Professional Master's Degree

Construction Materials and On-Site Quality Control

tech technological university

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Professional Master's Degree
Construction Materials and On-Site Quality Control

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/in/engineering/professional-master-degree/master-construction-materials-on-site-quality-control**

Index

01

Introduction

Recent research in construction materials has led to a notable improvement not only in their durability or resistance, but also in the safety they provide to buildings. In addition, greater environmental awareness has been established in this sector, where new materials are being studied every day in the pursuit of a more sustainable use of these materials. This constant innovation is something with which graduates must keep up to date if they want to progress in this professional field. That is why TECH has designed this program in which students can get up to date on the latest advances in materials such as concrete, biomimetics and metallics or the BIM tool as a control system. All this in a 100% online program which can be accessed 24 hours a day from a computer or tablet.

Businesses from the construction industry are looking for engineers with up-to-date knowledge of the latest innovations in materials and on-site quality control. Take a step further with this Professional Master's Degree and make progress in your professional career"

Stronger and more durable concrete, façade panels that help maintain an adequate temperature inside the building or systems that allow better channeling of rain are just some of the recent developments in the construction sector, which has been characterized by the relentless search for the cheapest and most resistant materials.

However, in recent years, these characteristics have been combined with the need to achieve more optimal results in sustainable construction, and the use of coordinated work systems such as BIM, designed to provide a global and integrated vision. A new approach that the engineering professional undoubtedly needs to progress in the sector. Therefore, over the 12 months of this Professional Master's Degree, you will acquire the most advanced knowledge of the technology applied to cement-based materials, the new materials used in roads, railroads and renewable energies or the progress achieved in industrialization and seismic-resistant constructions.

In addition, this program is focused on quality and safety of infrastructures and buildings, always adhering to the regulations that exist. In order to achieve this advanced knowledge in a much more dynamic way, students have access to multimedia resources (video summaries and detailed videos) which they can access at any time of the day.

TECH therefore offers an excellent opportunity for engineers who wish to advance in their careers through a flexible university program, which they can study wherever and whenever they wish. A program that only requires an electronic device with an internet connection to connect to the virtual campus where the syllabus is found. You also have the option of distributing your course load according to your needs, allowing you to combine a quality university education with your personal responsibilities.

This **Professional Master's Degree in Construction Materials and On-Site Quality Control** contains the most complete and up-to-date program on the market. Its most notable features are:

- Practical cases presented by experts in Construction
- 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

Learn to carry out an exhaustive analysis of the different construction materials and be a part of the global change”

You will be able to grow in a booming sector thanks to the latest innovations brought to you by this program in rail and road infrastructure"

This 100% online program will help you to identify what can cause alterations in construction materials.

Learn to manage new building technologies and participate in any construction work management process.

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

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

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

02

Objectives

The design of this Professional Master's Degree will allow the student to acquire new competencies and skills that are necessary to update their knowledge and skills in the construction industry. Therefore, at the end of this course, the graduate will be aware of the new materials used in railway infrastructures, constructions and buildings, as well as the main quality criteria required according to current regulations. The innovative teaching tools provided by TECH will enable students to reach these goals.

Guarantee the durability of construction materials and you will be able to operate in any international infrastructure project"

General Objectives

- Perform an exhaustive analysis of the different types of construction materials
- Gain in-depth knowledge of the features of different construction materials
- Implement new technologies applied to engineering materials
- Carry out correct waste assessment
- Manage materials from a quality engineering and materials production point of view
- Apply new techniques in making construction materials that are more environmentally friendly
- Raise awareness of new trends and materials applied to construction

Carry out advanced learning through an innovative teaching methodology to define and characterize the different insulating building materials"

Specific Objectives

Module 1. Science and Technology of Cement-Based Materials

- Delve into the science of concrete: Fresh and hardened state. Characteristics in the fresh state, mechanical properties in the hardened state, stress-strain behavior, modulus of deformation and Poisson's ratio, creep, fracture. Dimensional stability, shrinkage
- Know in detail the nature, characteristics and performance of special concretes, which have been investigated in recent years
- Develop and manufacture special concretes according to their dosage specifications and technological properties
- Analyze the most important characteristics of special concretes, of the different existing typologies, whether with fibers, light, self-compacting, etc.
- Gain in-depth knowledge of the different techniques for producing blended mixtures
- Perform typical tests on construction materials and be able to perform the required procedures

Module 2. Durability, Protection and Service Life of Materials

- Analyze the concept of durability of the construction materials and their relationship with the concept of sustainability
- Identify the main causes of the alteration of construction materials
- Analyze the interaction of materials with the environment in which they are immersed and its influence on their durability
- Identify the main incompatibilities between construction materials
- Establish the most appropriate characterization techniques for the study of the durability of each material
- Master different options to ensure the durability of structures
- Present mathematical models for the estimation of service life of materials

Module 3. New Materials and Innovations in Engineering and Construction

- Analyze the different materials that are involved in the construction and conservation of roads
- Delve into the different parts that make up roads, drainage, roadbeds, base layers and pavement layers, as well as surface treatments
- Perform an in-depth breakdown of asphalt mix manufacturing and laying procedures

Module 4. Metallic Materials

- Study the different metallic materials and their typologies
- Analyze the bending performance of steel and its regulations
- Know in detail the most important properties and behavior of steel as a construction material

Module 5. Valuation of Construction and Demolition Waste (CDW)

- Gain in-depth knowledge of sustainable material, carbon footprint and life cycle, etc.
- Address issues related to circular economy and waste reduction at source, as well as content related to the need for increased application of sustainable materials in construction works
- Identify the use of sustainable project materials

Module 6. Road Surfaces, Pavements and Asphalt Mixes

- Establish the classification of soils and their bearing capacity when using them in esplanades
- Know the different layers and the process of preparation and installation on site
- Perform a breakdown of binders and conglomerates to make bituminous emulsions
- Gain knowledge of surface treatments, as well as their risks of priming, adhesion and curing
- Gain in-depth knowledge of the process of manufacturing and laying asphalt mixes

Module 7. Other Construction Materials

- Define and characterize the different insulating building materials
- Know the main advantages of using innovative building materials from the point of view of energy saving and efficiency
- Identify basic production principles and specify new materials of the future
- Analyze the fundamentals of advanced and intelligent materials for sectors such as automotive, construction, aerospace, etc.
- Establish new developments in nanotechnology

Module 8. Industrialization and Earthquake-Resistant Construction

- Analyze and evaluate advanced techniques for the characterization of building systems
- Analyze and understand how the characteristics of structures influence their behavior
- Gain in-depth knowledge of the fundamentals of the behavior of reinforced concrete structures and the ability to conceive, design, build and maintain this type of structures

Module 9. Microstructural Characterization of Materials

- Give an in-depth breakdown of the various techniques and equipment used to chemically, mineralogically and petrophysically characterize a construction material
- Establish the basis for advanced materials characterization techniques, specifically optical microscopy, scanning electron microscopy, transmission electron microscopy, x-ray diffraction, x-ray fluorescence, etc.
- Master the evaluation and interpretation of data obtained with scientific techniques and procedures

Module 10. Quality Management: Focus and Tools

- Identify the concepts related to quality, ways of working that try to minimize failures, as well as internationally recognized Quality Management Systems
- Apply the acquired in-depth knowledge to the Management of Construction Works, through establishing formats that have been developed for the systematic monitoring of the different work units
- Compose and develop Quality Management Systems for the drafting, application, implementation and updating of Quality Manuals and Quality Plans

03

Skills

The structure of this Professional Master's Degree has been designed to provide the student with the opportunity to develop their skills in order to gain in-depth knowledge of the variables that affect construction materials and that can put a construction site at risk. To this end, the specialists who teach this program provide case studies that will be of great use and direct application in different situations within the construction sector.

Enroll now in a university course which you can access 24 hours a day from your computer or tablet"

General Skills

- Perform an exhaustive analysis of the different types of construction materials
- Determine which of the new technologies are applied to the engineering of materials
- Be able to globally manage different materials from a quality and production point of view
- Identify new techniques in making construction materials that are more environmentally friendly

Develop environmentally friendly materials that comply with the quality and safety regulations of the construction site"

Specific Skills

- Be able to delve into the basic aspects of concrete, knowing in detail its nature, characterization and presentations
- Develop and manufacture special concretes to suit the particular needs of the job site
- Gain knowledge about the different metallic materials and their properties
- Be able to understand the concept of durability of construction materials and their relationship with sustainability, identifying the main causes of alteration
- Acquire the necessary skills to identify the main incompatibilities between construction materials
- Master different options to ensure the durability of structures
- Be able to address issues related to circular economy and waste reduction at source, as well as content related to the need for increased application of sustainable materials in construction works
- Learn the uses of sustainable material waster and how to use them in future jobs in a safe way
- Deepen understanding in the innovation of new materials, as well as the competitive advantages it brings, its protection and its financing
- Fully understand the main innovations in materials and construction procedures in the different sectors of innovation, including those that have be brought from other production sectors
- Be able to identify the basic principles of production and specify the new materials of the future
- Gain an in-depth understanding of the fundamentals of the behavior of reinforced concrete structures and possess the ability to conceive, design, build and maintain this type of structures
- Establish the basis for advanced materials characterization techniques, specifically optical microscopy, scanning electron microscopy, transmission electron microscopy, x-ray diffraction, x-ray fluorescence, etc.
- Identify the concepts related to quality, ways of working that try to minimize failures, as well as internationally recognized Quality Management Systems

04

Course Management

In our commitment to offer elite education for all, TECH works with renowned professionals so that the student acquires solid knowledge in the speciality of Construction Materials and On-Site Quality Control . Therefore, this Professional Master's Degree brings together a highly qualified team with extensive experience in the sector, which will offer the most comprehensive and innovative information for the development of the graduate, who seeks to specialize in a booming sector.

Learn everything you need to enhance your career in this sector with the support of experts in the use of materials and their quality control"

Management

Dr. Miñano Belmonte, Isabel de la Paz

- PhD from the Polytechnic University of Cartagena
- Master's Degree in Construction (Major in Technology) from the Polytechnic University of Valencia
- Technical Architect from the Polytechnic University of Cartagena
- Construction Engineer from the Camilo José Cela University

Professors

Dr. Benito Saorin, Francisco Javier

- Municipal Technician in the Ricote-Murcia Town Hall
- Specialist in R&D&I in Construction Materials and Works
- PhD Construction Engineer
- PhD from the Polytechnic University of Valencia
- Master's Degree in Construction (Major in Technology) from the Polytechnic University of Valencia

Dr. Rodríguez López, Carlos Luis

- Coordinator of the sustainable construction and climate change area in CTCON
- Technician in the projects department of PM Arquitectura y Gestión SL
- PhD in Construction Engineering in Construction Materials and Sustainable Construction
- Doctor from the University of Alicante
- Master's Degree in Engineering of Materials, Water and Land: Sustainable Construction from the University of Alicante
- Construction Engineer from Polytechnic University of Cartagena

Ms. Hernández Pérez, Miriam

- Technical Engineer in the company Molina Community Services S.A, in the Production Department within the Water Service Exploitation Area
- Specialist in Sustainable Urban Drainage Systems, in the development of new materials and in the search for technologically advanced products with improved properties for use in construction
- Master's Degree in Civil Engineering (major: Transportation engineering, urban planning and land use planning)
- Researcher in Sustainable Construction and SUDS
- Degree in Civil Engineering (double major: Hydrology and Civil Constructions)

Mr. del Pozo Martín, Jorge

- Civil Engineer
- Diploma in Business Administration from UNED
- Specialist in Construction in Arthur Andersen, Pacadar, Dragados and Bovis Lend Lease
- Master's Degree in Research in Civil Engineering from the University of Cantabria

Dr. Parra Costa, Carlos J

- Head Professor in the Department of Architecture and Construction Technology from the Polytechnic University of Cartagena
- Postgraduate Diploma in the Finite Element Method
- PhD in Architecture from the Polytechnic University of Valencia

Dr. Muñoz Sánchez, María Belén

- Head Professor in the Department of Architecture and Construction Technology from the Polytechnic University of Cartagena
- Postgraduate Diploma in the Finite Element Method
- PhD in Architecture from the Polytechnic University of Valencia

Ms. López, M. Livia

- Master's Degree in Food Safety and Quality from the University of Valencia.
- Degree in Chemistry from the University of Valencia

Mr. Izquierdo Núñez, José Vicente

- Collaborator in regional, national and international projects in the field of composites and coatings for transport, construction and packaging applications
- Degree in Chemical Sciences

Mr. Martínez-Pacheco, Víctor

- Master's Degree in Science and Technology of Construction in Architecture

Dr. Navarro, Arsenio

- Head of the Construction and Renewable Energy Department
- Construction engineer and materials engineer
- PhD in Industrial Engineering and Production from the Polytechnic University of Valencia
- Collaborator in the management of R&D projects related to composites, coatings and fire protection
- Projects related to construction and transport on a national and international level (ECOXY, BASAJAUN, MAT4RAIL, JOSPEL)

05

Structure and Content

The syllabus of this Professional Master's Degree has been designed to offer students the latest advances in Construction Materials and On-Site Quality Control. To this end, a program has been developed that covers the durability, protection and service life of materials, the most recent innovations in engineering and construction, as well as the approaches and tools used to meet the quality criteria required by the various standards.

Learn about the new materials and technologies used in the construction sector and advance in your career thanks to this program"

Module 1. Science and Technology of Cement-Based Materials

1.1. Cement
- 1.1.1. Cement and Hydration Reactions: Cement Composition and Manufacturing Process. Majority Compounds, Minority Compounds
- 1.1.2. Process of Hydration. Characteristics of Hydrated Products. Alternative Materials to Cement
- 1.1.3. Innovation and New Products

1.2. Mortar
- 1.2.1. Properties
- 1.2.2. Manufacturing, Types and Uses
- 1.2.3. New Materials

1.3. High Resistance Concrete
- 1.3.1. Composition
- 1.3.2. Properties and Characteristics
- 1.3.3. New Designs

1.4. Self-Compacting Concrete
- 1.4.1. Nature and Characteristics of its Components
- 1.4.2. Dosage, Manufacturing, Transport and Commissioning
- 1.4.3. Characteristics of the Concrete

1.5. Light Concrete
- 1.5.1. Composition
- 1.5.2. Properties and Characteristics
- 1.5.3. New Designs

1.6. Fiber and Multifunctional Concretes
- 1.6.1. Materials Used in the Manufacturing
- 1.6.2. Properties
- 1.6.3. Designs

1.7. Self-Repairing and Self-Cleaning Concretes
- 1.7.1. Composition
- 1.7.2. Properties and Characteristics
- 1.7.3. New Designs

1.8. Other Cement-Based Materials (Fluid, Antibacterial, Biological, etc.)
- 1.8.1. Composition
- 1.8.2. Properties and Characteristics
- 1.8.3. New Designs

1.9. Destructive and Non-Destructive Characteristics Trials
- 1.9.1. Characterization of Materials
- 1.9.2. Destructive Techniques. Fresh and Hardened State
- 1.9.3. Non-Destructive Techniques and Procedures Applied to Materials and Construction Structures

1.10. Additive Mixtures
- 1.10.1. Additive Mixtures
- 1.10.2. Advantages and Disadvantages
- 1.10.3. Sustainability

Module 2. Durability, Protection and Service Life of Materials

2.1. Durability of Reinforced Concrete
- 2.1.1. Types of Damage
- 2.1.2. Factors
- 2.1.3. Most Common Damage

2.2. Durability of Cement-Based Materials 1. Concrete Degradation Processes
- 2.2.1. Cold Weather
- 2.2.2. Sea Water
- 2.2.3. Sulphate Attack

2.3. Durability of Cement-Based Materials 2. Concrete Degradation Processes
- 2.3.1. Alkali–Silica Reaction
- 2.3.2. Acid Attacks and Aggressive Ions
- 2.3.3. Hard Waters

2.4. Corrosion of Reinforcement I
- 2.4.1. Process of Corrosion in Metals
- 2.4.2. Forms of Corrosion
- 2.4.3. Passivity
- 2.4.4. Importance of the Problem
- 2.4.5. Behavior of Steel in Concrete
- 2.4.6. Corrosion Effects of Steel Embedded in Concrete

2.5. Corrosion of Reinforcement II
- 2.5.1. Carbonation Corrosion of Concrete
- 2.5.2. Corrosion by Penetration of Chlorides
- 2.5.3. Stress Corrosion
- 2.5.4. Factors Affecting the Speed of Corrosion

2.6. Models of Service Life
- 2.6.1. Service Life
- 2.6.2. Carbonation
- 2.6.3. Chlorides

2.7. Durability in the Regulations
- 2.7.1. Europe
- 2.7.2. Structural Code

2.8. Estimation of Service Life in New Projects and Existing Structures
- 2.8.1. New Project
- 2.8.2. Residual Service Life
- 2.8.3. Applications

2.9. Design and Execution of Durable Structures
- 2.9.1. Material Selection
- 2.9.2. Dosage Criteria
- 2.9.3. Protection of Reinforcement Against Corrosion

2.10. Tests, On-Site Quality Controls and Reparation
- 2.10.1. Control Tests on Site
- 2.10.2. Execution Control
- 2.10.3. Tests on Structures with Corrosion
- 2.10.4. Fundamentals for Reparation

Module 3. New Materials and Innovations in Engineering and Construction

3.1. Innovation
- 3.1.1. Innovation. Incentives. New Products and Diffusion
- 3.1.2. Innovation Protection

3.2. Roads II
- 3.2.1. Circular Economy with New Materials
- 3.2.2. Self-Repairing Road
- 3.2.3. Decontaminating Roads

3.3. Roads I
- 3.3.1. Energy Production on Roads
- 3.3.2. Wildlife Passes. Ecosystemic Fragmentation
- 3.3.3. IoT and Digitalization in Roads

3.4. Roads III
- 3.4.1. Safe Roads
- 3.4.2. Anti-Noise Roads and "Noisy" Roads
- 3.4.3. Anti-Heat Island Roads in Cities

3.5. Railroads
- 3.5.1. New Alternative Materials to Ballast
- 3.5.2. Ballast Flight
- 3.5.3. Elimination of Catenaries on Tramways

3.6. Underground and Tunnel Works
- 3.6.1. Excavation and Gunning
- 3.6.2. RMR (Rock Mass Rating)
- 3.6.3. Tunnel Boring Machines

3.7. Renewable Energy I
- 3.7.1. Solar Photovoltaic
- 3.7.2. Solar Thermal
- 3.7.3. Wind

3.8. Renewable Energy II
- 3.8.1. Maritime
- 3.8.2. Hydroelectric
- 3.8.3. Geothermal Energy

3.9. Maritime Works
- 3.9.1. New Materials and Shapes in Seawalls
- 3.9.2. Natural Alternative to Artificial Works
- 3.9.3. Prediction of Ocean Weather

3.10. Incorporation of Innovation from Other Construction Sectors
- 3.10.1. LIDAR (Laser Imaging Detection and Ranging)
- 3.10.2. Drones
- 3.10.3. Internet of Things (IoT)

Module 4. Metallic Materials

4.1. Metallic Materials: Types and Alloys
- 4.1.1. Metals
- 4.1.2. Ferrous Alloys
- 4.1.3. Non-Ferrous Alloys

4.2. Ferrous Metal Alloys
- 4.2.1. Fabricac2ión
- 4.2.2. Treatments
- 4.2.3. Conformation and Types

4.3. Ferrous Metal Alloys. Steel and Castings
- 4.3.1. Corten Steel
- 4.3.2. Stainless Steel
- 4.3.3. Carbon Steel
- 4.3.4. Castings

4.4. Ferrous Metal Alloys. Products of Steel
- 4.4.1. Hot Rolled Products
- 4.4.2. Foreign Profiles
- 4.4.3. Cold-Formed Profiles
- 4.4.4. Other Products Used in Metallic Construction

4.5. Ferrous Metallic Alloys Mechanical Characteristics of Steel
- 4.5.1. Stress-Strain Diagram
- 4.5.2. Simplified E-Diagrams
- 4.5.3. Loading and Unloading Process

4.6. Welded Joints
- 4.6.1. Cutting Methods
- 4.6.2. Types of Welded Joints
- 4.6.3. Electric Arc Welding
- 4.6.4. Fillet Welded Seams

4.7. Non-Ferrous Metal Alloys. Aluminium and its Alloys
- 4.7.1. Properties of Aluminium and its Alloys
- 4.7.2. Thermal Treatments and Hardening Mechanisms
- 4.7.3. Designation and Standardization of Aluminium Alloys
- 4.7.4. Aluminium Alloys for Forging and Casting

4.8. Non-Ferrous Metal Alloys. Copper and its Alloys
- 4.8.1. Pure Copper
- 4.8.2. Classification, Properties and Applications
- 4.8.3. Brasses, Bronzes, Cupro-Aluminium, Cupro-Silicides and Cupro-Nickels
- 4.8.4. Alpaca Silver

4.9. Non-Ferrous Metal Alloys. Titanium and its Alloys
- 4.9.1. Characteristics and Properties of Commercially Pure Titanium
- 4.9.2. Most Commonly Used Titanium Alloys
- 4.9.3. Thermal Treatments of Titanium and its Alloys

4.10. Non-Ferrous Metal Alloys, Light Alloys and Superalloys
- 4.10.1. Magnesium and its Alloys. Superalloys
- 4.10.2. Properties and Applications
- 4.10.3. Nickel-, Cobalt- and Iron-Based Superalloys

Module 5. Valuation of Construction and Demolition Waste (CDW)

5.1. Decarbonization
- 5.1.1. Sustainability of Construction Materials
- 5.1.2. Circular Economy
- 5.1.3. Carbon Footprint
- 5.1.4. Life Cycle Analysis Methodology and Analysis

5.2. Construction and Demolition Waste (CDW)
- 5.2.1. CDW
- 5.2.2. Current Situation
- 5.2.3. Problems of CDW

5.3. Characterization of CDW
- 5.3.1. Dangerous Waste
- 5.3.2. Non-Dangerous Waste
- 5.3.3. Urban Waste
- 5.3.4. European List of Construction and Demolition Wastes

5.4. Management of CDW I
- 5.4.1. Dangerous Waste
- 5.4.2. Non-Dangerous Waste
- 5.4.3. Inert Waste, Soils and Stones

5.5. Management of CDW II
- 5.5.1. Reuse
- 5.5.2. Recycled
- 5.5.3. Energetic Value. Elimination

5.6. Properties of CDW
- 5.6.1. Classification
- 5.6.2. Properties
- 5.6.3. Applications and Innovation with CDW

5.7. Innovation. Optimization of the Use of Resources. From Other Industrial, Agricultural and Urban Wastes
- 5.7.1. Supplementary Material: Ternary and Binary Mixtures
- 5.7.2. Geopolymers
- 5.7.3. Concrete and Asphalt Mixtures
- 5.7.4. Other Uses

5.8. Environmental Impact
- 5.8.1. Analysis
- 5.8.2. Impacts of CDW
- 5.8.3. Measures Adopted, Identification and Valorization

5.9. Degraded Spaces
- 5.9.1. Landfill
- 5.9.2. Use of Land
- 5.9.3. Control Plan, Maintenance and Restoration of the Zone

Module 6. Road Surfaces, Pavements and Asphalt Mixes

6.1. Drainage and Sewage Systems
- 6.1.1. Elements of Underground Drainage
- 6.1.2. Drainage of Road Surface
- 6.1.3. Drainage of Earthworks

6.2. Esplanades
- 6.2.1. Classification of Soils
- 6.2.2. Soil Compaction and Bearing Capacity
- 6.2.3. Formation of Esplanades

6.3. Base Layers
- 6.3.1. Granular Layers: Natural, Artificial and Draining Layers
- 6.3.2. Behavior Models
- 6.3.3. Preparation and Commissioning Processes

6.4. Treated Layers for Bases and Subbases
- 6.4.1. Layers Treated with Cement: Soil-Cement and Gravel-Cement
- 6.4.2. Layers Treated with Other Binders
- 6.4.3. Layers Treated with Bituminous Binding Agents. Gravel-Emulsion

6.5. Binders and Binding Agents
- 6.5.1. Asphalt Bitumens
- 6.5.2. Fluidized and Fluxed Bitumens: Modified Binders
- 6.5.3. Bituminous Emulsions

6.6. Aggregates for Pavement Layers
- 6.6.1. Aggregates Origins: Recycled Aggregates
- 6.6.2. Nature
- 6.6.3. Properties

6.7. Surface Treatments
- 6.7.1. Priming, Bonding and Curing Sprays
- 6.7.2. Gravel Irrigation
- 6.7.3. Bituminous Slurries and Cold Micro-Agglomerates

6.8. Bituminous Mixtures
- 6.8.1. Hot Mix Asphalt
- 6.8.2. Tempered Blends
- 6.8.3. Cold Asphalt Mixtures

6.9. Concrete Sidewalks
- 6.9.1. Types of Rigid Sidewalks
- 6.9.2. Concrete Slabs
- 6.9.3. Joints

6.10. Manufacturing and Laying of Asphalt Mixtures
- 6.10.1. Manufacturing, Commissioning and Quality Control
- 6.10.2. Conservation, Rehabilitation and Maintenance
- 6.10.3. Surface Characteristics of Pavements

Module 7. Other Construction Materials

7.1. Nanomaterials
- 7.1.1. Nanoscience
- 7.1.2. Applications in Construction Materials
- 7.1.3. Innovation and Applications

7.2. Foams
- 7.2.1. Types and Design
- 7.2.2. Properties
- 7.2.3. Uses and Innovation

7.3. Biomimetic Materials
- 7.3.1. Features
- 7.3.2. Properties
- 7.3.3. Applications

7.4. Metamaterials
- 7.4.1. Features
- 7.4.2. Properties
- 7.4.3. Applications

7.5. Biohydrometallurgy
- 7.5.1. Features
- 7.5.2. Technology of Recovery
- 7.5.3. Environmental Advantages

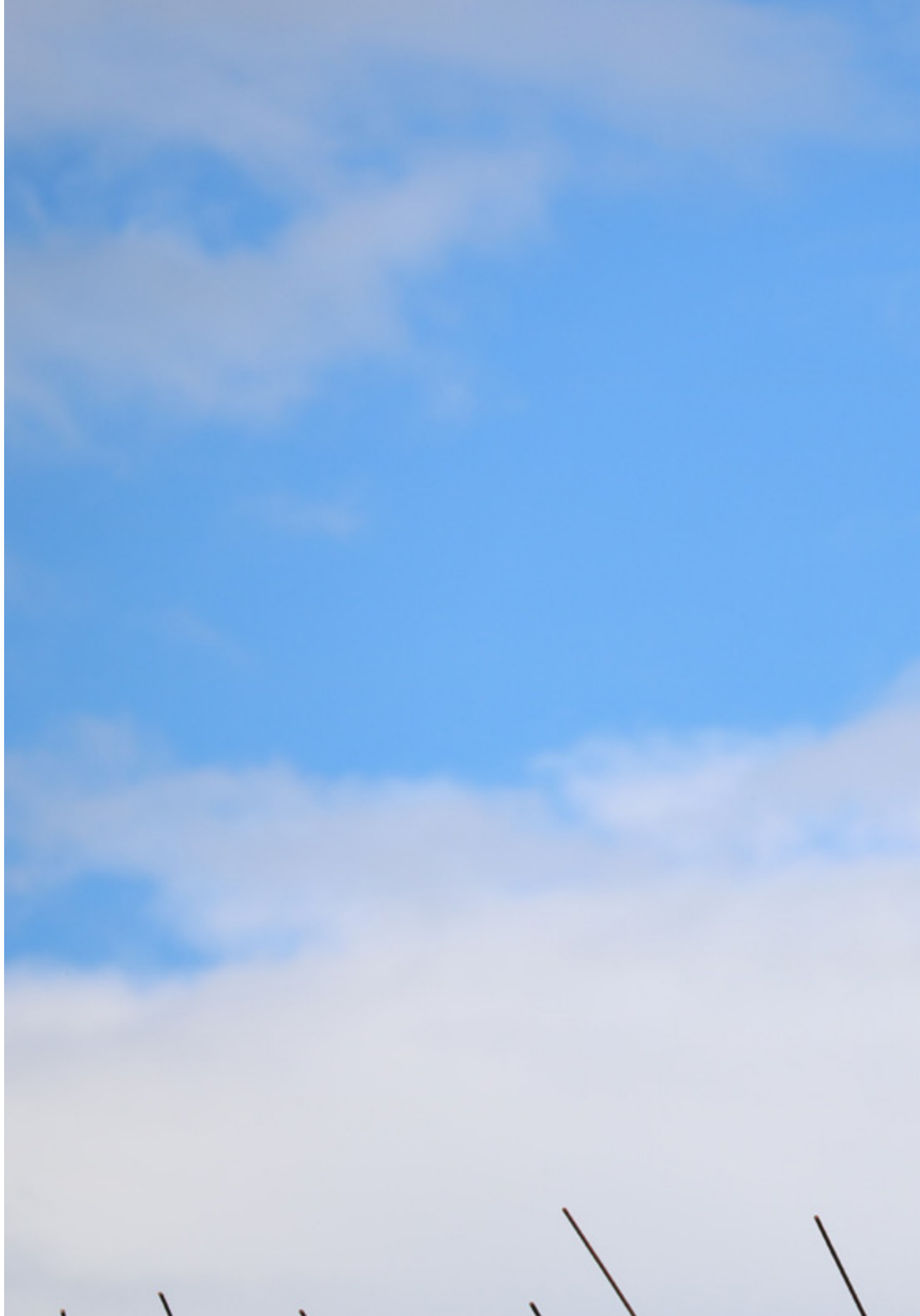
7.6. Self-Healing and Photoluminescent Materials
- 7.6.1. Types
- 7.6.2. Properties
- 7.6.3. Applications

7.7. Insulating and Thermoelectric Materials
- 7.7.1. Energy Efficiency and Sustainability
- 7.7.2. Typology
- 7.7.3. Innovation and New Design

7.8. Ceramics
- 7.8.1. Properties
- 7.8.2. Classification
- 7.8.3. Innovations in this Sector

7.9. Composite Materials and Aerogels
- 7.9.1. Description
- 7.9.2. Training
- 7.9.3. Applications

7.10. Other Materials
- 7.10.1. Stone Materials
- 7.10.2. Plaster
- 7.10.3. Others



Module 8. Industrialization and Earthquake-Resistant Construction

8.1. Industrialization: Prefabricated Construction
- 8.1.1. The Beginnings of Industrialization in Construction
- 8.1.2. Prefabricated Structural Systems
- 8.1.3. Prefabricated Constructive Systems

8.2. Prestressed Concrete
- 8.2.1. Voltage Losses
- 8.2.3. Serviceability Limit States
- 8.2.4. Ultimate Limit States
- 8.2.5. Precast Systems: Prestressed Slabs and Beams with Prestressed Reinforcement

8.3. Quality in Horizontal Building Structures
- 8.3.1. Unidirectional Joist Floor Slabs
- 8.3.2. Unidirectional Hollow-Core Slab Floors
- 8.3.3. Unidirectional Ribbed Sheet Metal Floor Slabs
- 8.3.4. Waffle Slabs
- 8.3.5. Solid Slabs

8.4. Structural Systems in Tall Buildings
- 8.4.1. Review of Skyscrapers
- 8.4.2. Wind in High-Rise Buildings
- 8.4.3. Materials
- 8.4.4. Structural Diagrams

8.5. Dynamic Behavior of Building Structures Exposed to Earthquakes
- 8.5.1. One Degree of Freedom Systems
- 8.5.2. Systems with Several Degrees of Freedom
- 8.5.3. Seismic Action
- 8.5.4. Heuristic Design of Earthquake-Resistant Structures

8.6. Complex Geometrics in Architecture
- 8.6.1. Hyperbolic Paraboloids
- 8.6.2. Tensile Structures
- 8.6.3. Pneumatic or Inflatable Structures

8.7. Reinforcement of Concrete Structures
- 8.7.1. Appraisals
- 8.7.2. Reinforcement of Pillars
- 8.7.3. Beam Reinforcement

8.8. Wooden Structures
- 8.8.1. Wood Grading
- 8.8.2. Dimension of Beams
- 8.8.3. Dimension of Pillars

8.9. Automization in Structures. BIM as a Control Tool
- 8.9.1. BIM
- 8.9.2. Federated BIM File Exchange Models
- 8.9.3. New Structure Generation and Control Systems

8.10. Additive Manufacturing Through 3d Printing
- 8.10.1. Principles of 3D Printing
- 8.10.2. Structural Systems Printed in 3D
- 8.10.3. Other Systems

Module 9. Microstructural Characterization of Materials

9.1. Optical Microscope
- 9.1.1. Advanced Optic Microscope Techniques
- 9.1.2. Principles of the Technique
- 9.1.3. Topography and Application

9.2. Transmission Electron Microscopy (TEM)
- 9.2.1. TEM Structure
- 9.2.2. Electron Diffraction
- 9.2.3. TEM Images

9.3. Scanning Electron Microscope (SEM)
- 9.3.1. SEM Characteristics
- 9.3.2. Microanalysis of X Rays
- 9.3.3. Advantages and Disadvantages

9.4. Scanning Transmission Electron Microscopy (STEM)
- 9.4.1. STEM
- 9.4.2. Images and Tomography
- 9.4.3. EELS

9.5. Atomic Force Microscopy (AFM)
- 9.5.1. AFM
- 9.5.2. Topographic Modes
- 9.5.3. Electric and Magnetic Characterization of Samples

9.6. Mercury Intrusion Porosimetry Hg
- 9.6.1. Porosity and Porous System
- 9.6.2. Equipment and Properties
- 9.6.3. Analysis

9.7. Nitrogen Porosimetry
- 9.7.1. Description of the Equipment
- 9.7.2. Properties
- 9.7.3. Analysis

9.8. X Ray Diffraction (XRD)
- 9.8.1. Generation and Characteristics of XRD
- 9.8.2. Sample Preparation
- 9.8.3. Analysis

9.9. Electrical Impedance Spectroscopy (EIE)
- 9.9.1. Method
- 9.9.2. Procedure
- 9.9.3. Advantages and Disadvantages

9.10. Other Interesting Techniques
- 9.10.1. Thermogravimetry
- 9.10.2. Fluorescence
- 9.10.3. Absorption Isothermal Desorption of H2O Vapor

Module 10. Quality Management: Focus and Tools

10.1. Quality in Construction
- 10.1.1. Quality: Principles of Quality Management Systems (QMS)
- 10.1.2. Documentation of Quality Management Systems
- 10.1.3. Benefits of Quality Management Systems
- 10.1.4. Environmental Management Systems (EMS)
- 10.1.5. Integrated Management Systems (IMS)

10.2. Errors
- 10.2.1. Concept of Error, Failure, Defect or Non-Conformity
- 10.2.2. Errors in the Technical Processes
- 10.2.3. Errors in the Organization
- 10.2.4. Errors in Human Behavior
- 10.2.5. Consequence of the Errors

10.3. Causes
- 10.3.1. Organization
- 10.3.2. Techniques
- 10.3.3. Human

10.4. Quality Tools
- 10.4.1. Global
- 10.4.2. Partial
- 10.4.3. ISO 9000:2008

10.5. Quality and its Control in Construction
- 10.5.1. Quality Control Plan
- 10.5.2. Quality Plan of a Company
- 10.5.3. Quality Manual of a Company

10.6. Laboratory Testing, Calibration, Certification and Accreditation
- 10.6.1. Normalization, Accreditation, Certification
- 10.6.2. CE Marking
- 10.6.3. Advantages of Accreditation of Testing and Accreditation Laboratories

10.7. Quality Management Systems ISO 9001: 2015
- 10.7.1. ISO 17025
- 10.7.2. Objective and Scope of the 17025 Regulation
- 10.7.3. Relationship Between ISO 17025 and LA 9001

10.8. Management Requirements and Laboratory Techniques of ISO 17025 I
- 10.8.1. Quality Management Systems
- 10.8.2. Document Control
- 10.8.3. Complaints Management: Corrective and Preventative Actions

10.9. Management Requirements and Laboratory Techniques of ISO 17025 II
- 10.9.1. Internal Audits
- 10.9.2. Personal, Installation and Environmental Conditions
- 10.9.3. Testing Methods and Calibration and Validation of Methods

10.10. Phases to Follow to Achieve the ISO 17025 Accreditation
- 10.10.1. Accreditation in a Laboratory Test and Calibration I
- 10.10.2. Accreditation in a Laboratory Test and Calibration II
- 10.10.3. Process of Accreditation

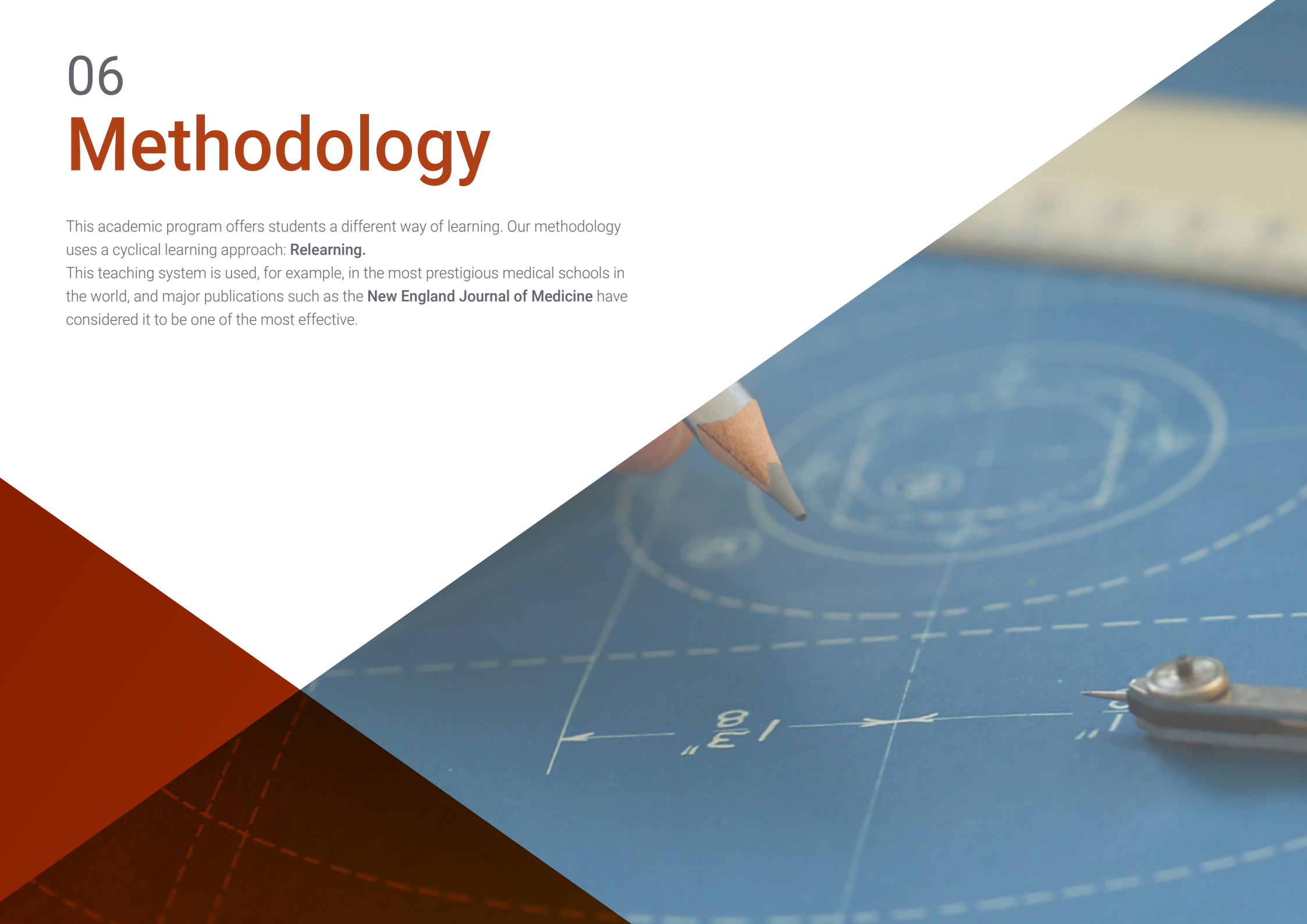
The perfect program for an in-depth breakdown of the various techniques and equipment that will help you chemically, mineralogically and petrophysically characterize a building material"

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 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

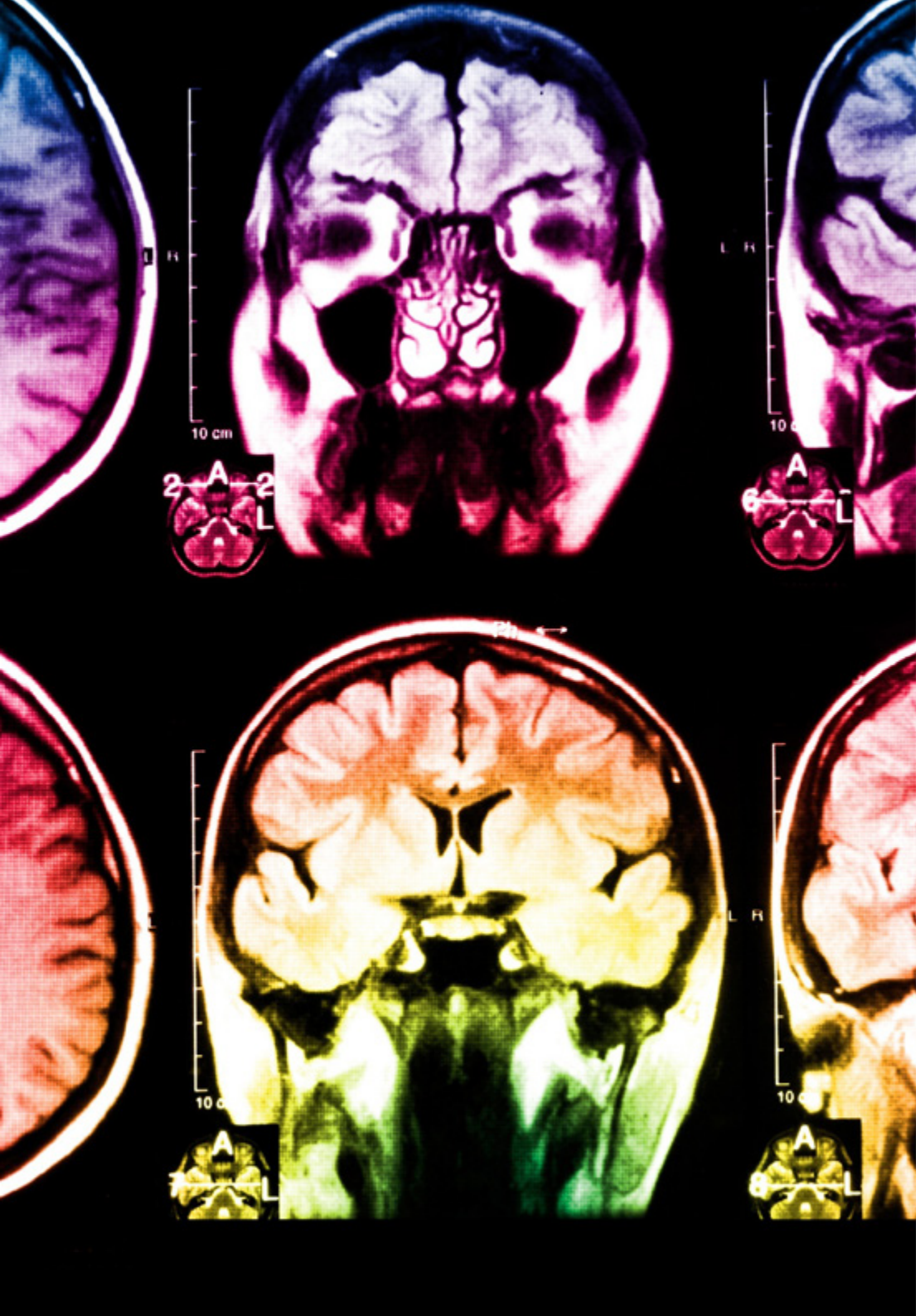
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

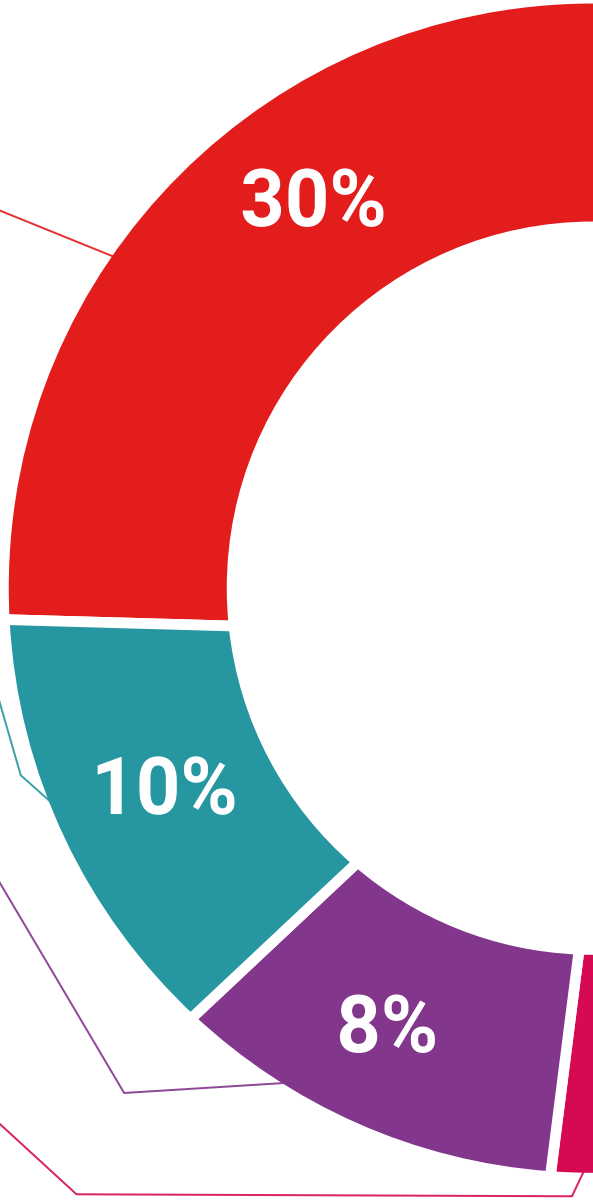
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

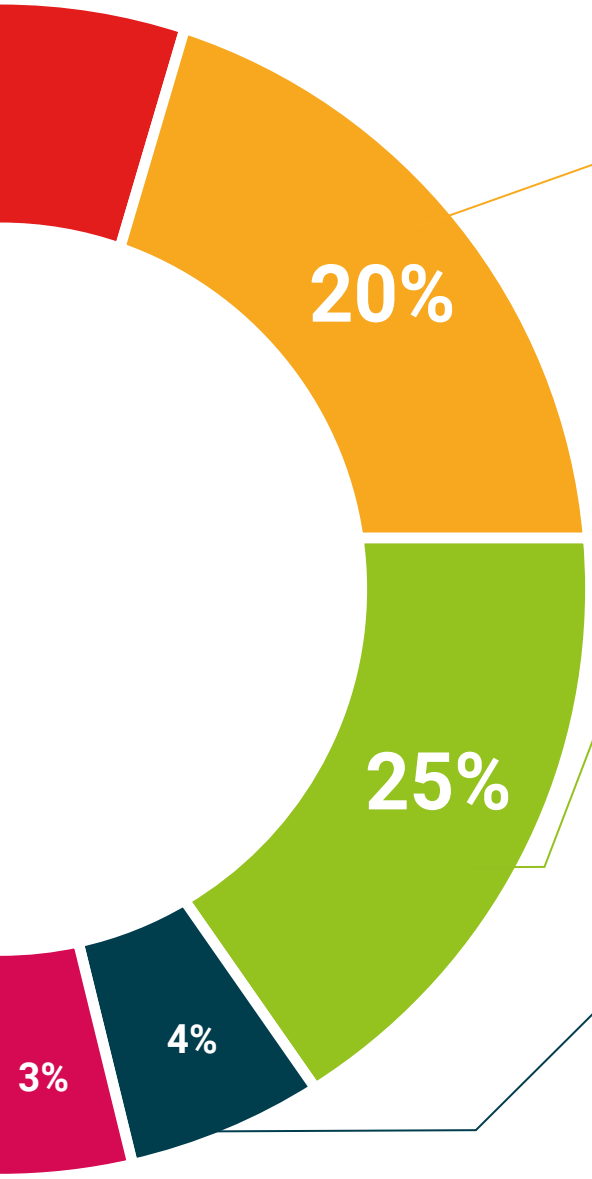
Practising Skills and Abilities

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.

07

Certificate

The Professional Master's Degree in Construction Materials and On-Site Quality Control guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree issued by TECH Technological University.

Successfully complete this program and receive your university degree without travel or laborious paperwork"

This **Professional Master's Degree in Construction Materials and On-Site Quality Control** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Professional Master's Degree** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Professional Master's Degree, and meets the requirements commonly demanded by labor exchanges, competitive examinations and professional career evaluation committees.

Title: **Professional Master's Degree in Construction Materials and On-Site Quality Control**

Official Nº of hours: **1,500 h.**


tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Construction Materials and On-Site

This is a qualification awarded by this University, equivalent to 1,500 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro
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


Professional Master's Degree in Construction Materials and On-Site Quality Control

Subject type	Hours
Compulsory (CO)	1,500
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 1,500

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Science and Technology of Cement-Based Materials	150	CO
1º	Durability, Protection and Service Life of Materials	150	CO
1º	New Materials and Innovations in Engineering and Construction	150	CO
1º	Metallic Materials	150	CO
1º	Valuation of Construction and Demolition Waste (CDW)	150	CO
1º	Road Surfaces, Pavements and Asphalt Mixes	150	CO
1º	Other Construction Materials	150	CO
1º	Industrialization and Earthquake-Resistant Construction	150	CO
1º	Microstructural Characterization of Materials	150	CO
1º	Quality Management: Focus and Tools	150	CO

Tere Guevara Navarro
Dean

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

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Professional Master's Degree
Construction Materials and On-Site Quality Control

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree

Construction Materials and On-Site Quality Control

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