Professional Master's Degree

Energy Efficiency and Sustainability in the Construction of Buildings

tech global university

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Professional Master's Degree
Energy Efficiency and Sustainability in the Construction of Buildings

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

Website: **www.techtitute.com/us/engineering/professional-master-degree/master-energy-efficiency-sustainability-construction-buildings**

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01

Introduction

The incorporation of energy-efficient strategies and systems in building plans, and the inclusion of measures that work towards having a lower environmental impact are essential for the engineering sector today. With this up-to-date program, we offer professionals the possibility of being trained in the new developments that have arisen in this field in a complete and totally up-to-date manner, expanding and consolidating their skills to develop innovative, energy-efficient and environmentally sustainable projects.

Learn how to incorporate new energy-efficient and sustainable systems in the construction of buildings in a Professional Master's Degree created to boost your professional capacity"

The Professional Master's Degree in Energy Efficiency and Sustainability in the Construction of Buildings addresses the complete range of issues involved in this field, both in the residential and tertiary sectors. Studying this course will give students a clear advantage over students who study other programs that focus on specific blocks, which prevents the student from knowing the interrelationship with other areas included in the multidisciplinary field of energy efficiency and sustainability in the construction of buildings.

This up-to-date program incorporates a module dedicated to the circular economy within the building sector with which to quantify not only the energy impact, but also the environmental impact.

Additionally, there is a module that analyzes the different types of control, automation and networks that can be used to increase the potential of energy efficiency proposals.

Together with the rest of the modules on facilities and architecture, it offers a global and interrelated vision of topics in the field of energy efficiency and sustainability in the construction of buildings, which makes it unique. It is essential for professionals to complete this Professional Master's Degree in order to reach their full potential in this area.

By completing and passing the assessments of this program, the students will obtain sound knowledge of the rules and regulations to be applied in relation to energy efficiency and sustainability in construction. They will be able to master their understanding of energy, bioclimatic architecture, renewable energies and building installations, such as electrical, thermal, lighting and control.

Furthermore, students will give their professional career a great boost by being able to lead the transformation in terms of circular economy and successfully carry out energy audits and certification processes in the building sector.

Moreover, as this is a 100% online Professional Master's Degree, the student is not conditioned by fixed schedules or the need to move to another physical location, but can access the contents at any time of the day, balancing their work or personal life with their academic life.

This **Professional Master's Degree in Energy Efficiency and Sustainability in the Construction of Buildings** contains the most complete and up-to-date program on the market. The most important features include:

- The development of practical cases presented by experts in Energy Efficiency and Sustainability in the Construction of Buildings
- The graphic, schematic, and practical contents with which they are created provide scientific and practical information on the disciplines that are essential for professional development
- Practical exercises where self-assessment can be used to improve learning
- Special emphasis on innovative methodologies in Energy Efficiency and Sustainability in the Construction of Buildings
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection work
- Content that is accessible from any fixed or portable device with an internet connection

Acquire the most comprehensive and up-to-date knowledge in terms of standards and applicable regulations in a convenient and flexible way"

The most innovative and interesting aspects of energy, bioclimatic architecture, renewable energies and building installations in an intensive, high-quality program"

With comprehensive educational material supported by the best audiovisual systems on the educational market, providing you with an immersive learning experience.

A 100% online Professional Master's Degree that will allow you to balance your studies with your professional work with maximum organizational flexibility.

A teaching staff of experts in the field of building construction contributes the experience of their work to this program, in addition to recognized specialists from leading companies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive experience programmed for learning 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, developed by renowned and experienced experts in Energy Efficiency and Sustainability in the Construction of Buildings.

02

Objectives

The main objective of the Professional Master's Degree in Energy Efficiency and Sustainability in the Construction of Building is to enhance the skills of professionals in this field to help them incorporate the main innovations in building construction in to their daily work.

This Professional Master's Degree will keep you up to date with everything you need to know in terms of regulations, energy efficiency and sustainability, including the most innovative proposals regarding the architecture of the future"

General objectives

- Understand the impact of a city's energy consumption and the major elements that make it function- the buildings
- Analyze energy consumption and demand in depth, as these are the key determinants of a building's energy comfort
- Prepare the student in the general knowledge of the different norms, standards, regulations and existing legislation, which will allow them to deepen their understanding of the specific ones involved in the field of energy saving in buildings
- Provide fundamental knowledge to support the rest of the modules and related information search tools
- Apply the key aspects of the circular economy in building using Life Cycle Analysis and Carbon Footprint tools to establish plans to reduce environmental impact, as well as to meet the criteria of green public procurement
- Prepare the student to perform energy audits in accordance with EN 16247-2, provide energy services and energy certification to establish improvement measures to increase energy savings and sustainability in buildings
- Delve into the importance of the architectural tools that will make it possible to make the best use of the climatic environment of a building
- Carry out an exhaustive analysis on the technique of each of the renewable energies. This will allow the student to have the ability and vision to design the best options for choosing an energy option in terms of available resources
- Internalize and expand on self-consumption, as well as the advantages of its application in buildings
- Choose the most efficient equipment and detect deficiencies in the electrical installation to reduce consumption, optimize installations and establish a culture of energy efficiency in the organization. Also know the design of electric vehicle charging point infrastructures for their implementation in buildings
- Delve into the different cooling and heating generation systems most commonly used today
- Perform a complete analysis of the main maintenance operations of air conditioning equipment, its cleaning and replacement of parts
- Perform an in-depth breakdown of the properties of light involved in building energy savings
- Master and apply the techniques and requirements for the design and calculation of lighting systems, seeking to comply with health, visual and energy criteria
- Delve into and analyze the different control systems installed in buildings, the differences between them, the applicability criteria in each case and the energy savings provided

Specific objectives

Module 1. Energy in the Construction of Buildings

- Gain insight into energy in cities
- Identify the importance of a building's energy performance
- Deepen knowledge of the differences between energy consumption and energy demand
- Analyze, in detail, the importance of energy comfort and liveability

Module 2. Standards and Regulations

- Identify the responsible bodies and agencies
- Achieve a global vision of current regulations
- Provide tools to search for related information

Module 3. Circular Economy

- Take a comprehensive approach to the circular economy in buildings in order to maintain a strategic vision of implementation and best practices
- Quantify, through life cycle analysis and carbon footprint calculation, the impact of real estate management on sustainability in order to develop improvement plans that allow energy savings and environmental impact reduction in buildings

Module 4. Energy Audits and Certification

- Recognize the type of work to be carried out depending on the objectives set by the client to recognize the need to perform an energy audit
- Analyze the provision of energy services to know each of their characteristics in defining energy service contracts
- Perform energy certification on buildings to determine the initial energy rating and define improvement options according to standards

Module 5. Bioclimatic Architecture

- Gain exhaustive knowledge of the structural elements and their effect on building energy efficiency
- Study structural components that allow the use of sunlight and other natural resources and their architectural adaptation
- Detect the connection between buildings and human health

Module 6. Renewable Energies

- Deal, in detail, with the evolution of renewable energies up to their current applications
- Carry out exhaustive studies of applying these energies in today's construction
- Internalize and expand on self-consumption, as well as the advantages of its application in buildings

Module 7. Electrical Installations

- Choose the most efficient equipment to ensure the lowest possible energy consumption in building activity
- Detect and correct defects derived from the existence of harmonics to reduce energy losses in the electrical grid by optimizing its energy transmission capacity
- Design electric vehicle charging infrastructures in the building in compliance with current regulations or specific customer requirements
- Optimize electricity bills to obtain the greatest economic savings according to the building's demand profile
- Implement a culture of energy efficiency to increase energy and economic savings in facility management activity within property management

Module 8. Thermal Installations

- Master the different thermal air conditioning systems and their operation
- Thoroughly break down its components for machine maintenance
- Analyze the role of energy efficiency in the evolution of different systems

Module 9. Lighting installations

- Apply the principles of lighting technology, its properties, differentiating the aspects that contribute to energy savings
- Analyze the criteria, characteristics and requirements of the different solutions that can be used in buildings
- Design and calculate lighting projects, improving energy efficiency
- Integrate health-enhancing lighting techniques as a benchmark in energy savings

Module 10. Control Installations

- Analyze the different installations, technologies and control systems applied to energy saving in buildings
- Differentiate between the different systems to be implemented, distinguishing the characteristics in each specific case
- Delve into how control installations bring energy savings to buildings by optimizing energy resources
- Master the principles of configuration of control systems used in buildings

Achieve the level of knowledge you desire and master Energy Efficiency and Sustainability in the Construction of Building with this high-level refresher program"

03

Skills

After passing the assessments of this Professional Master's Degree, the student will have acquired the necessary skills for professional practice that incorporates the most up-to-date and competitive perspective of energy efficiency and current sustainability criteria in building construction.

With the specific criteria of providing you with a practical specialization, this up-to-date program will allow you to convert your learning experience into real professional skills, almost immediately"

General skills

- Understand building energy consumption and carry out actions to reduce it
- Apply specific regulations related to energy saving in buildings
- Perform energy audits in buildings
- Detect and solve problems in electrical installations to save energy consumption

Add the skills of a fully up-to-date professional to your CV and compete among the best in the industry"

Specific skills

- Discover the impact of a city's energy consumption
- Gain knowledge about the legislation and regulations related to energy saving and sustainability in building and apply them at work
- Develop improvement plans to reduce the environmental impact of buildings
- Use natural resources following a bioclimatic architectural adaptation
- Apply renewable energies in building construction
- Apply all the techniques necessary to achieve energy savings in buildings
- Develop and apply efficient air-conditioning systems
- Develop and apply efficient lighting systems
- Use control systems for energy savings

04

Course Management

A multidisciplinary teaching faculty will offer you the most up-to-date and comprehensive knowledge in this field, supporting you during the learning process and sharing with you their experience and real vision of the profession.

You will learn from professionals with extensive experience in this sector, who will provide you with a specific vision of the reality of this field of work"

International Guest Director

Stefano Silvani is a proven leader in digital transformation, with more than 10 years of experience driving technology innovations in areas such as cloud, IoT, Artificial Intelligence, Machine Learning (AI/ML), Software as a Service (SaaS) and Platform as a Service (PaaS) solutions. As such, his background includes a strategic focus on transforming business models and negotiating large-scale enterprise deals. In addition, his interests encompass value creation through technology, the development of new digital solutions and leadership implementation.

He has also worked in world-renowned companies such as General Electric Digital, where he played a crucial role in the launch of Predix, the first industrial IoT platform in the market. He has also joined Siemens Digital Industries, where he has led the expansion of the Mindsphere platform and the code development platform under Mendix. In this sense, his career has continued at Siemens Smart Infrastructure, where he has led the global pre-sales team for the intelligent building platform Building X, generating advanced technology solutions for global companies.

In addition to his professional work, he has been an active speaker on topics of digital innovation, value co-creation and leadership. With experience in several countries, such as Italy, Spain, Luxembourg and Switzerland, he has brought a global perspective to his projects, exploring new ways to drive business and technological innovation worldwide.

He has also been recognized for his ability to lead digital transformations in complex organizations. In fact, his team has generated $70 million in annual revenue, offering consulting services in intelligent buildings and architectural governance solutions. And it is his focus on cross-functional collaboration and his ability to manage global teams that have positioned him as a trusted advisor to senior executives.

Mr. Silvani, Stefano

- Global Head of Pre-Sales at Siemens, Zurich, Switzerland
- Global Pre-Sales - Smart Buildings at Siemens
- Presales Predix - EMEA at GE Digital
- Commercial Contracts and Partnership Management Officer at Menarini International Operations Luxemburg SA
- Master's Degree in Economics and Management at the University Di Roma Tor Vergata
- Master's Degree in Computer Engineering and Big Data at the University Telematica Internazionale

Thanks to TECH, you will be able to learn with the best professionals in the world"

Management

Mr. Nieto-Sandoval González- Nicolás, David

- Industrial Technical Engineer from the E.U.P. of Málaga
- Industrial Engineer from E.T.S.I.I
- Master's Degree in Integral Management of Quality, Environment and Health and Safety at Work from the University of the Balearic Islands
- He has been working for more than 11 years, both for companies and independently, for clients in the private agri-food industrial sector and the institutional sector, as a consultant in engineering, project management, energy saving and circularity in organizations
- Professor certified by the EOI in the areas of industry, entrepreneurship, human resources, energy, new technologies and technological innovation
- Trainer for the European INDUCE project
- Trainer at institutions such as COGITI or COIIM

Professors

Ms. Peña Serrano, Ana Belén

- Technical Engineer in Topography from the Polytechnic University of Madrid
- Master's Degree in Renewable Energies from San Pablo CEU University
- Postgraduate Certificate in Geological Cartography from Universidad Nacional de Educación a Distancia (National University of Distance Education)
- Postgraduate Certificate in Building Energy Certification from Construction Labor Foundation
- Her experience covers several sectors from working on site, to managing people in human resources
- She collaborates in different scientific communication projects, directing the dissemination in different media in the field of energy
- Member of the work management team for the Master's Degree in Environmental and Energy Management in Organizations at the International University of La Rioja

Mr. González Cano, José Luis

- Degree in Optics and Optometry from the Complutense University of Madrid
- Lighting Designer - He collaborates with companies in the lighting sector in consulting, training, lighting technology projects and implementation of ISO 9001:2015 quality systems (internal auditor)
- He is a teacher of Vocational Training in electronic systems, telematics (CISCO certified instructor), radio communications, IoT
- Member of the Professional Association of Lighting Designers (Technical Consultant) and member of the Spanish Lighting Committee, who participates in working groups on LED technology

Make the most of this opportunity and take a definitive qualitative leap in your career"

05

Structure and Content

This educational program includes all the necessary contents for students to gain extensive and specific knowledge in the area of Energy Efficiency and Sustainability in the Construction of Buildings, through a continuous process of competence growth that will boost the theoretical and practical capacity of the students.

A very complete syllabus that will take you through the learning process in an intensive and stimulating way"

Module 1. Energy in the Construction of Buildings

1.1. Energy in Cities
- 1.1.1. City Energy Behavior
- 1.1.2. Sustainable Development Goals
- 1.1.3. ODS 11 - Sustainable Citizens and Communities

1.2. Less Consumption or Cleaner Energy
- 1.2.1. The Social Awareness of Clean Energies
- 1.2.2. Social Responsibility in Energy Usage
- 1.2.3. Greater Energy Need

1.3. Smart Cities and Buildings
- 1.3.1. Smart Buildings
- 1.3.2. Current Situation of Smart Buildings
- 1.3.3. Smart Building Examples

1.4. Energy Consumption
- 1.4.1. Building Energy Consumption
- 1.4.2. Measuring Energy Consumption
- 1.4.3. Knowing Our Consumption

1.5. Energy Demand
- 1.5.1. Building Energy Demand
- 1.5.2. Calculating Energy Demand
- 1.5.3. Managing Energy Demand

1.6. Efficient Usage of Energy
- 1.6.1. Responsibility in Energy Usage
- 1.6.2. Knowing Our Energy System

1.7. Thermal Comfort
- 1.7.1. The Importance of Thermal Comfort
- 1.7.2. The Need for Thermal Comfort

1.8. Energy Poverty
- 1.8.1. Energy Dependence
- 1.8.2. Current Situation

1.9. Solar Radiation. Climate Zones
- 1.9.1. Solar Radiation
- 1.9.2. Hourly Solar Radiation
- 1.9.3. Effects of Solar Radiation
- 1.9.4. Climate Zones
- 1.9.5. The Importance of the Geographic Location of a Building

Module 2. Standards and Regulations

2.1. Building Construction Sustainability Certificates
- 2.1.1. The Need for Certificates
- 2.1.2. Certification Procedures
- 2.1.3. BREEAM, LEED, Green and WELL
- 2.1.4. PassiveHaus

2.2. Standards
- 2.2.1. Industry Foundation Classes (IFC)
- 2.2.2. Building Information Model (BIM)

2.3. European Directives
- 2.3.1. Directive 2002/ 91
- 2.3.2. Directive 2010/ 31
- 2.3.3. Directive 2012/ 27
- 2.3.4. Directive 2018/ 844

Module 3. Circular Economy

3.1. Circular Economy Tendency
- 3.1.1. Circular Economy Origin
- 3.1.2. Circular Economy Definition
- 3.1.3. Circular Economy Necessity
- 3.1.4. Circular Economy as Strategy

3.2. Circular Economy Features
- 3.2.1. First Principle: Preserve and Improve
- 3.2.2. Second Principle: Optimize
- 3.2.3. Third Principle. Promote
- 3.2.4. Key Features

3.3. Circular Economy Benefits
- 3.3.1. Economic Advantages
- 3.3.2. Social Benefits
- 3.3.3. Business Benefits
- 3.3.4. Environmental Benefits

3.4. Circular Economy Legislation
- 3.4.1. Regulations
- 3.4.2. European Directives

3.5. Life Cycle Analysis
- 3.5.1. Life Cycle Analysis (LCA) Scope
- 3.5.2. Stages
- 3.5.3. Reference Standards
- 3.5.4. Methodology
- 3.5.5. Tools

3.6. Carbon Footprint Calculation
- 3.6.1. Carbon Footprint
- 3.6.2. Types of Scope
- 3.6.3. Methodology
- 3.6.4. Tools
- 3.6.5. Carbon Footprint Calculation

3.7. CO2 Emission Reduction Plans
- 3.7.1. Improvement Plans: Supplies
- 3.7.2. Improvement Plans: Demand
- 3.7.3. Improvement Plans: Installations
- 3.7.4. Improvement Plans: Equipment
- 3.7.5. Emissions Offsets

3.8. Carbon Footprint Records
- 3.8.1. Carbon Footprint Records
- 3.8.2. Requirements Prior to Registration
- 3.8.3. Documentation
- 3.8.4. Registration Request

3.9. Good Circular Practices
- 3.9.1. Methodology BIM
- 3.9.2. Selecting Material and Equipment
- 3.9.3. Maintenance
- 3.9.4. Waste Management
- 3.9.5. Reusing Material

Module 4. Energy Audits and Certification

4.1. Energy Audits
- 4.1.1. Energy Diagnostics
- 4.1.2. Energy Audits
- 4.1.3. ESE Energy Audits

4.2. Competencies of an Energy Auditor
- 4.2.1. Personal Attributes
- 4.2.2. Knowledge and Skills
- 4.2.3. Skill Acquisition, Maintenance and Improvement
- 4.2.4. Certifications
- 4.2.5. List of Energy Service Providers

4.3. Auditing Measurement Tools
- 4.3.1. Network Analyzer and Clamp Ammeters
- 4.3.2. Luxmeter
- 4.3.3. Thermohygrometer
- 4.3.4. Anemometer
- 4.3.5. Combustion Analyser
- 4.3.6. Thermographic Camera
- 4.3.7. Transmittance Meter

4.4. Investment Analysis
- 4.4.1. Preliminary Considerations
- 4.4.2. Noise Assessment Criteria
- 4.4.3. Cost Study
- 4.4.4. Grants and Subsidies
- 4.4.5. Recovery Period
- 4.4.6. Optimal Profitability Level

4.5. Managing Contracts with Energy Services Companies
- 4.5.1. First Service: Energy Management
- 4.5.2. Second Service: Maintenance
- 4.5.3. Third Service: Total Guarantee
- 4.5.4. Fourth Service: Facility Improvement and Renovation
- 4.5.5. Fifth Service: Savings and Renewable Energy Investments

4.6. Certification Programs: HULC
- 4.6.1. HULC Program
- 4.6.2. Data Prior to Calculation
- 4.6.3. Practical Case Example: Residential Case
- 4.6.4. Practical Case Example: Small Tertiary Case
- 4.6.5. Practical Case Example: Large Tertiary

4.7. Certification Programs: Others
- 4.7.1. Variety in Energy Calculation Programs Use
- 4.7.2. Other Certification Programs

Module 5. Bioclimatic Architecture

5.1. Materials Technology and Construction Systems
- 5.1.1. Bioclimatic Architecture Evolution
- 5.1.2. Most Used Materials
- 5.1.3. Constructive Systems
- 5.1.4. Thermal Bridges

5.2. Enclosures, Walls and Roofs
- 5.2.1. The Role of Enclosures in Energy Efficiency
- 5.2.2. Vertical Enclosures and Materials Used
- 5.2.3. Horizontal Enclosures and Materials Used
- 5.2.4. Flat Roofs
- 5.2.5. Sloping Roofs

5.3. Openings, Glazing and Frames
- 5.3.1. Types of Openings
- 5.3.2. The Role of Openings in Energy Efficiency
- 5.3.3. Materials Used

5.4. Solar Protection
- 5.4.1. Need for Solar Protection
- 5.4.2. Solar Protection Systems
  - 5.4.2.1. Awnings
  - 5.4.2.2. Slats
  - 5.4.2.3. Overhangs
  - 5.4.2.4. Setbacks
  - 5.4.2.5. Other Protection Systems

5.5. Bioclimatic Strategy in Summer
- 5.5.1. The Importance of Utilizing Shade
- 5.5.2. Bioclimatic Construction Techniques for Summer
- 5.5.3. Good Building Practices

5.6. Bioclimatic Strategy for Winter
- 5.6.1. The Importance the Utilizing the Sun
- 5.6.2. Bioclimatic Construction Techniques for Winter
- 5.6.3. Construction Examples

5.7. Canadian Wells. Trombe Wall. Vegetable Covers
- 5.7.1. Other Forms of Energy Utilization
- 5.7.2. Canadian Wells
- 5.7.3. Trombe Wall
- 5.7.4. Vegetable Covers

5.8. The Importance of Building Orientation
- 5.8.1. The Wind Rose
- 5.8.2. Building Orientations
- 5.8.3. Examples of Bad Practices

5.9. Healthy Buildings
- 5.9.1. Air Quality
- 5.9.2. Lighting Quality
- 5.9.3. Thermal Insulation
- 5.9.4. Acoustic Insulation
- 5.9.5. Sick Building Syndrome

5.10. Bioclimatic Architecture Examples
- 5.10.1. International Architecture
- 5.10.2. Bioclimatic Architecture

Module 6. Renewable Energies

6.1. Thermal Solar Power
- 6.1.1. Thermal Solar Power Scope
- 6.1.2. Thermal Solar Power Systems
- 6.1.3. Thermal Solar Power Today
- 6.1.4. Thermal Solar Power Use in Buildings
- 6.1.5. Advantages and Disadvantages

6.2. Photovoltaic Solar Power
- 6.2.1. Photovoltaic Solar Power Evolution
- 6.2.2. Photovoltaic Solar Power Today
- 6.2.3. Photovoltaic Solar Power Use in Buildings
- 6.2.4. Advantages and Disadvantages

6.3. Microhydraulic Power
- 6.3.1. Hydraulic Power in Buildings
- 6.3.2. Hydraulic Power and Microhydraulic Power Today
- 6.3.3. Practical Applications of Hydraulic Power
- 6.3.4. Advantages and Disadvantages

6.4. Micro-Wind Power
- 6.4.1. Wind and Micro-Wind Power
- 6.4.2. Update on Wind and Micro-Wind Power
- 6.4.3. Practical Applications of Wind Power
- 6.4.4. Advantages and Disadvantages

6.5. Biomass
- 6.5.1. Biomass as Renewable Fuel
- 6.5.2. Types of Biomass Fuel
- 6.5.3. Oil-Fired Heat Production Systems
- 6.5.4. Advantages and Disadvantages

6.6. Geothermal
- 6.6.1. Geothermal Energy
- 6.6.2. Geothermal Power Systems Today
- 6.6.3. Advantages and Disadvantages

6.7. Aerothermal Power
- 6.7.1. Aerothermal Power in Buildings
- 6.7.2. Aerothermal Power Systems Today
- 6.7.3. Advantages and Disadvantages

6.8. Cogeneration Systems
- 6.8.1. Cogeneration
- 6.8.2. Cogeneration Systems in Homes and Buildings
- 6.8.3. Advantages and Disadvantages

6.9. Biogas in Building
- 6.9.1. Potentialities
- 6.9.2. Biodigesters
- 6.9.3. Integration

6.10. Self-Consumption
- 6.10.1. Self-Consumption Application
- 6.10.2. Self-Consumption Benefits
- 6.10.3. The Sector Today
- 6.10.4. Self-Consumption Power Systems in Buildings

Module 7. Electrical Installations

7.1. Electrical Equipment
- 7.1.1. Classification
- 7.1.2. Appliance Consumption
- 7.1.3. Usage Profiles

7.2. Energy Labels
- 7.2.1. Labeled Products
- 7.2.2. Label Interpretation
- 7.2.3. Ecolabels
- 7.2.4. EPREL Database Product Registration
- 7.2.5. Estimated Savings

7.3. Individual Measurement Systems
- 7.3.1. Measuring Power Consumption
- 7.3.2. Individual Meters
- 7.3.3. Switchboard Meters
- 7.3.4. Choosing Devices

7.4. Filters and Capacitor Banks
- 7.4.1. Differences between Power Factor and Cosine PHI
- 7.4.2. Harmonics and Distortion Rate
- 7.4.3. Reactive Energy Compensation
- 7.4.4. Filter Selection
- 7.4.5. Capacitor Bank Selection

7.5. Stand-By Consumption
- 7.5.1. Stand-By Study
- 7.5.2. Code of Conduct
- 7.5.3. Estimating Stand-By Consumption
- 7.5.4. Anti-Stand-By Devices

7.6. Electric Vehicle Recharging
- 7.6.1. Types of Recharging Points
- 7.6.2. Potential ITC-BT 52 Diagrams
- 7.6.3. Provision of Regulatory Infrastructures in Building Construction
- 7.6.4. Horizontal Property and Installation of Recharging Points

7.7. Uninterruptible Power Supply (UPS) Systems
- 7.7.1. UPS Infrastructure
- 7.7.2. Types of UPS
- 7.7.3. Features
- 7.7.4. Applications
- 7.7.5. UPS Selection

7.8. Electric Meter
- 7.8.1. Types of Meters
- 7.8.2. Digital Meter Operation
- 7.8.3. Use as an Analyzer
- 7.8.4. Telemetry and Data Mining

7.9. Electric Billing Optimization
- 7.9.1. Electricity Rates
- 7.9.2. Types of Low Voltage Consumers
- 7.9.3. Types of Low Voltage Rates
- 7.9.4. Power Term and Penalties
- 7.9.5. Reactive Power Term and Penalties

7.10. Efficient Usage of Energy
- 7.10.1. Energy Saving Habits
- 7.10.2. Appliance Energy Saving
- 7.10.3. Energy Culture in Facility Management

Module 8. Thermal Installations

8.1. Thermal Installations in Buildings
- 8.1.1. Idealization of Thermal Installations in Buildings
- 8.1.2. Thermal Machine Operation
- 8.1.3. Pipe Insulation
- 8.1.4. Duct Insulation

8.2. Gas-Fired Heat Production Systems
- 8.2.1. Gas-Fired Heating Equipment
- 8.2.2. Components of a Gas Production System
- 8.2.3. Vacuum Test
- 8.2.4. Good Practices in Gas Heat Systems

8.3. Oil-Fired Heat Production Systems
- 8.3.1. Oil-Fired Heating Equipment
- 8.3.2. Components of an Oil-Fired Heat Production Systems
- 8.3.3. Good Practices in Oil-Fired Heating Systems

8.4. Oil-Fired Heat Production Systems
- 8.4.1. Biomass Heating Equipment
- 8.4.2. Components of a Biomass Heat Production System
- 8.4.3. The Use of Biomass in the Home
- 8.4.4. Good Practices in Biomass Production Systems

8.5. Heat Pumps
- 8.5.1. Heat Pump Equipment
- 8.5.2. Components of a Heat Pump
- 8.5.3. Advantages and Disadvantages
- 8.5.4. Good Practices in Heat Pump Equipment

8.6. Refrigerant Gases
- 8.6.1. Knowledge of Refrigerant Gases
- 8.6.2. Types of Refrigerant Gas Classification

8.7. Refrigeration Systems
- 8.7.1. Cooling Equipment
- 8.7.2. Typical Installations
- 8.7.3. Other Refrigeration Installations
- 8.7.4. Revision and Cleaning of Refrigeration Components

8.8. DHW Systems
- 8.8.1. Types of DHW Systems
- 8.8.2. Domestic DHW Systems
- 8.8.3. Correct Use of DHW Systems

8.9. DHW Systems
- 8.9.1. Types of DHW Systems
- 8.9.2. DHW Systems
- 8.9.3. Correct Use of DHW Systems

8.10. Maintenance of Thermal Installations
- 8.10.1. Boiler and Burner Maintenance
- 8.10.2. Maintenance of Auxiliary Components
- 8.10.3. Refrigerant Gas Leak Detection
- 8.10.4. Refrigerant Gas Recovery

Module 9. Lighting installations

9.1. Light Sources
- 9.1.1. Lighting Technology
  - 9.1.1.1. Properties of Light
  - 9.1.1.2. Photometry
  - 9.1.1.3. Photometric Measurements
  - 9.1.1.4. Luminaires
  - 9.1.1.5. Auxiliary Electrical Equipment
- 9.1.2. Traditional Light Sources
  - 9.1.2.1. Incandescent and Halogen
  - 9.1.2.2. High- and Low-Pressure Sodium Vapor
  - 9.1.2.3. High- and Low-Pressure Mercury Steam
  - 9.1.2.4. Other Technologies: Induction, Xenon

9.2. LED Technology
- 9.2.1. Principle of Operation
- 9.2.2. Electrical Characteristics
- 9.2.3. Advantages and Disadvantages
- 9.2.4. LED Luminaires. Optical
- 9.2.5. Auxiliary Equipment. *Driver*

9.3. Interior Lighting Requirements
- 9.3.1. Standards and Regulations
- 9.3.2. Lighting Project
- 9.3.3. Quality Criteria

9.4. Outdoor Lighting Requirements
- 9.4.1. Standards and Regulations
- 9.4.2. Lighting Project
- 9.4.3. Quality Criteria

9.5. Lighting Calculations with Calculation Software. DIALux
- 9.5.1. Features
- 9.5.2. Menus
- 9.5.3. Project Design
- 9.5.4. Obtaining and Interpreting Results

9.6. Lighting Calculations with Calculation Software. EVO
- 9.6.1. Features
- 9.6.2. Advantages and Disadvantages
- 9.6.3. Menus
- 9.6.4. Project Design
- 9.6.5. Obtaining and Interpreting Results

9.7. Energy Efficiency in Lighting
- 9.7.1. Energy Efficiency Improvement Measures
- 9.7.2. Integration of Natural Light

9.8. Biodynamic Lighting
- 9.8.1. Light Pollution
- 9.8.2. Circadian Rhythms
- 9.8.3. Harmful Effects

9.9. Calculation of Interior Lighting Projects
- 9.9.1. Residential Buildings
- 9.9.2. Business Buildings
- 9.9.3. Educational Centers
- 9.9.4. Hospitals
- 9.9.5. Public Buildings
- 9.9.6. Industries
- 9.9.7. Commercial and Exhibition Spaces

9.10. Calculation of Outdoor Lighting Projects
- 9.10.1. Street and Road Lighting
- 9.10.2. Facades
- 9.10.3. Signs and Illuminated Signs

Module 10. Control Installations

10.1. Home Automation
- 10.1.1. State-of-the-Art
- 10.1.2. Standards and Regulations
- 10.1.3. Equipment
- 10.1.4. Services
- 10.1.5. Networks

10.2. Inmotics
- 10.2.1. Characteristics and Regulations
- 10.2.2. Building Automation and Control Technologies and Systems
- 10.2.3. Technical Building Management for Energy Efficiency

10.3. Telemanagement
- 10.3.1. System Determination
- 10.3.2. Key Elements
- 10.3.3. Monitoring Software

10.4. Smart Home
- 10.4.1. Features
- 10.4.2. Equipment

10.5. The Internet of Things IoT
- 10.5.1. Technological Monitoring
- 10.5.2. Standards
- 10.5.3. Equipment
- 10.5.4. Services
- 10.5.5. Networks

10.6. Telecommunications Installations
- 10.6.1. Key Infrastructure
- 10.6.2. Television
- 10.6.3. Radio
- 10.6.4. Telephony

10.7. KNX, DALI Protocols
- 10.7.1. Standardization
- 10.7.2. Applications
- 10.7.3. Equipment
- 10.7.4. Design and Configuration

10.8. IP Networks WiFi
- 10.8.1. Standards
- 10.8.2. Features
- 10.8.3. Design and Configuration

10.9. Bluetooth
- 10.9.1. Standards
- 10.9.2. Design and Configuration
- 10.9.3. Features

10.10. Future Technologies
- 10.10.1. Zigbee
- 10.10.2. Programming and Configuration. Python
- 10.10.3. Big Data

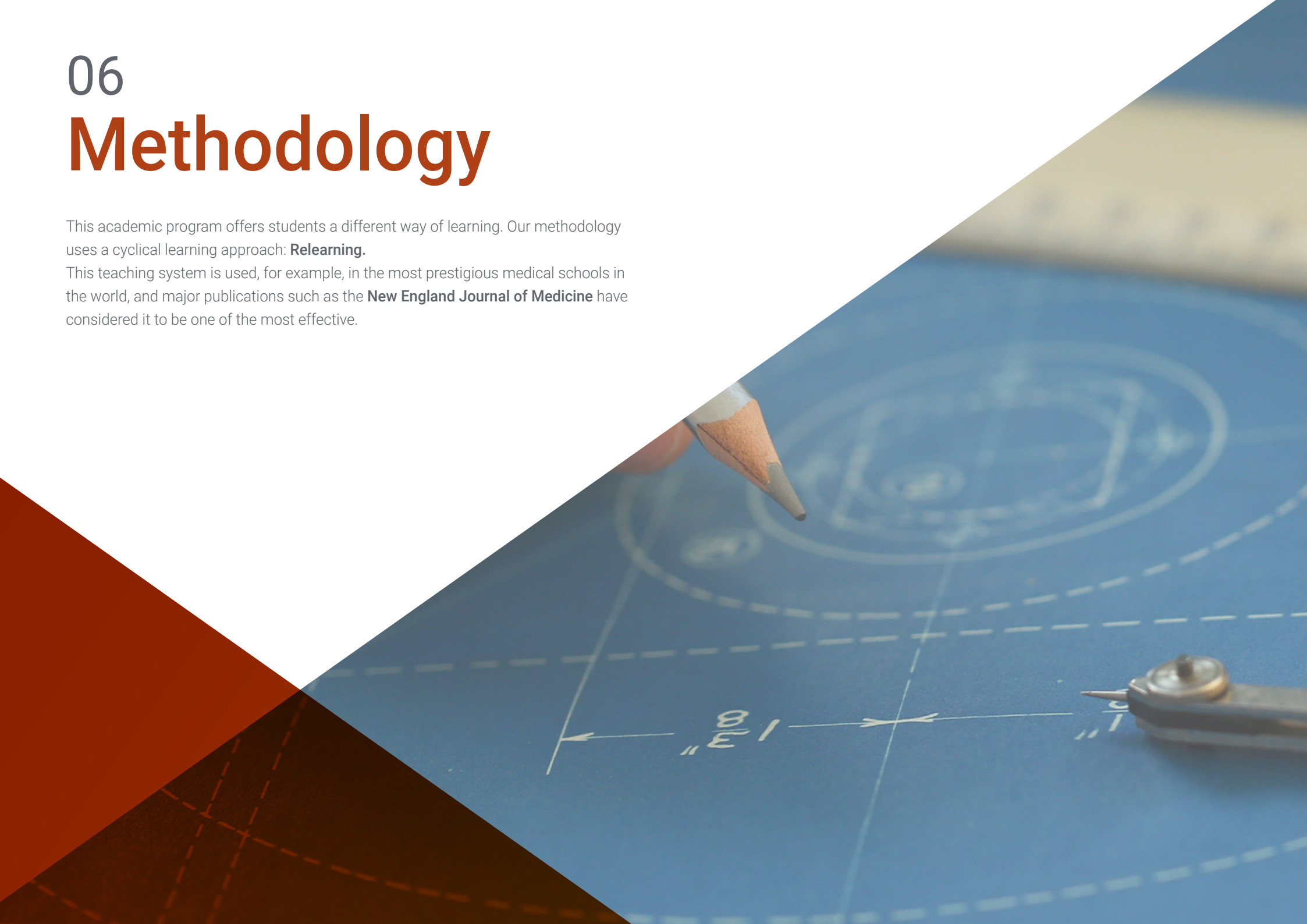
This program will allow you to advance in your career comfortably"

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

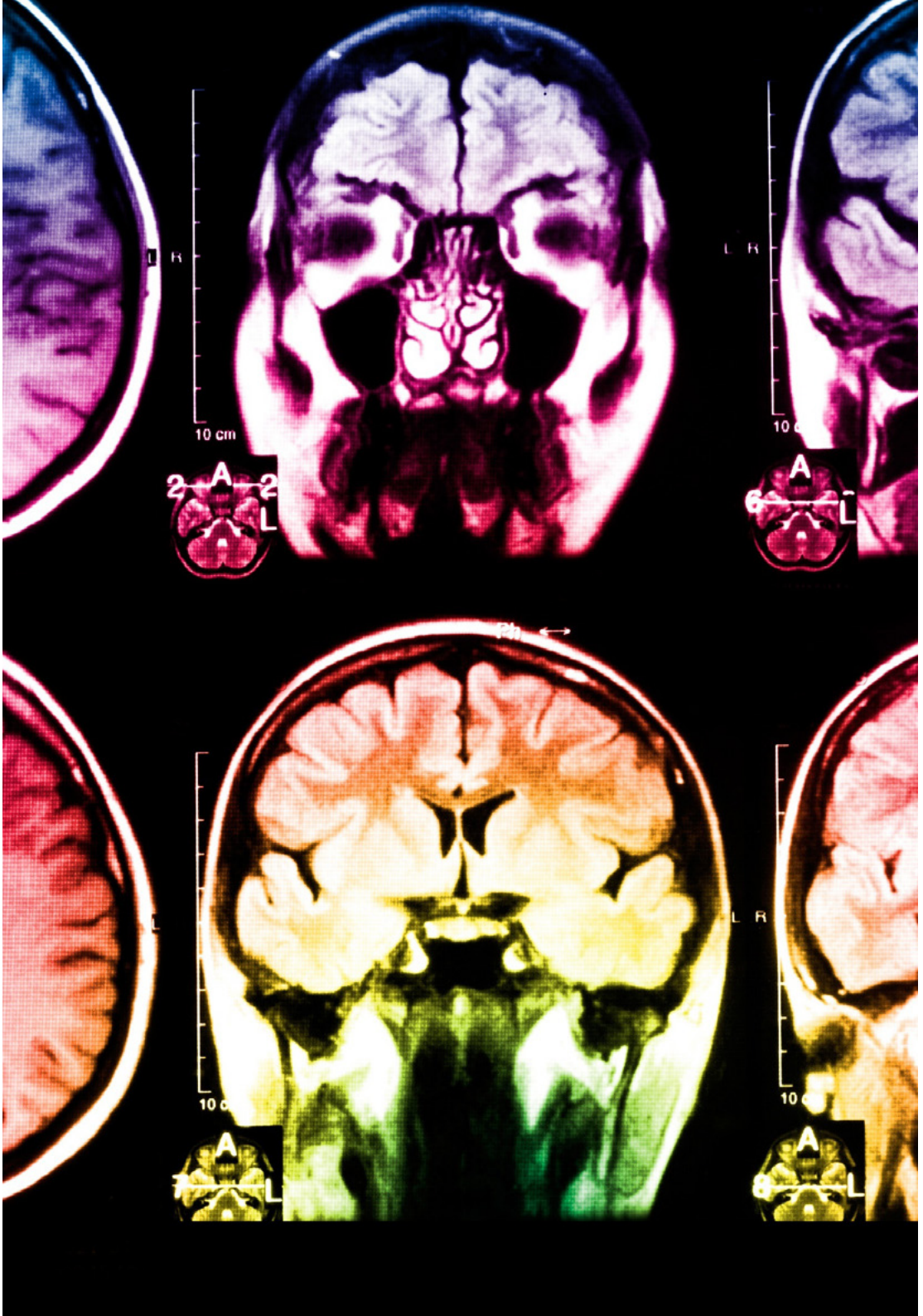
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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 relearn). 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 elearning, 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.

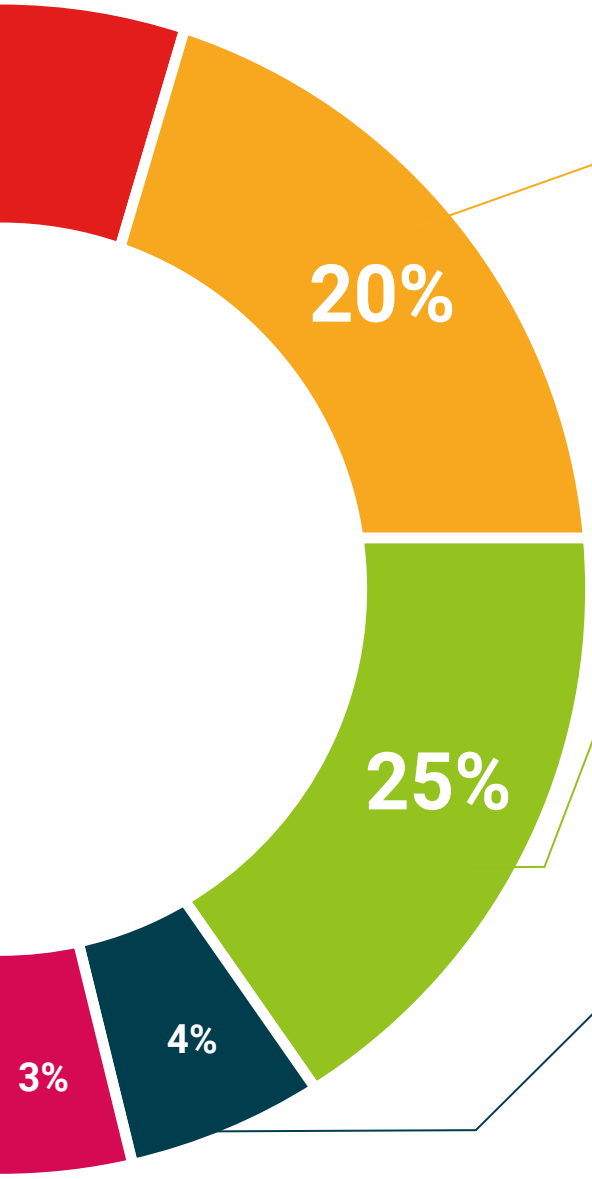
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

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 Energy Efficiency and Sustainability in the Construction of Buildings guarantees you, in addition to the most rigorous and updated training, access to a Professional Master's Degree issued by TECH Global University.

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

This program will allow you to obtain your **Professional Master's Degree diploma in Energy Efficiency and Sustainability in the Construction of Buildings** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

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

Title: **Professional Master's Degree in Energy Efficiency and Sustainability in the Construction of Buildings**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**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Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Professional Master's Degree in Energy Efficiency and Sustainability in the Construction of Buildings

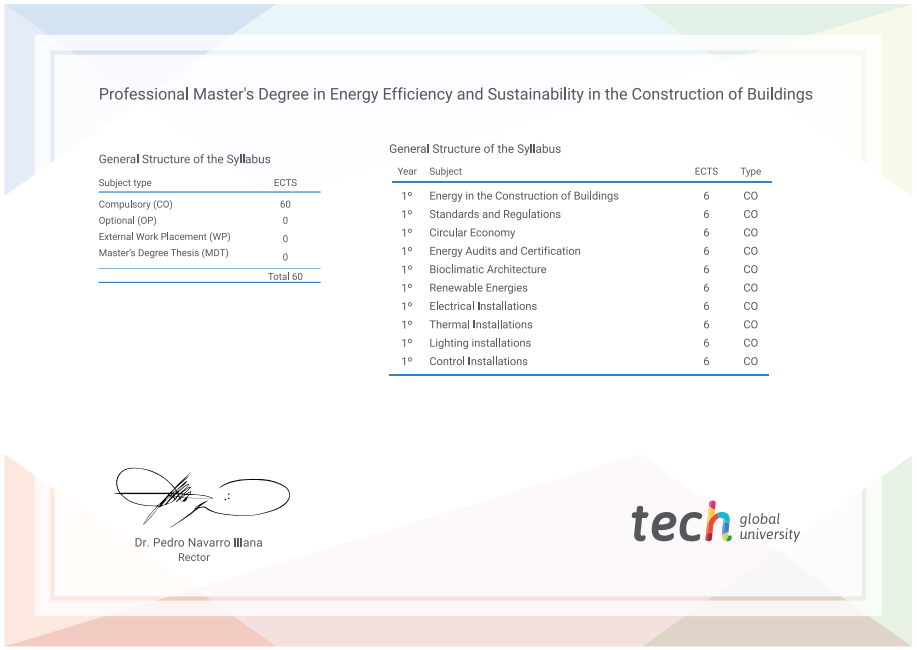
This is a program of 1,500 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

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

Dr. Pedro Navarro Illana
Rector

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Energy Efficiency and Sustainability in the Construction of Buildings

General Structure of the Syllabus

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

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Energy in the Construction of Buildings	6	CO
1º	Standards and Regulations	6	CO
1º	Circular Economy	6	CO
1º	Energy Audits and Certification	6	CO
1º	Bioclimatic Architecture	6	CO
1º	Renewable Energies	6	CO
1º	Electrical Installations	6	CO
1º	Thermal Installations	6	CO
1º	Lighting installations	6	CO
1º	Control Installations	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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Professional Master's Degree

Energy Efficiency and Sustainability in the Construction of Buildings

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

Professional Master's Degree

Energy Efficiency and Sustainability in the Construction of Buildings

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