Advanced Master's Degree

Energy Efficiency in the Construction of Buildings

tech technological university

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Advanced Master's Degree
Energy Efficiency in the Construction of Buildings

- Modality: **online**
- Duration: **2 years**
- Certificate: **TECH Technological University**
- Dedicated: **16 hours a week**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/pk/engineering/advanced-master-degree/advanced-master-degree-energy-efficiency-construction-buildings**

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01

Introduction

Energy Efficiency in the Construction of Buildings is an essential task that must be carried out from the design process of the building, since there are techniques and tools that allow reducing energy consumption, as well as the use of renewable energies, which are essential in today's society. For this reason TECH has launched this program for engineers. This is a 100% online degree where all the up-to-date information on electrical systems and energy efficiency in the building process will be studied in depth.

Engineers must update their knowledge of new building techniques. In this Advanced Master's Degree we give you the keys to Energy Efficiency in the Construction of Buildings, in an intensive and complete training"

The Advanced Master's Degree in Energy Efficiency in the Construction of Buildings covers the complete range of issues involved in this field, both in the residential and tertiary sectors, and in the field of intervention in existing buildings as well as in new construction. Its study has a clear advantage over 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 program has been designed to provide superior information on Energy Efficiency in the Construction of Buildings. Therefore, at the end of the course, the student will be able to analyze the possible measures to develop a rehabilitation and energy efficiency project based on the experience of singular works and success cases presented in this specialization, where they will be able to analyze the different options of intervention in the energy field regarding materials, systems and installations of high energy performance.

Likewise, they will have acquired a solid knowledge of the rules and regulations to be applied in relation to energy efficiency and sustainability in the construction of buildings. And they will be able to master the knowledge of energy, bioclimatic architecture, renewable energies and building installations, such as electrical, thermal, lighting and control.

Throughout this program, the students will go through all the current approaches to the different challenges of their profession. A high-level step that will become a process of improvement, not only on a professional level, but also on a personal level. Additionally, at TECH we have a social commitment: to help highly qualified professionals to specialize and to develop their personal, social and professional skills throughout the course of their studies.

This Advanced Master's Degree is designed to provide access to the specific knowledge of this discipline in an intensive and practical way. A great value for any professional. In addition, as it is a 100% online modality, the student decides where and when to study. Without the restrictions of fixed timetables or having to move between classrooms, this course can be combined with work and family life.

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

- The latest technology in e-learning software
- Intensely visual teaching system, supported by graphic and schematic contents that are easy to assimilate and understand
- Practical case studies presented by practising experts
- State-of-the-art interactive video systems
- Teaching supported by telepractice
- Continuous updating and recycling systems
- Self-regulated learning: full compatibility with other occupations
- Practical exercises for self-assessment and learning verification
- Support groups and educational synergies: Questions to the expert, discussion forums and knowledge
- Communication with the teacher and individual reflection work
- Content that is accessible from any fixed or portable device with an Internet connection
- Supplementary documentation databases are permanently available, even after the program

The use of renewable energy provides social, economic and environmental improvements and its implementation in buildings is essential. What are you waiting for to enroll and learn this at TECH?"

A program created for professionals who aspire to excellence and that will allow them to acquire new skills and strategies in a smooth and effective way"

A high-level scientific program, supported by advanced technological development and the teaching experience of the best professionals.

A deep and comprehensive dive into the most important energy saving strategies and approaches.

Our teaching staff is made up of working professionals. In this way, TECH makes sure to offer the student the academic updating objective it intends. A multidisciplinary team of trained and experienced professionals in different environments, who will develop the theoretical knowledge efficiently, but, above all, will put at the service of the program practical knowledge derived from their own experience.

This command of the subject is complemented by the effectiveness of the methodological design of this Grand Master. Developed by a multidisciplinary team of e-learning experts, it integrates the latest advances in educational technology. In this way, the student will be able to study with a range of convenient and versatile multimedia tools.

The design of this program is based on Problem-Based Learning, an approach that conceives learning as a highly practical process. To achieve this remotely, we will use telepractice. With the help of an innovative interactive video system and *Learning from an Expert*.

02

Objectives

Our objective is to prepare highly qualified professionals for the working An objective that is complemented, moreover, in a global manner, by promoting human development that lays the foundations for a better society. This objective is focused on helping professionals reach a much higher level of expertise and control. A goal that can be achieved through the educational journey that this Advanced Master's Degree offers.

If your goal is to improve in your profession, to acquire a qualification that will enable you to compete among the best, then look no further: welcome to TECH"

General Objectives

- Undertake the particularities to correctly manage the design, project, construction and execution of Energy Rehabilitation Works (Existing Buildings) and Energy Saving (New Buildings)
- Interpret the current regulatory framework based on current regulations and the possible criteria to be implemented for energy efficiency in buildings
- Discover the potential business opportunities offered by the knowledge of the various energy efficiency measures, from studying tenders and technical tenders for construction contracts, projecting buildings, analyzing and directing the works, managing, coordinating and planning the development of Energy Saving and Rehabilitation Projects
- Ability to analyze building maintenance programs developing the study of appropriate energy saving measures to be implemented according to technical requirements
- Delve into the latest trends, technologies and techniques in the field of Energy Efficiency in the Construction of Buildings
- 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 him/her to deepen in the specific ones that act in the development of procedures for the actions 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
- 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. As well as 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

- 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

Our goal is to help you achieve yours, through a very unique training program that will become an unparalleled professional growth experience"

Specific Objectives

Module 1. Energy Rehabilitation of Existing Buildings

- Master the main concepts of the methodology to be followed in the development of an energy rehabilitation study analysis according to the criteria to be implemented
- Interpret the pathologies of foundations, roofs, facades and exterior slabs, carpentry and glazing, as well as installations, developing the study of energy rehabilitation of an existing building, from data collection, analysis and assessment, study of the different proposals for improvement and conclusions, study of technical regulations of application
- Establish the guidelines to be taken into account in the development of energy rehabilitation interventions in historic buildings, from data collection, analysis and assessment, the study of the different proposals for improvement and conclusions, study of technical regulations of application
- Acquire the necessary knowledge to develop an economic study of energy rehabilitation based on the analysis of the cost, execution times, the conditions of specialization of the works, the guarantees and specific tests to be requested
- Elaborate an assessment of the appropriate energy rehabilitation intervention and its alternatives based on the analysis of the different intervention options, based on the analysis of costs based on amortization, the correct selection of objectives, as well as a final extract with the possible courses of action

Module 2. Energy Efficiency in New Buildings

- Know the building categories, an analysis of the constructive solutions and objectives to be achieved, as well as the elaboration of a cost study of the various intervention proposals
- Interpret the possible pathologies of new buildings based on the study of foundations, roofs, facades and exterior slabs, carpentry and glazing, as well as installations, developing the complete energy rehabilitation study from data collection, analysis and evaluation, the study of the different improvement proposals and conclusions, study of the applicable technical regulations
- Establish the guidelines that must be taken into account in the development of new building interventions with Energy Efficiency in singular buildings, from data collection, analysis and assessment, the study of the different proposals for improvement and conclusions, study of the technical regulations of application
- Acquire the necessary knowledge to develop an economic study of new construction with energy efficiency based on the analysis of the cost, execution times, specialization conditions of the works, guarantees and specific tests to be requested
- Elaborate an assessment of the appropriate intervention of a New Energy Efficiency Building intervention and its alternatives based on the analysis of the different intervention options, based on the analysis of costs based on amortization, the correct selection of objectives, as well as a final extract with the possible courses of action

Module 3. Energy Efficiency in the Envelope

- Deepen the scope of the envelope study, such as parameters related to materials, thicknesses, conductivity, transmittance and as basic technical conditions to analyze the energy performance of a building
- Interpret the possible energy improvements based on the study of the energy optimization of foundations, roofs, facades and exterior slabs (floors and ceilings), as well as basement walls in contact with the building, developing the study from data collection, analysis and assessment, study of the different proposals for improvement and conclusions, study of technical regulations of application
- Approach singular encounters of the thermal envelope such as installation skids and chimneys
- Acquire the knowledge of the study of the envelope in singular prefabricated constructions
- Plan and control the correct execution by means of a thermographic study according to the materials, their layout, development of the thermographic analysis, and study of the solutions to be implemented

Module 4. Energy Savings in Windows and Glazing

- Master the fundamental concepts of the scope of the study of window and door frames, such as parameters relating to materials (single or mixed material solutions), technical justifications and various innovative solutions depending on the nature of the building
- Interpret possible energy improvements based on the study of the technical characteristics of the windows and doors, such as transmittance, air permeability, water tightness and wind resistance
- Cover in detail the scope of the study of glazing types and the composition of composite glazing, such as parameters related to their properties, technical justifications and various innovation solutions depending on the nature of the building
- Acquire knowledge of the different types of sun protection based on their layout and technical justifications, as well as unique solutions
- Discover the new proposals for high energy performance windows and glazing

Module 5. Energy Savings in Thermal Bridges

- Delve into the fundamental concepts of the scope of the study of possible thermal bridges, such as parameters related to the definition, application regulations, technical justifications and various innovation solutions depending on the nature of the building
- Approach the analysis of each thermal bridge based on the nature of the type, so we will develop the constructive thermal bridges, the geometric ones, the ones due to material change
- Analyze the possible singular thermal bridges of the building: the window, the splayed, the pillar and the slab
- Plan and control the correct execution based on the study of possible thermal bridges through thermography, specifying the thermographic equipment, the working conditions, the detection of encounters to be corrected and subsequent analysis of solutions
- Analyze the different thermal bridge calculation tools: *Therm, Cypetherm He Plus* and Flixo

Module 6. Energy Savings in Airtightness

- Delve into the scope of the airtightness study, such as parameters related to the definition, application regulations, technical justifications and various innovation solutions depending on the nature of the building
- Interpret the possible energy improvements based on the study of the energy optimization of airtightness based on the intervention in the envelope and in the installations
- Interpret the development of the various pathologies that can occur when building airtightness is not taken into account: condensation, humidity, efflorescence, high energy consumption, poor comfort, etc
- Address the technical requirements based on different technical solutions in order to optimize comfort, indoor air quality and noise protection
- Plan and control the correct execution based on the required thermography tests, smoke tests and Blower-Door test

Module 7. Energy Saving in Facilities

- Delve into the study of the scope of the study of air conditioning installations, such as parameters relating to the definition, application regulations, technical justifications and various innovative solutions depending on the nature of the building
- Delve into the study of aerothermal installations, such as definition parameters, application standards, technical justifications and various innovative solutions depending on the nature of the building
- You will acquire detailed knowledge in the study of ventilation installations with heat recovery, such as parameters related to the definition, application regulations, technical justifications and various innovative solutions depending on the nature of the building
- Select the type of boiler and pumps with high energy efficiency and air conditioning through radiant floors and ceilings based on the applicable regulations, technical justifications and various innovative solutions depending on the nature of the building
- Discover the installation opportunities of the Free-cooling system by analyzing its definition, application regulations, technical justifications and various innovation solutions depending on the nature of the building
- Analyze the lighting and transport installations of the building with high Energy Efficiency
- Plan and control the construction of appropriate solar thermal and photovoltaic systems
- Know the operation of building energy consumption control systems through home automation and *Best Management System* (BMS)

Module 8. Building Energy Simulation Tools and Regulations

- Interpret the legislative framework applicable to the energy certification of buildings
- Knowing the proposed regulatory changes in energy matters in the framework of the Technical Building Code CTE 2019 compared to the previous CTE 2013
- Analyze the different valid tools for the energy certification of buildings, whether it is the Lider-Calener Unified Tools, the C3X Energy Certification program, the C3 Energy Certification program, the CERMA Energy Certification program, the CYPETHERM 2020 Energy Certification program, the SG SAVE Energy Certification program
- Integrate the fundamental knowledge of the development of an Energy Certification of an existing building by the Simplified Procedure using the C3X program and of a new building using the Unified Lider-Calener tool

Module 9. Energy in the Construction of Buildings

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

Module 10. Standards and Regulations

- Identify the responsible bodies and agencies
- Achieve a global vision of current regulations
- Justify the differences between the different documents, whether they are norms, regulations, standards, legislation and their scope of application
- Analyze in detail the main regulations that regulate the application procedures on Energy Efficiency and sustainability in buildings
- Provide tools to search for related information

Module 11. Circular Economy

- Have 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 on sustainability in property management for the development of improvement plans that allow energy savings and reduction of the environmental impact produced by buildings
- Master the criteria of green public procurement in the real estate sector in order to be able to face and manage them with criteria

Module 12. Energy Audit

- Discuss in detail the scope of an energy audit, the fundamental general concepts, objectives and analysis methodology
- Analyze the energy diagnosis based on the analysis of the envelope and systems, the analysis of consumption and energy accounting, the proposal of renewable energies to be implemented, as well as the proposal of various consumption control systems
- Analyze the benefits of an Energy Audit based on energy consumption, energy costs, environmental improvements, competitiveness improvements and building maintenance improvements
- Establish the guidelines that must be taken into account in the development of the energy audit, such as the request for prior documentation of planimetries and invoices, visits to the building in operation, as well as the necessary equipment
- Gather previous information about the building to be audited based on general data, planimetries, previous projects, list of installations and technical data sheets, as well as energy invoices
- Elaborate preliminary data collection procedures with energy inventory, construction aspects, systems and installations, electrical measurements and operating conditions
- Interpret the analysis and evaluation of the envelope, systems and installations, the different options for action, energy balances and energy accounting of the building
- Develop a program of improvement proposals based on the energy supply and demand of the building, the type of action to be carried out, the optimization of the envelope and the systems and installations, as well as develop a final report that concludes the study developed
- Plan the development costs of the Energy Audit based on the scale of the building to be analyzed
- Delve into the current regulations and future forecasts in energy matters that condition the implementation of the measures proposed in the Energy Audit

Module 13. Energy Audits and Certification

- Recognize the type of work to be developed depending on the objectives set by the client to recognize the need to perform an energy audit
- Conduct an energy audit of the building in accordance with EN 16247-2 to establish an action protocol to determine the initial situation and propose energy efficiency options
- 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 14. 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 15. 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 16. 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 therefore economic savings in the Facility Management activity within real estate management

Module 17. 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 18. Lighting installations

- Apply the principles of lighting technology, its properties, differentiating the aspects that contribute to Energy Efficiency
- 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 lighting techniques for health improvement as a reference element in Energy Efficiency

Module 19. Control Installations

- Analyze the different installations, technologies and control systems applied to Energy Efficiency in the Construction of 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

Module 20. International Sustainability, Energy Efficiency and Comfort Certifications

- Delve into the scope of international sustainability and energy efficiency certifications, as well as current zero/zero consumption certifications
- Discuss in detail the sustainability certifications Leed, BREEAM and Green, the origins, the types of certifications, the levels of certification, as well as the criteria to be implemented
- Learn about LEED ZERO Certification, its origin, certification levels, criteria to be implemented and development framework
- Discuss in detail the Passivhaus, EnePHit, Minergie and nZEB certifications, the origins, the certification levels, the criteria to be implemented and the framework for the development of nearly zero/zero energy buildings
- Learn more about WELL Certification, its origin, certification levels, criteria to be implemented and development framework

The teaching materials of this program, elaborated by these specialists, have contents that are completely applicable to your professional experiences"

03

Skills

Once all the contents have been studied and the objectives of the Advanced Master's Degree in Energy Efficiency in the Construction of Buildings have been achieved, the professional will have a superior competence and performance in this area. A very complete approach, in a high-level degree, that makes the difference as a program within the educational context for the energy field in the construction of buildings.

Achieving excellence in any profession requires effort and perseverance. But, above all, the support of professionals, who will give you the boost you need, with the necessary means and assistance. At TECH, we offer you everything you need"

General Skills

- Acquire the necessary skills for the professional practice in the field of sustainable building, with the knowledge of all the factors necessary to perform it with quality and solvency
- Understand building energy consumption and carry out actions to reduce it
- Apply the specific regulations related to Energy Efficiency in the Construction of Buildings
- Perform energy audits in buildings
- Detect and solve problems in electrical installations to save energy consumption

Our objective is very simple: to offer you quality training, with the best teaching system available today, so that you can achieve excellence in your profession"

Specific Skills

- Design rehabilitation projects for existing buildings under strict energy efficiency criteria
- Design Energy Efficiency projects for new buildings under strict energy efficiency criteria
- Coordinate and plan the development of rehabilitation and energy efficiency projects
- Work as project manager for refurbishment and energy efficiency projects
- Manage execution and installation departments of construction companies specialized in energy efficiency
- Bid and prepare tenders for the award of construction contracts for energy rehabilitation and energy efficiency works
- Develop, coordinate and plan building maintenance programs and establish the optimal intervention measures in accordance with established technical criteria, giving priority to energy demand reduction
- Access to management positions in the energy resources business areas of companies in the sector
- Qualify as a specialist in energy-efficient energy retrofit construction
- Qualify as a specialist in the construction of energy-efficient new buildings
- Qualify as a specialist building energy assessor
- Discover the impact of a city's energy consumption
- Gain knowledge about the legislation and regulations related to Energy Efficiency and sustainability in the construction of buildings and to apply them in their work
- Develop improvement plans to reduce the environmental impact of buildings
- Apply the EN 16247-2 standard for carrying out audits
- 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 efficiency

04

Course Management

For our master's degree to be of the highest quality, we are proud to work with a teaching staff of the highest level, chosen for their proven track record in the field of education. Professionals from different areas and fields of expertise that make up a complete, multidisciplinary team. A unique opportunity to learn from the best.

Our professors bring their vast experience and their teaching skills to offer you a stimulating and creative specialized training program"

Management

Ms. Peña Serrano, Ana Belén

- Technical engineer at Quetzal Ingeniería
- Production of a podcast about renewable energies
- Documentation Technician at AT Spain Holdco
- Technical engineer at Ritrac Training
- Topography projects at Caribersa
- Technical Engineering in Topography by the Polytechnic University of Madrid
- Master's Degree in Renewable Energies from San Pablo CEU University

Mr. Nieto-Sandoval González- Nicolás, David

- Industrial Technical Engineer by the E.U.P of Málaga
- Industrial Engineer by the E.T.S.I.I. of Ciudad Real.
- Data Protection Officer (DPO), Antonio Nebrija University
- Expert in project management and business consultant and mentor in organizations such as Youth Business Spain or COGITI of Ciudad Real
- CEO of the start-up GoWork oriented to competency management and professional development and business expansion through hyperlabels
- Writer of technological training content for both public and private entities.
- Professor certified by the EOI in the areas of industry, entrepreneurship, human resources, energy, new technologies and technological innovation

Professors

Dr. Diedrich Valero, Daniel

- Project Manager and Architect at DMDV Architects PASSIVHAUS
- Co-founder of CENERGETICA, sustainability consulting in international certifications LEED, BREEAM and WELL
- Associate Professor in different higher programs in his field of specialization
- Doctorate from the University of Alcalá
- Architect by the Polytechnic University of Madrid, ETSAM
- Architect certified in zero energy consumption by Passive House Institut Darmstadt, Germany

Dr. Celis D'Amico, Flavio

- Architect expert in Sustainable and Heritage Construction
- Architect at CDE Arquitectura SLP
- Researcher at the School of Architecture of the University of Alcalá de
- Editor of the magazine Hábitat Sustentable from the University of Bio-Bio
- PhD in Architecture from the Polytechnic University of Madrid

Dr. Da Casa Martín, Fernando

- Director of the Office of Infrastructure and Maintenance Management of the University of Alcalá
- Professor of programs in the service of Architecture
- Professor of Restoration and Architectural Heritage University School
- Director of the School of Technical Architecture
- PhD in Architecture from the Polytechnic University of Madrid
- Specialist in architectural intervention, geotechnical engineering, sustainable architecture and the environment, and heritage
- Europa Nostra European Community Award for Heritage Conservation

Mr. Postigo Castellanos, Juan

- Technical architect expert in the integral management of promotions, land purchase and urban development
- Technical Architect
- Manager and Technical Director POSCON S.L
- Work execution management
- Technical Architect from the Polytechnic University of Madrid
- Master's Degree in Renewable Energies from the European University of Madrid
- Certified Passive House Consultant by the Passivhaus Institut (Darmstadt, Alemania)
- Master's Degree in Environment and Bioclimatic Architecture from the Polytechnic University of Madrid
- MBA Building at the European Business School

Ms. Dombriz Martialay, Talia

- Co-founder and CEO of CENERGETICA
- Project Manager from DMDV Architects
- Multiple national and international consultancies for LEED, BREEAM and WELL certifications, as well as PASSIVHAUS
- Doctorate courses at ETSAM
- Architect, Building and Urban Planning from the Polytechnic University of Madrid
- Architecture by CEU San Pablo University
- U.S. LEED® AP BD+C qualifications. Green Building Council (USGBC), BREEAM® ES Advisor by the Building Research Establishment (BRE) and of WELL™ AP by the International WELL Building Institute (IWBI) and expert in PASSIVHAUS buildings

Dr. Echeverría Valiente, Ernesto

- Director CDE Architecture
- CEO Celis DA Casa Echeverría Arquitecture
- Head of the Pinar Group's Building Department
- Collaborator in the creation of 2 patents and researcher
- Professor of Drawing and Geometry at the School of Architecture of Alcalá
- PhD in Architecture from the Polytechnic University of Madrid
- Degree in Architecture from the Polytechnic University of Madrid

Mr. González Cano, José Luis

- Lighting Designer
- Vocational training teacher in electronic systems, telematics (CISCO certified instructor), radio communications, IoT
- Degree in Optics and Optometry from the Complutense University of Madrid
- Industrial Electronics Technician by Netecad Academy
- Member of: The Professional Association of Lighting Designers (Technical Consultant), Member of the Spanish Lighting Committee

A unique, key, and decisive educational experience to boost your professional development"

05

Structure and Content

The contents of this program have been developed by different professors with a clear purpose: to ensure that our students acquire each and every one of the skills necessary to become true experts in this subject. The content of this Grand Master's Degree enables you to learn all aspects of the different disciplines involved in this field. A complete and well-structured program that will take you to the highest standards of quality and success.

Through a very well compartmentalized development, you will be able to access the most advanced knowledge of the moment in Energy Efficiency"

Module 1. Energy Rehabilitation of Existing Buildings

1.1. Methodology
- 1.1.1. Main Concepts
- 1.1.2. Establishment of Building Categories
- 1.1.3. Analysis of Construction Pathologies
- 1.1.4. Analysis of the Objectives of the Regulations

1.2. Study of Pathologies of Foundations of Existing Buildings
- 1.2.1. Data Collection
- 1.2.2. Analysis and Evaluation
- 1.2.3. Proposals for Improvement and Conclusions
- 1.2.4. Technical Regulations

1.3. Study of Roof Pathologies in Existing Buildings
- 1.3.1. Data Collection
- 1.3.2. Analysis and Evaluation
- 1.3.3. Proposals for Improvement and Conclusions
- 1.3.4. Technical Regulations

1.4. Studies of Pathologies of Facades of Existing Buildings
- 1.4.1. Data Collection
- 1.4.2. Analysis and Evaluation
- 1.4.3. Proposals for Improvement and Conclusions
- 1.4.4. Technical Regulations

1.5. Studies of Pathologies of Exterior Floor Slabs of Existing Buildings
- 1.5.1. Data Collection
- 1.5.2. Analysis and Evaluation
- 1.5.3. Proposals for Improvement and Conclusions
- 1.5.4. Technical Regulations

1.6. Studies of Pathologies of Carpentry and Glazing in Existing Buildings
- 1.6.1. Data Collection
- 1.6.2. Analysis and Evaluation
- 1.6.3. Proposals for Improvement and Conclusions
- 1.6.4. Technical Regulations

1.7. Analysis of Existing Building Installations
- 1.7.1. Data Collection
- 1.7.2. Analysis and Evaluation
- 1.7.3. Proposals for Improvement and Conclusions
- 1.7.4. Technical Regulations

1.8. Study of Energy Rehabilitation Interventions in Historic Buildings
- 1.8.1. Data Collection
- 1.8.2. Analysis and Evaluation
- 1.8.3. Proposals for Improvement and Conclusions
- 1.8.4. Technical Regulations

1.9. Economic Study of Energy Rehabilitation
- 1.9.1. Cost Analysis
- 1.9.2. Time Analysis
- 1.9.3. Specialization of the Works
- 1.9.4. Guarantees and Specific Tests

1.10. Evaluation of Appropriate Intervention and Alternatives
- 1.10.1. Analysis of the Different Intervention Options
- 1.10.2. Cost Analysis Based on Amortization
- 1.10.3. Target Selection
- 1.10.4. Final Assessment of the Selected Intervention

Module 2. Energy Efficiency in New Buildings

2.1. Methodology
- 2.1.1. Establishment of Building Categories
- 2.1.2. Analysis of Construction Solutions
- 2.1.3. Analysis of the Objectives of the Regulations
- 2.1.4. Elaboration of the Cost of the Intervention Proposals

2.2. Foundation Studies for New Construction
- 2.2.1. Type of Action
- 2.2.2. Analysis and Evaluation
- 2.2.3. Intervention Proposals and Conclusions
- 2.2.4. Technical Regulations

2.3. Studies of New Construction Roofs
- 2.3.1. Type of Action
- 2.3.2. Analysis and Evaluation
- 2.3.3. Intervention Proposals and Conclusions
- 2.3.4. Technical Regulations

2.4. Studies of New Building Facades
- 2.4.1. Type of Action
- 2.4.2. Analysis and Evaluation
- 2.4.3. Intervention Proposals and Conclusions
- 2.4.4. Technical Regulations

2.5. External Floor Slab Studies for New Buildings
- 2.5.1. Type of Action
- 2.5.2. Analysis and Evaluation
- 2.5.3. Intervention Proposals and Conclusions
- 2.5.4. Technical Regulations

2.6. Studies of Carpentry and Glazing of New Buildings
- 2.6.1. Type of Action
- 2.6.2. Analysis and Evaluation
- 2.6.3. Intervention Proposals and Conclusions
- 2.6.4. Technical Regulations

2.7. Analysis of New Construction Installations
- 2.7.1. Type of Action
- 2.7.2. Analysis and Evaluation
- 2.7.3. Intervention Proposals and Conclusions
- 2.7.4. Technical Regulations

2.8. Studies and Options for Energy Efficiency Measures in Singular Buildings
- 2.8.1. Type of Action
- 2.8.2. Analysis and Evaluation
- 2.8.3. Intervention Proposals and Conclusions
- 2.8.4. Technical Regulations

2.9. Economic Study of the Different Alternatives for Energy Saving in New Buildings
- 2.9.1. Cost Analysis
- 2.9.2. Time Analysis
- 2.9.3. Specialization of the Works
- 2.9.4. Guarantees and Specific Tests

2.10. Evaluation of the Appropriate Solution and Alternatives
- 2.10.1. Analysis of the Different Intervention Options
- 2.10.2. Cost Analysis on a Depreciation Basis
- 2.10.3. Target Selection
- 2.10.4. Final Assessment of the Selected Intervention

Module 3. Energy Efficiency in the Envelope

3.1. Main Concepts
- 3.1.1. Materials
- 3.1.2. Thicknesses
- 3.1.3. Conductivity
- 3.1.4. Transmittance

3.2. Foundation Insulation
- 3.2.1. Materials
- 3.2.2. Layout
- 3.2.3. Technical Justifications
- 3.2.4. Innovation Solutions

3.3. Facade Insulation
- 3.3.1. Materials
- 3.3.2. Layout
- 3.3.3. Technical Justifications
- 3.3.4. Innovation Solutions

3.4. Roof Insulation
- 3.4.1. Materials
- 3.4.2. Layout
- 3.4.3. Technical Justifications
- 3.4.4. Innovation Solutions

3.5. Floor Slab Insulation: Floors
- 3.5.1. Materials
- 3.5.2. Layout
- 3.5.3. Technical Justifications
- 3.5.4. Innovation Solutions

3.6. Floor Slab Insulation: Ceilings
- 3.6.1. Materials
- 3.6.2. Layout
- 3.6.3. Technical Justifications
- 3.6.4. Innovation Solutions

3.7. Basement Wall Insulation
- 3.7.1. Materials
- 3.7.2. Layout
- 3.7.3. Technical Justifications
- 3.7.4. Innovation Solutions

3.8. Installation Skids Vs. Chimneys
- 3.8.1. Materials
- 3.8.2. Layout
- 3.8.3. Technical Justifications
- 3.8.4. Innovation Solutions

3.9. Envelope in Prefabricated Buildings
- 3.9.1. Materials
- 3.9.2. Layout
- 3.9.3. Technical Justifications
- 3.9.4. Innovation Solutions

3.10. Innovation Solutions
- 3.10.1. Thermography Analysis
- 3.10.2. Thermography According to Layout
- 3.10.3. Development of Thermographic Analysis
- 3.10.4. Solutions to be Implemented

Module 4. Energy Savings in Windows and Glazing

4.1. Types of Joinery
- 4.1.1. Single Material Solutions
- 4.1.2. Mixed Solutions
- 4.1.3. Technical Justifications
- 4.1.4. Innovation Solutions

4.2. Transmittance
- 4.2.1. Definition
- 4.2.2. Regulations
- 4.2.3. Technical Justifications
- 4.2.4. Innovation Solutions

4.3. Air Permeability
- 4.3.1. Definition
- 4.3.2. Regulations
- 4.3.3. Technical Justifications
- 4.3.4. Innovation Solutions

4.4. Water Tightness
- 4.4.1. Definition
- 4.4.2. Regulations
- 4.4.3. Technical Justifications
- 4.4.4. Innovation Solutions

4.5. Wind Resistance
- 4.5.1. Definition
- 4.5.2. Regulations
- 4.5.3. Technical Justifications
- 4.5.4. Innovation Solutions

4.6. Types of Glasses
- 4.6.1. Definition
- 4.6.2. Regulations
- 4.6.3. Technical Justifications
- 4.6.4. Innovation Solutions

4.7. Glass Composition
- 4.7.1. Definition
- 4.7.2. Regulations
- 4.7.3. Technical Justifications
- 4.7.4. Innovation Solutions

4.8. Solar Shading
- 4.8.1. Definition
- 4.8.2. Regulations
- 4.8.3. Technical Justifications
- 4.8.4. Innovation Solutions

4.9. High Energy Performance Joinery
- 4.9.1. Definition
- 4.9.2. Regulations
- 4.9.3. Technical Justifications
- 4.9.4. Innovation Solutions

4.10. High Energy Performance Glasses
- 4.10.1. Definition
- 4.10.2. Regulations
- 4.10.3. Technical Justifications
- 4.10.4. Innovation Solutions

Module 5. Energy Savings in Thermal Bridges

5.1. Main Concepts
- 5.1.1. Definition
- 5.1.2. Regulations
- 5.1.3. Technical Justifications
- 5.1.4. Innovation Solutions

5.2. Constructive Thermal Bridges
- 5.2.1. Definition
- 5.2.2. Regulations
- 5.2.3. Technical Justifications
- 5.2.4. Innovation Solutions

5.3. Geometric Thermal Bridges
- 5.3.1. Definition
- 5.3.2. Regulations
- 5.3.3. Technical Justifications
- 5.3.4. Innovation Solutions

5.4. Thermal Bridges due to Material Change
- 5.4.1. Definition
- 5.4.2. Regulations
- 5.4.3. Technical Justifications
- 5.4.4. Innovation Solutions

5.5. Analysis of Singular Thermal Bridges: The Window
- 5.5.1. Definition
- 5.5.2. Regulations
- 5.5.3. Technical Justifications
- 5.5.4. Innovation Solutions

5.6. Analysis of Singular Thermal Bridges: Capialization
- 5.6.1. Definition
- 5.6.2. Regulations
- 5.6.3. Technical Justifications
- 5.6.4. Innovation Solutions

5.7. Analysis of Singular Thermal Bridges: The Abutment
- 5.7.1. Definition
- 5.7.2. Regulations
- 5.7.3. Technical Justifications
- 5.7.4. Innovation Solutions

5.8. Analysis of Singular Thermal Bridges: The Floor Slab
- 5.8.1. Definition
- 5.8.2. Regulations
- 5.8.3. Technical Justifications
- 5.8.4. Innovation Solutions

5.9. Thermal Bridge Analysis with Thermography
- 5.9.1. Thermographic Equipment
- 5.9.2. Work Conditions
- 5.9.3. Detection of Encounters to be Corrected
- 5.9.4. Thermography in the Solution

5.10. Thermal Bridge Calculation Tools
- 5.10.1. *Therm*
- 5.10.2. *Cypetherm He Plus*
- 5.10.3. Flixo
- 5.10.4. Case Study 1

Module 6. Energy Savings in Airtightness

6.1. Main Concepts
- 6.1.1. Definition of Airtightness vs. Watertightness:
- 6.1.2. Regulations
- 6.1.3. Technical Justifications
- 6.1.4. Innovation Solutions

6.2. Control of Airtightness in the Enclosure
- 6.2.1. Location
- 6.2.2. Regulations
- 6.2.3. Technical Justifications
- 6.2.4. Innovation Solutions

6.3. Tightness Control in Installations
- 6.3.1. Location
- 6.3.2. Regulations
- 6.3.3. Technical Justifications
- 6.3.4. Innovation Solutions

6.4. Pathologies
- 6.4.1. Condensations
- 6.4.2. Moisture
- 6.4.3. Energy Consumption
- 6.4.4. Low Comfort

6.5. Comfort
- 6.5.1. Definition
- 6.5.2. Regulations
- 6.5.3. Technical Justifications
- 6.5.4. Innovation Solutions

6.6. Indoor Air Quality
- 6.6.1. Definition
- 6.6.2. Regulations
- 6.6.3. Technical Justifications
- 6.6.4. Innovation Solutions

6.7. Noise Protection
- 6.7.1. Definition
- 6.7.2. Regulations
- 6.7.3. Technical Justifications
- 6.7.4. Innovation Solutions

6.8. Tightness Test: Thermography
- 6.8.1. Thermographic Equipment
- 6.8.2. Work Conditions
- 6.8.3. Detection of Encounters to be Corrected
- 6.8.4. Thermography in the Solution

6.9. Smoke Testing
- 6.9.1. Smoke Test Equipment
- 6.9.2. Work Conditions
- 6.9.3. Detection of Encounters to be Corrected
- 6.9.4. Smoke Test in the Solution

6.10. Blower Door Test Essay
- 6.10.1. Blower Door Test Equipment
- 6.10.2. Work Conditions
- 6.10.3. Detection of Encounters to be Corrected
- 6.10.4. Blower-Door Test in the Solution

Module 7. Energy Saving in Facilities

7.1. Air Conditioning Installations
- 7.1.1. Definition
- 7.1.2. Regulations
- 7.1.3. Technical Justifications
- 7.1.4. Innovation Solutions

7.2. Aerothermal Power
- 7.2.1. Definition
- 7.2.2. Regulations
- 7.2.3. Technical Justifications
- 7.2.4. Innovation Solutions

7.3. Ventilation with Heat Recovery
- 7.3.1. Definition
- 7.3.2. Regulations
- 7.3.3. Technical Justifications
- 7.3.4. Innovation Solutions

7.4. Selection of Energy-Efficient Boilers and Pumps
- 7.4.1. Definition
- 7.4.2. Regulations
- 7.4.3. Technical Justifications
- 7.4.4. Innovation Solutions

7.5. Air Conditioning Alternatives: Floor/Ceilings
- 7.5.1. Definition
- 7.5.2. Regulations
- 7.5.3. Technical Justifications
- 7.5.4. Innovation Solutions

7.6. Free Cooling by External Air
- 7.6.1. Definition
- 7.6.2. Regulations
- 7.6.3. Technical Justifications
- 7.6.4. Innovation Solutions

7.7. Lighting and Transport Equipment
- 7.7.1. Definition
- 7.7.2. Regulations
- 7.7.3. Technical Justifications
- 7.7.4. Innovation Solutions

7.8. Solar Thermal Production
- 7.8.1. Definition
- 7.8.2. Regulations
- 7.8.3. Technical Justifications
- 7.8.4. Innovation Solutions

7.9. Solar Photovoltaic Production
- 7.9.1. Definition
- 7.9.2. Regulations
- 7.9.3. Technical Justifications
- 7.9.4. Innovation Solutions

7.10. Control Systems: Home Automation and Best Management System (BMS)
- 7.10.1. Definition
- 7.10.2. Regulations
- 7.10.3. Technical Justifications
- 7.10.4. Innovation Solutions

Module 8. Building Energy Simulation Tools and Regulations

8.1. Current Regulations: New Technical Code CTE 2019
- 8.1.1. Definition
- 8.1.2. Regulations
- 8.1.3. Existing Buildings Vs. Newly Constructed Buildings
- 8.1.4. Competent Technicians for Energy Certification
- 8.1.5. Register of Energy Certificates

8.2. Differences Between CTE 2019 and CTE 2013
- 8.2.1. He-0 Limitation of Energy Consumption
- 8.2.2. He-1 Conditions for the Control of the Energy Demand
- 8.2.3. He-3 Lighting Installation Conditions
- 8.2.4. He-4 Minimum Contribution of Renewable Energy to Cover Domestic Hot Water Demand
- 8.2.5. He-5 Minimum Electric Power Generation

8.3. Unified Energy Certification Tool Lider-Calener
- 8.3.1. HULC Tool
- 8.3.2. Installation
- 8.3.3. Settings
- 8.3.4. Scope
- 8.3.5. Example of Certification with Unified Tool Lider-Calener

8.4. ce3x Energy Certification Program
- 8.4.1. ce3x Program
- 8.4.2. Installation
- 8.4.3. Settings
- 8.4.4. Scope

8.5. ce3 Energy Certification Program
- 8.5.1. ce3 Program
- 8.5.2. Installation
- 8.5.3. Settings
- 8.5.4. Scope

8.6. CERMA Energy Certification Program
- 8.6.1. Cerma Program
- 8.6.2. Installation
- 8.6.3. Settings
- 8.6.4. Scope

8.7. *Cypetherm* 2020 Energy Certification Program
- 8.7.1. Cypetherm Program
- 8.7.2. Installation
- 8.7.3. Settings
- 8.7.4. Scope

8.8. sg save Energy Certification Program
- 8.8.1. sg save Program
- 8.8.2. Installation
- 8.8.3. Settings
- 8.8.4. Scope

8.9. Practical Example of Energy Certification with Simplified C3X Procedure for an Existing Building
- 8.9.1. Building Location
- 8.9.2. Description of the Building Envelope
- 8.9.3. Description of the Systems
- 8.9.4. Energy Consumption Analysis

8.10. Practical Example of Energy Certification with the Lider - Calener Unified Tool for a New Construction Building
- 8.10.1. Building Location
- 8.10.2. Description of the Building Envelope
- 8.10.3. Description of the Systems
- 8.10.4. Energy Consumption Analysis

Module 9. Energy in the Construction of Buildings

9.1. Energy in Cities
- 9.1.1. City Energy Behavior
- 9.1.2. Sustainable Development Goals
- 9.1.3. Sustainable Development Goal 11 - Sustainable Citizens and Communities

9.2. Less Consumption or Cleaner Energy
- 9.2.1. The Social Awareness of Clean Energies
- 9.2.2. Social Responsibility in Energy Usage
- 9.2.3. Greater Energy Need

9.3. Smart Cities and Buildings
- 9.3.1. Smart Buildings
- 9.3.2. Current Situation of Smart Buildings
- 9.3.3. Smart Building Examples

9.4. Energy Consumption
- 9.4.1. Building Energy Consumption
- 9.4.2. Measuring Energy Consumption
- 9.4.3. Knowing Our Consumption

9.5. Energy Demand
- 9.5.1. Building Energy Demand
- 9.5.2. Calculating Energy Demand
- 9.5.3. Managing Energy Demand

9.6. Efficient Usage of Energy
- 9.6.1. Responsibility in Energy Usage
- 9.6.2. Knowing Our Energy System

9.7. Energetic Liveability
- 9.7.1. Energy Liveability as a Key Aspect
- 9.7.2. Factors Affecting Building Energetic Liveability

9.8. Thermal Comfort
- 9.8.1. The Importance of Thermal Comfort
- 9.8.2. The Need for Thermal Comfort

9.9. Energy Poverty
- 9.9.1. Energy Dependence
- 9.9.2. Current Situation

9.10. Solar Radiation. Climate Zones
- 9.10.1. Solar Radiation
- 9.10.2. Hourly Solar Radiation
- 9.10.3. Effects of Solar Radiation
- 9.10.4. Climate Zones
- 9.10.5. The Importance of the Geographic Location of a Building

Module 10. Standards and Regulations

10.1. Regulation BORRAR
- 10.1.1. Justification BORRAR
- 10.1.2. Key Notes BORRAR
- 10.1.3. Responsible Agencies and Authorities BORRAR

10.2. International Standards
- 10.2.1. ISO Standards
- 10.2.2. EN Standards BORRAR
- 10.2.3. UNE Standards BORRAR

10.3. Building Construction Sustainability Certificates
- 10.3.1. The Need for Certificates
- 10.3.2. Certification Procedures
- 10.3.3. BREEAM, LEED, Green and WELL
- 10.3.4. *PassiveHaus*

10.4. Standards
- 10.4.1. *Industry Foundation Classes* (IFC)
- 10.4.2. *Building Information Model* (BIM)

10.5. European Directives
- 10.5.1. Directive 2002/ 91
- 10.5.2. Directive 2010/ 31
- 10.5.3. Directive 2012/ 27
- 10.5.4. Directive 2018/ 844

10.6. Technical Building Code (TBC) BORRAR
- 10.6.1. Applying TBC BORRAR
- 10.6.2. CTE Basic Documents BORRAR
- 10.6.3. CTE Support Documents BORRAR
- 10.6.4. Accepted Documents BORRAR

10.7. Building Energy Certification Procedure
- 10.7.1. R.D. (Royal Decree) 235/ 2013 BORRAR
- 10.7.2. Technical Conditions
- 10.7.3. Energy Efficiency Label

10.8. Regulation of Thermal Installations in Buildings (RITE)
- 10.8.1. Objectives
- 10.8.2. Administration Conditions
- 10.8.3. Execution Conditions
- 10.8.4. Maintenance and Inspections
- 10.8.5. Technical Guides

10.9. Low Voltage Electrotechnical Regulations
- 10.9.1. Key Application Aspects
- 10.9.2. Internal Installations
- 10.9.3. Installations in Publicly Concurred Premises
- 10.9.4. External Installations
- 10.9.5. Domotic Installations

10.10. Related Standards Search Engines
- 10.10.1. Government Agencies BORRAR
- 10.10.2. Business Entities and Associations

Module 11. Circular Economy

11.1. Circular Economy Tendency
- 11.1.1. Origin of Circular Economy
- 11.1.2. Circular Economy Definition
- 11.1.3. Circular Economy Necessity
- 11.1.4. Circular Economy as a Strategy

11.2. Circular Economy Features
- 11.2.1. First Principle: Preserve and Improve
- 11.2.2. Second Principle: Optomize
- 11.2.3. Third Principle: Promote
- 11.2.4. Key Features

11.3. Circular Economy Benefits
- 11.3.1. Economic Advantages
- 11.3.2. Social Benefits
- 11.3.3. Business Benefits
- 11.3.4. Environmental Benefits

11.4. Circular Economy Legislation BORRAR
- 11.4.1. Regulations BORRAR
- 11.4.2. European Directives BORRAR
- 11.4.3. Legislation in Spain BORRAR
- 11.4.4. Legislación autonómica BORRAR

11.5. Life Cycle Analysis
- 11.5.1. Life Cycle Analysis (LCA) Scope
- 11.5.2. Stages
- 11.5.3. Reference Standards
- 11.5.4. Methodology
- 11.5.5. Data Science

11.6. Green Public Procurement BORRAR
- 11.6.1. Legislation BORRAR
- 11.6.2. Green Procurement Manual BORRAR
- 11.6.3. Guidelines for Public Procurement BORRAR
- 11.6.4. Public Procurement Plan 2018-2025 BORRAR

11.7. Carbon Footprint Calculation
- 11.7.1. Carbon Footprint
- 11.7.2. Types of Scope
- 11.7.3. Methodology
- 11.7.4. Data Science
- 11.7.5. Carbon Footprint Calculation

11.8. CO2 Emission Reduction Plans
- 11.8.1. Improvement Plans: Supplies
- 11.8.2. Improvement Plans: Demand
- 11.8.3. Improvement Plans: Facilities
- 11.8.4. Improvement Plans: Equipment
- 11.8.5. Emissions Offsets

11.9. Carbon Footprint Records
- 11.9.1. Carbon Footprint Records
- 11.9.2. Requirements Prior to Registration
- 11.9.3. Documentation
- 11.9.4. Registration Request

11.10. Good Circular Practices
- 11.10.1. Methodology BIM
- 11.10.2. Selecting Material and Equipment
- 11.10.3. Maintenance
- 11.10.4. Waste Management
- 11.10.5. Reusing Material

Module 12. Energy Audit

12.1. The Scope of an Energy Audit
- 12.1.1. Main Concepts
- 12.1.2. Objectives
- 12.1.3. The Scope of an Energy Audit
- 12.1.4. The Methodology of an Energy Audit

12.2. Energy Diagnosis
- 12.2.1. Analysis of the Enclosure Vs. Systems and Installations
- 12.2.2. Consumption Analysis and Energy Accounting
- 12.2.3. Renewable Energy Proposals
- 12.2.4. Proposals for Home Automation, Telemanagement and Automation systems

12.3. Benefits of an Energy Audit
- 12.3.1. Energy Consumption and Energy Costs
- 12.3.2. Environmental Improvement
- 12.3.3. Improved Competitiveness
- 12.3.4. Improved Maintenance

12.4. Development Methodology
- 12.4.1. Previous Documentation Request. Planimetry
- 12.4.2. Previous Documentation Request. Invoices
- 12.4.3. Visits to the Building in Operation
- 12.4.4. Necessary Equipment

12.5. Information Gathering
- 12.5.1. General Data
- 12.5.2. Planimetries
- 12.5.3. Projects. List of Installations
- 12.5.4. Technical Data Sheets. Energy Invoicing

12.6. Data Collection
- 12.6.1. Energy Inventory
- 12.6.2. Construction Aspects
- 12.6.3. Systems and Installations
- 12.6.4. Electrical Measurements and Operating Conditions

12.7. Analysis and Evaluation
- 12.7.1. Envelope Analysis
- 12.7.2. Analysis of Systems and Installations
- 12.7.3. Evaluation of Performance Options
- 12.7.4. Energy Balances and Energy Accounting

12.8. Proposals for Improvement and Conclusions
- 12.8.1. Energy Supply/Demand
- 12.8.2. Type of Action to be Taken
- 12.8.3. Envelope and Systems and Installations
- 12.8.4. Final Report

12.9. Economic Valuation vs. Scope
- 12.9.1. Cost of Housing Audit
- 12.9.2. Cost of Residential Building Audit
- 12.9.3. Cost of Tertiary Building Audit
- 12.9.4. Audit Cost of Shopping Center

12.10. Current Regulations BORRAR
- 12.10.1. National Energy Efficiency Plan BORRAR
- 12.10.2. Standard UNE 16247:2012. Energy Audits. Requirements BORRAR
- 12.10.3. COP21. Directive 2012/27/EU BORRAR
- 12.10.4. COP25. Chile-Madrid BORRAR

Module 13. Energy Audits and Certification

13.1. Energy Audit
- 13.1.1. Energy Diagnosis
- 13.1.2. Energy Audit
- 13.1.3. ESE Energy Audits

13.2. Competencies of an Energy Auditor
- 13.2.1. Personal Attributes
- 13.2.2. Knowledge and Skills
- 13.2.3. Skill Acquisition, Maintenance and Improvement
- 13.2.4. Certifications
- 13.2.5. List of Energy Service Providers

13.3. Energy Audits in Building Construction: UNE-EN 16247-2 BORRAR
- 13.3.1. Preliminary Contact BORRAR
- 13.3.2. Field Work BORRAR
- 13.3.3. Analysis BORRAR
- 13.3.4. Report BORRAR
- 13.3.5. Final Presentation BORRAR

13.4. Auditing Measurement Tools
- 13.4.1. Network Analyzer and Clamp Ammeters
- 13.4.2. Luxmeter
- 13.4.3. Thermohygrometer
- 13.4.4. Anemometer
- 13.4.5. Combustion Analyser
- 13.4.6. Thermographic Camera
- 13.4.7. Transmittance Meter

13.5. Análisis de inversiones
- 13.5.1. Preliminary Considerations
- 13.5.2. Noise Assessment Criteria
- 13.5.3. Cost Study
- 13.5.4. Grants and Subsidies
- 13.5.5. Recovery Period
- 13.5.6. Optimal Profitability Level

13.6. Managing Contracts with Energy Services Companies
- 13.6.1. Energy Efficiency Services: UNE-EN 15900 BORRAR
- 13.6.2. First Service: Energy Management
- 13.6.3. Second Service: Maintenance
- 13.6.4. Third Service: Total Guarantee
- 13.6.5. Fourth Service: Facility Improvement and Renovation
- 13.6.6. Fifth Service: Savings and Renewable Energy Investments

13.7. Certification Programs: HULC
- 13.7.1. HULC Program
- 13.7.2. Data Prior to Calculation
- 13.7.3. Practical Case Example: Residencial Case
- 13.7.4. Practical Case Example: Small Tertiary Case
- 13.7.5. Practical Case Example: Large Tertiary

13.8. Certification Programs: CE3X
- 13.8.1. CE3X Program
- 13.8.2. Data Prior to Calculation
- 13.8.3. Practical Case Example: Residencial Case
- 13.8.4. Practical Case Example: Small Tertiary Case
- 13.8.5. Practical Case Example: Large Tertiary

13.9. Certification Programs: CERMA BORRAR
- 13.9.1. CERMA Program BORRAR
- 13.9.2. Data Prior to Calculation BORRAR
- 13.9.3. Practical Case Example: New Construction BORRAR
- 13.9.4. Practical Case Example: Existing Buildings BORRAR

13.10. Certification Programs: Others
- 13.10.1. Variety in Energy Calculation Programs Use
- 13.10.2. Other Certification Programs

Module 14. Bioclimatic Architecture

14.1. Materials Technology and Construction Systems
- 14.1.1. Bioclimatic Architecture Evolution
- 14.1.2. Most Used Materials
- 14.1.3. Constructive Systems
- 14.1.4. Thermal Bridges

14.2. Enclosures, Walls and Roofs
- 14.2.1. The Role of Enclosures in Energy Efficiency
- 14.2.2. Vertical Enclosures and Materials Used
- 14.2.3. Horizontal Enclosures and Materials Used
- 14.2.4. Flat Roofs
- 14.2.5. Sloping Roofs

14.3. Openings, Glazing and Frames
- 14.3.1. Types of Openings
- 14.3.2. The Role of Openings in Energy Efficiency
- 14.3.3. Materials Used

14.4. Solar Protection
- 14.4.1. Need for Solar Protection
- 14.4.2. Solar Protection Systems
- 14.4.2.1. Awnings
- 14.4.2.2. Slats
- 14.4.2.3. Overhangs
- 14.4.2.4. Setbacks
- 14.4.2.5. Other Protection Systems

14. 5. Bioclimatic Strategy in Summer
- 14.5.1. The Importance of Utilizing Shade
- 14.5.2. Bioclimatic Construction Techniques for Summer
- 14.5.3. Good Building Practices

14.6. Bioclimatic Strategy for Winter
- 14.6.1. The Importance the Utilizing the Sun
- 14.6.2. Bioclimatic Construction Techniques for Winter
- 14.6.3. Construction Examples

14.7. Canadian Wells: Trombe Wall. Vegetable Covers
- 14.7.1. Other Forms of Energy Utilization
- 14.7.2. Canadian Wells
- 14.7.3. Trombe Wall
- 14.7.4. Vegetable Covers

14.8. The Importance of Building Orientation
- 14.8.1. The Wind Rose
- 14.8.2. Building Orientations
- 14.8.3. Examples of Bad Practices

14.9. Healthy Buildings
- 14.9.1. Air Quality
- 14.9.2. Lighting Quality
- 14.9.3. Thermal Insulation
- 14.9.4. Acoustic Insulation
- 14.9.5. Sick Building Syndrome

14.10. Bioclimatic Architecture Examples
- 14.10.1. International Architecture
- 14.10.2. Bioclimatic Architecture

Module 15. Renewable Energies

15.1. Thermal Solar Power
- 15.1.1. Thermal Solar Power Scope
- 15.1.2. Thermal Solar Power Systems
- 15.1.3. Thermal Solar Power Today
- 15.1.4. Thermal Solar Power Use in Buildings
- 15.1.5. Advantages and Disadvantages

15.2. Photovoltaic Solar Power
- 15.2.1. Photovoltaic Solar Power Evolution
- 15.2.2. Photovoltaic Solar Power Today
- 15.2.3. Photovoltaic Solar Power Use in Buildings
- 15.2.4. Advantages and Disadvantages

15.3. Mini Hydraulic Power
- 15.3.1. Hydraulic Power in Buildings
- 15.3.2. Hydraulic Power and Microhydraulic Power Today
- 15.3.3. Practical Applications of Hydraulic Power
- 15.3.4. Advantages and Disadvantages

15.4. Mini Wind Power
- 15.4.1. Wind and Micro-Wind Power
- 15.4.2. Update on Wind and Micro-Wind Power
- 15.4.3. Practical Applications of Wind Power
- 15.4.4. Advantages and Disadvantages

15.5. Biomass
- 15.5.1. Biomass as Renewable Fuel
- 15.5.2. Types of Biomass Fuel
- 15.5.3. Oil-Fired Heat Production Systems
- 15.5.4. Advantages and Disadvantages

15.6. Geothermal
- 15.6.1. Geothermal Energy
- 15.6.2. Geothermal Power Systems Today
- 15.6.3. Advantages and Disadvantages

15.7. Aerothermal Power
- 15.7.1. Aerothermal Power in Buildings
- 15.7.2. Aerothermal Power Systems Today
- 15.7.3. Advantages and Disadvantages

15.8. Cogeneration Systems
- 15.8.1. Cogeneration
- 15.8.2. Cogeneration Systems in Homes and Buildings
- 15.8.3. Advantages and Disadvantages

15.9. Biogas in Building
- 15.9.1. Potentialities
- 15.9.2. Biodigestors
- 15.9.3. Integration

15.10. Self-Consumption
- 15.10.1. Self-Consumption Application
- 15.10.2. Self-Consumption Benefits
- 15.10.3. The Sector Today
- 15.10.4. Self-Consumption Power Systems in Buildings

Module 16. Electrical Installations

16.1. Electrical Equipment
- 16.1.1. Classification
- 16.1.2. Appliance Consumption
- 16.1.3. Usage Profiles

16.2. Energy Labels
- 16.2.1. Labeled Products
- 16.2.2. Label Interpretation
- 16.2.3. Ecolabels
- 16.2.4. EPREL Database Product Registration
- 16.2.5. Estimated Savings

16.3. Individual Measurement Systems
- 16.3.1. Measuring Power Consumption
- 16.3.2. Individual Meters
- 16.3.3. Switchboard Meters
- 16.3.4. Choosing Devices

16.4. Filters and Capacitor Banks
- 16.4.1. Differences between Power Factor and Cosine PHI
- 16.4.2. Harmonics and Distortion Rate
- 16.4.3. Reactive Energy Compensation
- 16.4.4. Filter Selection
- 16.4.5. Capacitor Bank Selection

16.5. Stand-By Consumption
- 16.5.1. Stand-By Study
- 16.5.2. Code of Conduct
- 16.5.3. Stand-By Consumption Estimation
- 16.5.4. Anti-Stand-By Devices

16.6. Electric Vehicle Recharging
- 16.6.1. Types of Recharging Points
- 16.6.2. Potential ITC-BT 52 Diagrams
- 16.6.3. Provision of Regulatory Infrastructures in Building Construction
- 16.6.4. Horizontal Property and Installation of Recharging Points

16.7. Uninterruptible Power Supply (UPS) Systems
- 16.7.1. UPS Infrastructure
- 16.7.2. Types of UPS
- 16.7.3. Features
- 16.7.4. Applications
- 16.7.5. UPS Selection

16.8. Electric Meter
- 16.8.1. Types of Meters
- 16.8.2. Digital Meter Operation
- 16.8.3. Use as an Analyzer
- 16.8.4. Telemetry and Data Mining

16.9. Electric Billing Optimization
- 16.9.1. Electricity Rates
- 16.9.2. Types of Low Voltage Consumers
- 16.9.3. Types of Low Voltage Rates
- 16.9.4. Power Term and Penalties
- 16.9.5. Reactive Power Term and Penalties

16.10. Efficient Usage of Energy
- 16.10.1. Energy Saving Habits
- 16.10.2. Appliance Energy Saving
- 16.10.3. Energy Culture in Facility Management

Module 17. Thermal Installations

17.1. Thermal Installations in Buildings
- 17.1.1. Idealization of Thermal Installations in Buildings
- 17.1.2. Thermal Machine Operation
- 17.1.3. Pipe Insulation
- 17.1.4. Duct Insulation

17.2. Gas-Fired Heat Production Systems
- 17.2.1. Gas-Fired Heating Equipment
- 17.2.2. Components of a Gas Production System
- 17.2.3. Vacuum Test
- 17.2.4. Good Practices in Gas Heat Systems

17.3. Oil-Fired Heat Production Systems
- 17.3.1. Oil-Fired Heating Equipment
- 17.3.2. Components of an Oil-Fired Heat Production Systems
- 17.3.3. Good Practices in Oil-Fired Heating Systems

17.4. Oil-Fired Heat Production Systems
- 17.4.1. Biomass Heating Equipment
- 17.4.2. Components of a Biomass Heat Production System
- 17.4.3. The Use of Biomass in the Home
- 17.4.4. Good Practices in Biomass Production Systems

17.5. Heat Pumps
- 17.5.1. Heat Pump Equipment
- 17.5.2. Components of a Heat Pump
- 17.5.3. Advantages and Disadvantages
- 17.5.4. Good Practices in Heat Pump Equipment

17.6. Refrigerant Gases
- 17.6.1. Knowledge of Refrigerant Gases
- 17.6.2. Types of Refrigerant Gas Classification

17.7. Refrigeration Systems
- 17.7.1. Cooling Equipment
- 17.7.2. Typical Installations
- 17.7.3. Other Refrigeration Installations
- 17.7.4. Revision and Cleaning of Refrigeration Components

17.8. DHW Systems
- 17.8.1. Types of DHW Systems
- 17.8.2. Domestic HVAC Systems
- 17.8.3. Correct Use of DHW Systems

17.9. DHW Systems
- 17.9.1. Types of DHW Systems
- 17.9.2. DHW Systems
- 17.9.3. Correct Use of DHW Systems

17.10. Maintenance of Thermal Installations
- 17.10.1. Boiler and Burner Maintenance
- 17.10.2. Maintenance of Auxiliary Components
- 17.10.3. Refrigerant Gas Leak Detection
- 17.10.4. Refrigerant Gas Recovery

Module 18. Lighting installations

18.1. Light Sources
- 18.1.1. Lighting Technology
- 18.1.1.1. Properties of Light
- 18.1.1.2. Photometry
- 18.1.1.3. Photometric Measurements
- 18.1.1.4. Luminaires
- 18.1.1.5. Auxiliary Electrical Equipment
- 18.1.2. Traditional Light Sources
- 18.1.2.1. Incandescent and Halogen
- 18.1.2.2. High and Low Pressure Sodium Vapor
- 18.1.2.3. High- and Low-Pressure Mercury Steam
- 18.1.2.4. Other Technologies: Induction, Xenon

18.2. LED Technology
- 18.2.1. Principle of Operation
- 18.2.2. Electrical Characteristics
- 18.2.3. Advantages and Disadvantages
- 18.2.4. LED Luminaires. Optical
- 18.2.5. Auxiliary Equipment. *Driver*

18.3. Interior Lighting Requirements
- 18.3.1. Standards and Regulations
- 18.3.2. Lighting Project
- 18.3.3. Quality Criteria

18.4. Outdoor Lighting Requirements
- 18.4.1. Standards and Regulations
- 18.4.2. Lighting Project
- 18.4.3. Quality Criteria

18.5. Lighting Calculations with Calculation Software. DIALux
- 18.5.1. Features
- 18.5.2. Menus
- 18.5.3. Project Design
- 18.5.4. Obtaining and Interpreting Results

18.6. Lighting Calculations with Calculation Software. EVO
- 18.6.1. Features
- 18.6.2. Advantages and Disadvantages
- 18.6.3. Menus
- 18.6.4. Project Design
- 18.6.5. Obtaining and Interpreting Results

18.7. Energy Efficiency in Lighting
- 18.7.1. Standards and Regulations
- 18.7.2. Energy Efficiency Improvement Measures
- 18.7.3. Integration of Natural Light

18.8. Biodynamic Lighting
- 18.8.1. Light Pollution
- 18.8.2. Circadian Rhythms
- 18.8.3. Harmful Effects

18.9. Calculation of Interior Lighting Projects
- 18.9.1. Residential Buildings
- 18.9.2. Business Buildings
- 18.9.3. Educational Centers
- 18.9.4. Hospitals
- 18.9.5. Public Buildings
- 18.9.6. Industries
- 18.9.7. Commercial and Exhibition Spaces

18.10. Calculation of Outdoor Lighting Projects
- 18.10.1. Street and Road Lighting
- 18.10.2. Facades
- 18.10.3. Signs and Illuminated Signs

Module 19. Control Installations

19.1. Home Automation
- 19.1.1. State-of-the-Art
- 19.1.2. Standards and Regulations
- 19.1.3. Equipment
- 19.1.4. Services
- 19.1.5. Networks

19.2. Inmotics
- 19.2.1. Characteristics and Regulations
- 19.2.2. Building Automation and Control Technologies and Systems
- 19.2.3. Technical Building Management for Energy Efficiency

19.3. Telemanagement
- 19.3.1. System Determination
- 19.3.2. Key Elements
- 19.3.3. Monitoring Software

19.4. *Smart Home*
- 19.4.1. Features
- 19.4.2. Equipment

19.5. The Internet of Things IoT
- 19.5.1. Technological Monitoring
- 19.5.2. Standards
- 19.5.3. Equipment
- 19.5.4. Services
- 19.5.5. Networks

19.6. Telecommunications Installations
- 19.6.1. Key Infrastructure
- 19.6.2. Television
- 19.6.3. Radio
- 19.6.4. Telephony

19.7. KNX, DALI Protocols
- 19.7.1. Standardization
- 19.7.2. Applications
- 19.7.3. Equipment
- 19.7.4. Design and Configuration

19.8. IP Networks Wi-Fi Systems
- 19.8.1. Standards
- 19.8.2. Features
- 19.8.3. Design and Configuration

19.9. Bluetooth
- 19.9.1. Standards
- 19.9.2. Design and Configuration
- 19.9.3. Features

19.10. Future Technologies
- 19.10.1. Zigbee
- 19.10.2. Programming and Configuration. Python
- 19.10.3. *Big Data*

Module 20. International Sustainability, Energy Efficiency and Comfort Certifications

20.1. The Future of Energy Saving in Buildings: Sustainability and Energy Efficiency Certifications
- 20.1.1. Sustainability Vs. Energy Efficiency
- 20.1.2. Evolution of Sustainability
- 20.1.3. Types of Certifications
- 20.1.4. The Future of Certifications

20.2. The Leed Certification
- 20.2.1. Origin of the Standard
- 20.2.2. Types of *Leed* Certifications
- 20.2.3. Levels of Certification
- 20.2.4. Criteria to be Implemented

20.3. Leed Zero Certification
- 20.3.1. Origin of the Standard
- 20.3.2. Leed Zero Resources
- 20.3.3. Criteria to be Implemented
- 20.3.4. Zero Energy Buildings

20.4. BREEAM Certification
- 20.4.1. Origin of the Standard
- 20.4.2. Types of BREEAM Certifications
- 20.4.3. Levels of Certification
- 20.4.4. Criteria to be Implemented

20.5. Green Certification
- 20.5.1. Origin of the Standard
- 20.5.2. Types of Green Certifications
- 20.5.3. Levels of Certification
- 20.5.4. Criteria to be Implemented

20.6. The Passivhaus Standard and its Application in Nearly Zero/Zero Energy Buildings
- 20.6.1. Origin of the Standard
- 20.6.2. *Passivhaus* Certification Levels
- 20.6.3. Criteria to be Implemented
- 20.6.4. Zero Energy Buildings

20.7. The Enerphit Standard and its Application in Nearly Zero/Zero Energy Buildings
- 20.7.1. Origin of the Standard
- 20.7.2. EnerPhit Certification Levels
- 20.7.3. Criteria to be Implemented
- 20.7.4. Zero Energy Buildings

20.8. The Minergie Standard and its Application in Nearly Zero/Zero Energy Buildings
- 20.8.1. Origin of the Standard
- 20.8.2. Minergie Certification Levels
- 20.8.3. Criteria to be Implemented
- 20.8.4. Zero Energy Buildings

20.9. The nZEB Standard and its Application in Nearly Zero/Zero Energy Buildings
- 20.9.1. Origin of the Standard
- 20.9.2. nZEB Certification Levels
- 20.9.3. Criteria to be Implemented
- 20.9.4. Zero Energy Buildings

20.10. WELL Certification
- 20.10.1. Origin of the Standard
- 20.10.2. Types of BREEAM Certifications
- 20.10.3. Levels of Certification
- 20.10.4. Criteria to be Implemented

Make the most of this opportunity to learn about the latest advances in this field in order to apply it to your daily practice"

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

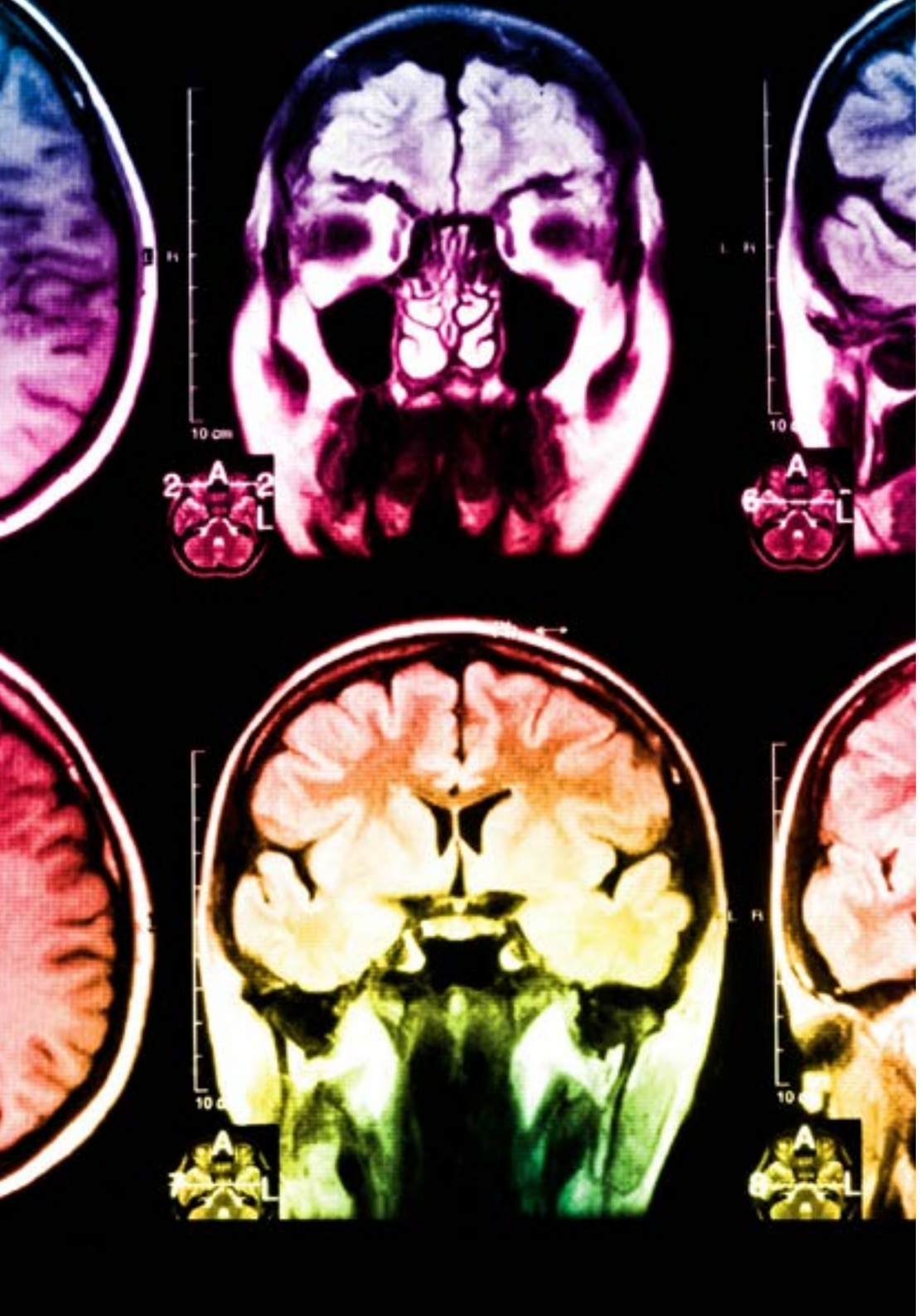
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

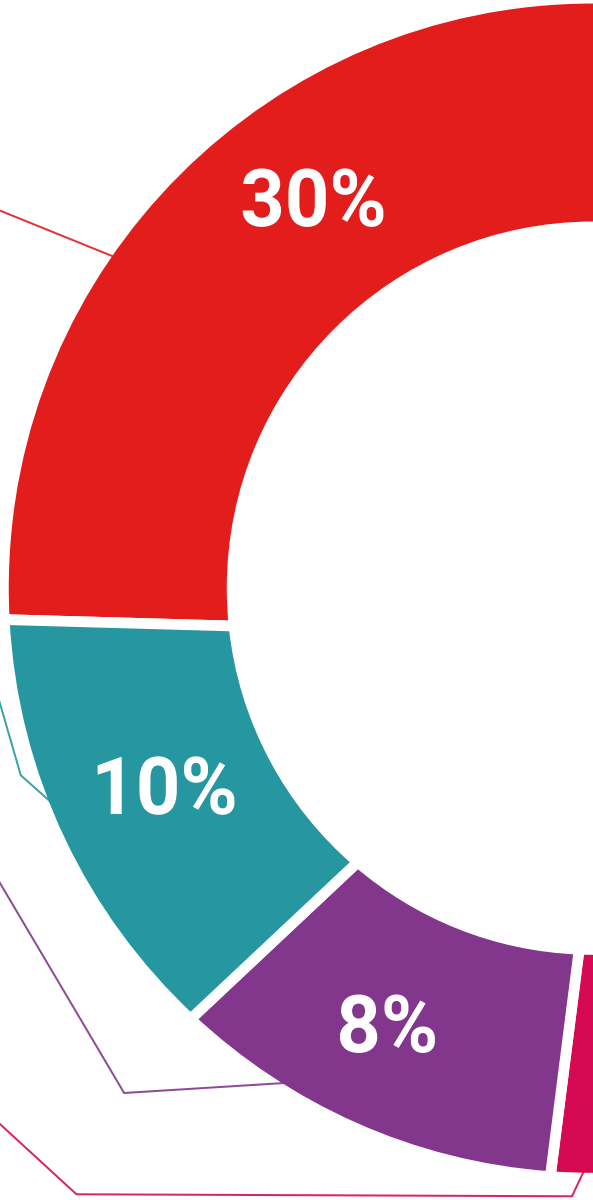
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

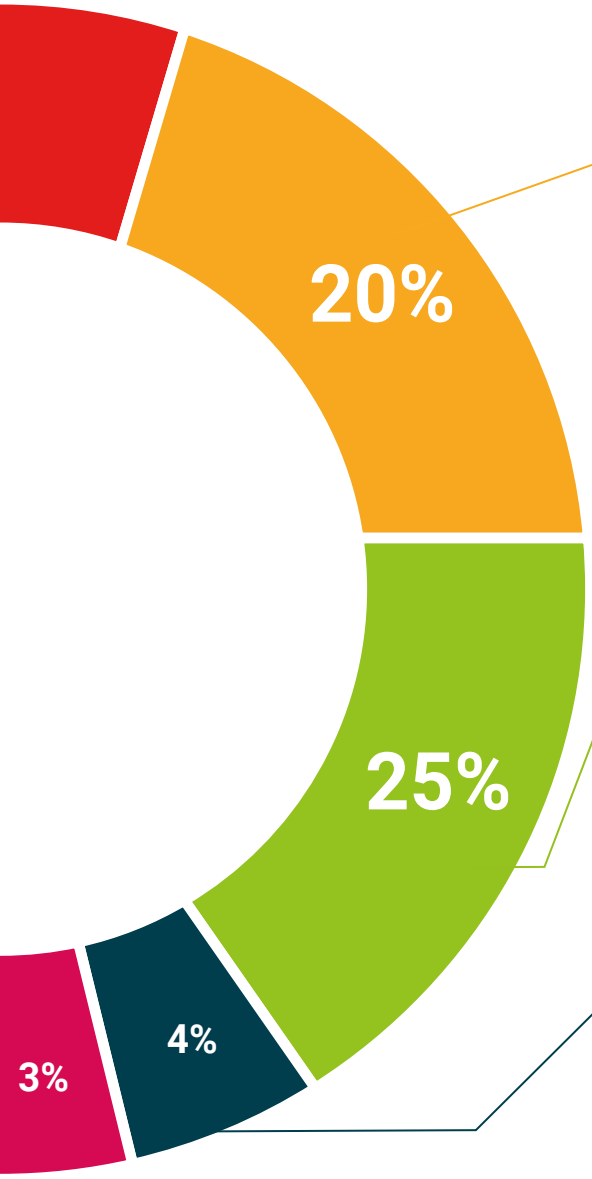
Practising Skills and Abilities

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 Advanced Master's Degree in Energy Efficiency in the Construction of Buildings guarantees students, in addition to the most rigorous and up-to-date education, access to an Advanced Master's Degree diploma issued by TECH Technological University.

Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"

This **Advanced Master's Degree in Energy Efficiency in the Construction of Buildings** contains the most complete and up-to-date program on the market.

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

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

Title: **Advanced Master's Degree in Energy Efficiency in the Construction of Buildings**

Official No. of Hours: **3,000 h.**


tech technological university

Awards the following

CERTIFICATE

to

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

For having successfully passed and accredited the following program

ADVANCED MASTER'S DEGREE

in

Energy Efficiency in the Construction of Buildings

This is a qualification awarded by this University, equivalent to 3,000 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


Advanced Master's Degree in Energy Efficiency in the Construction of Buildings

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Energy Rehabilitation of Existing Buildings	150	CO
1º	Energy Efficiency in New Buildings	150	CO
1º	Energy Efficiency in the Envelope	150	CO
1º	Energy Savings in Windows and Glazing	150	CO
1º	Energy Savings in Thermal Bridges	150	CO
1º	Energy Savings in Airtightness	150	CO
1º	Energy Saving in Facilities	150	CO
1º	Building Energy Simulation Tools and Regulations	150	CO
1º	Energy in the Construction of Buildings	150	CO
1º	Standards and Regulations	150	CO
1º	Circular Economy	150	CO

Year	Subject	Hours	Type
2º	Energy Audit	150	CO
2º	Energy Audits and Certification	150	CO
2º	Bioclimatic Architecture	150	CO
2º	Renewable Energies	150	CO
2º	Electrical Installations	150	CO
2º	Thermal Installations	150	CO
2º	Lighting installations	150	CO
2º	Control Installations	150	CO
2º	International Sustainability, Energy Efficiency and Comfort Certifications	150	CO

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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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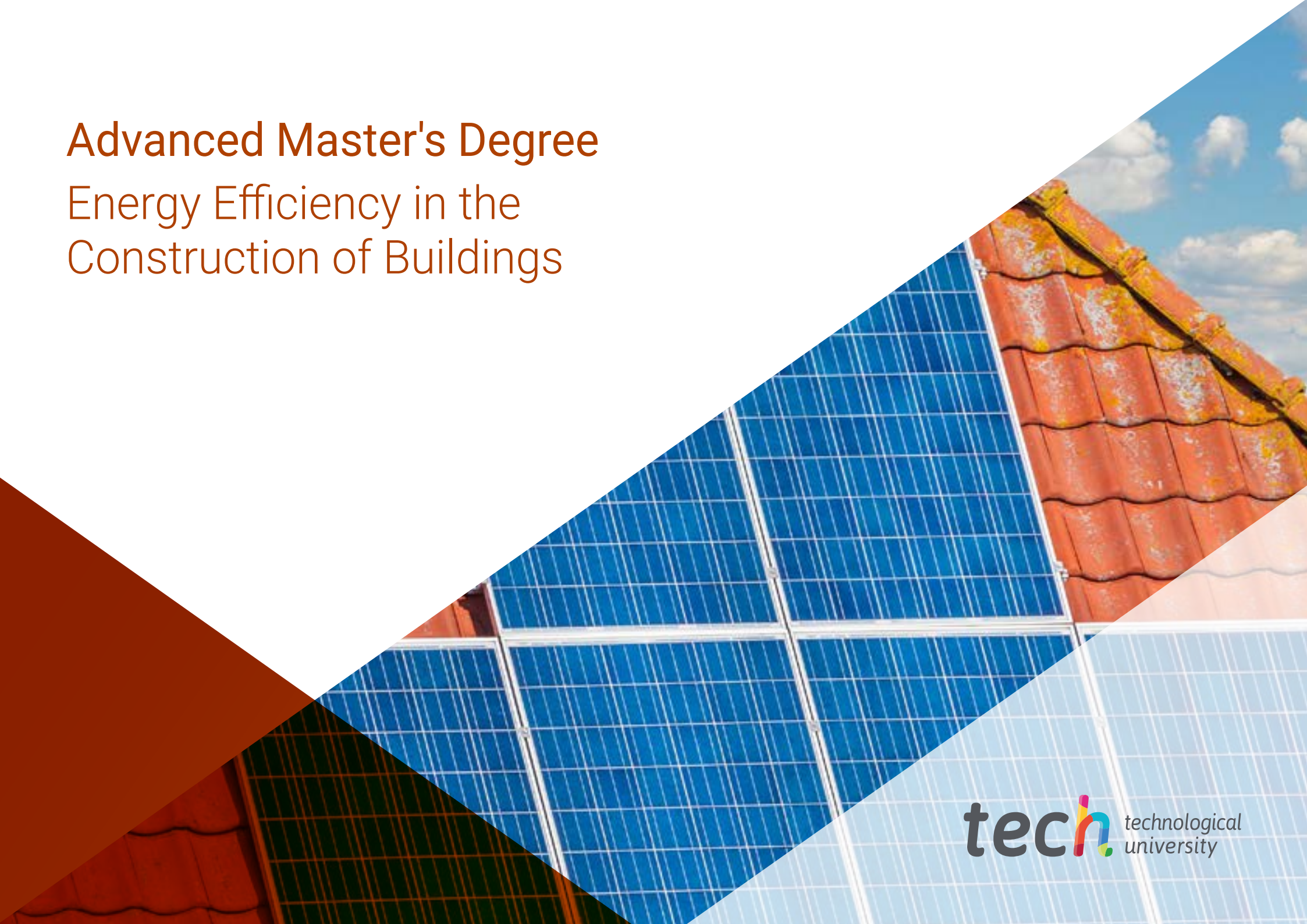
Advanced Master's Degree
Energy Efficiency in the Construction of Buildings

- Modality: **online**
- Duration: **2 years**
- Certificate: **TECH Technological University**
- Dedicated: **16 hours a week**
- Schedule: **at your own pace**
- Exams: **online**

Advanced Master's Degree

Energy Efficiency in the Construction of Buildings



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