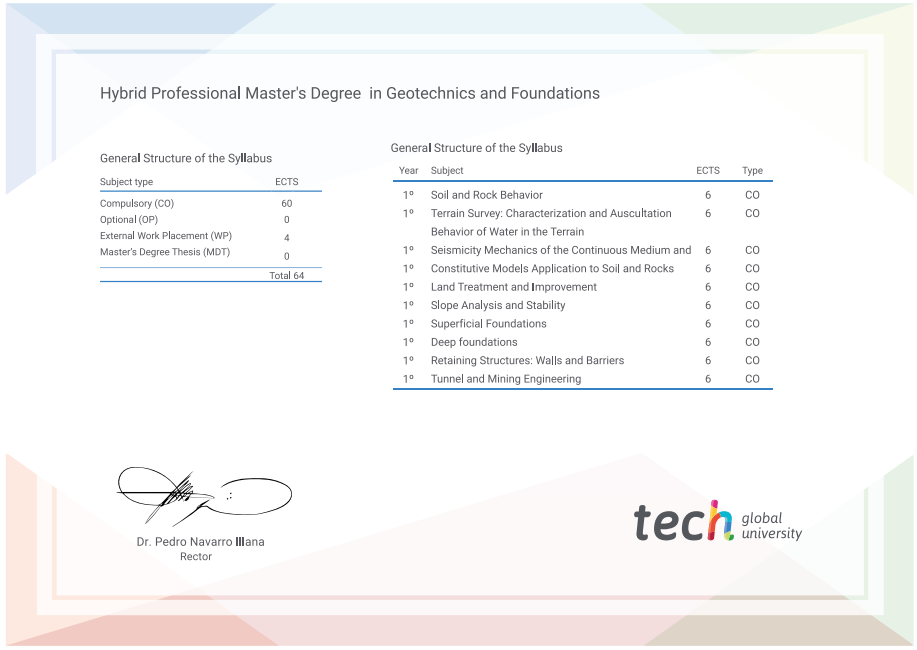
This is a private qualification of 1,920 hours of duration equivalent to 64 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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
Dean

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



Hybrid Professional Master's Degree in Geotechnics and Foundations

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	4
Master's Degree Thesis (MDT)	0
	Total 64

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Soil and Rock Behavior	6	CO
1º	Terrain Survey: Characterization and Auscultation	6	CO
	Behavior of Water in the Terrain		
1º	Seismicity Mechanics of the Continuous Medium and	6	CO
1º	Constitutive Models Application to Soil and Rocks	6	CO
1º	Land Treatment and Improvement	6	CO
1º	Slope Analysis and Stability	6	CO
1º	Superficial Foundations	6	CO
1º	Deep foundations	6	CO
1º	Retaining Structures: Walls and Barriers	6	CO
1º	Tunnel and Mining Engineering	6	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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Hybrid Professional Master's Degree

Geotechnics and Foundations

Modality: **Hybrid (Online + Internship)**

Duration: **12 months**

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Accreditation: **60 + 4 ECTS**

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