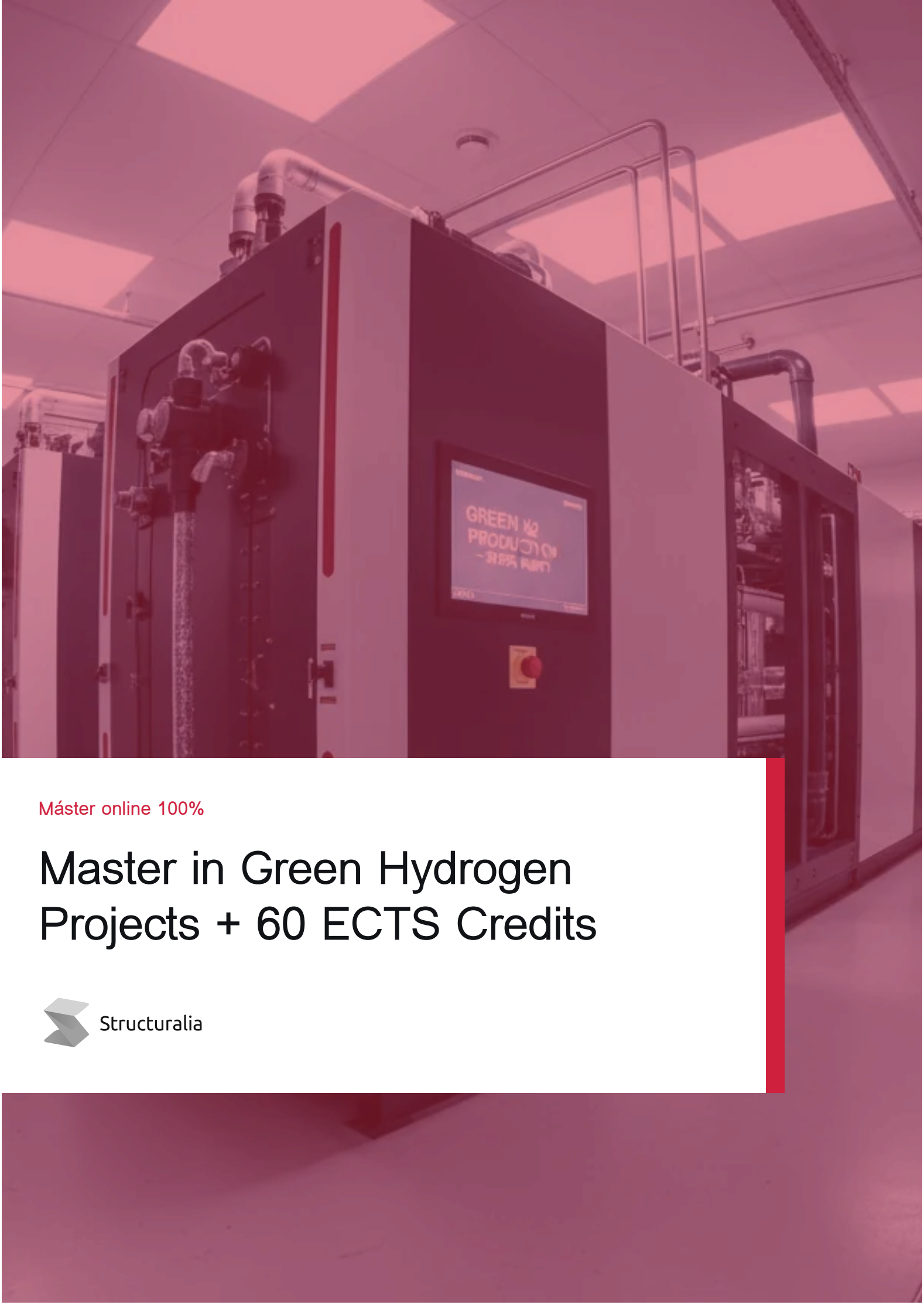


Máster online 100%

Master in Green Hydrogen Projects + 60 ECTS Credits

Structuralia

Máster online 100%

Master in Green Hydrogen Projects + 60 ECTS Credits

Modality
Online

Languages
Español

Duration
1500 hours (60 ECTS)

No Limit
AI Assistant

Does it include practices?
NO

Educational Institutions

Structuralia Engineering eLearning

UNIVERSIDAD NEBRIJA

Summary

The Master in Green Hydrogen Projects is the high-level specialization that strategically integrates all the critical dimensions of the sector of this energy vector for professionals seeking to advance their career and operate successfully. This program equips you with advanced competencies to lead and direct clean resource initiatives, even in the most challenging circumstances. You will delve into product strategy, complex infrastructure development, and the funding sources essential to driving critical infrastructure projects. You will address the generation and storage of this resource, its applications in the production of electrical energy and specific installations, always from a perspective of emissions reduction and climate change mitigation. You will consolidate your ability to make strategic decisions, optimizing each phase of the life cycle of this green technology projects and ensuring their technical and economic viability. You will develop high-level skills in the implementation of innovative and sustainable solutions, transforming the energy landscape and actively contributing to industrial and social decarbonization. You will analyze the techniques and

technologies for decarbonization, including the production of this vector and fuel cells, for a complete vision of the ecosystem.

Agenda

MODULE 1. HYDROGEN AS AN ENERGY VECTOR

1. DIDACTIC UNIT 1. ENERGY AND HYDROGEN

1. History of hydrogen
2. What is hydrogen?
3. Current electrical and energy matrix
4. Hydrogen as an energy vector
5. Outlook for the Hydrogen Roadmap

2. DIDACTIC UNIT 2. HYDROGEN GENERATION AND STORAGE

1. PEM Electrolysis
2. Alkaline Electrolysis
3. SOEC and AEM electrolysis
4. Hydrogen storage
5. Hydrogen distribution

3. DIDACTIC UNIT 3. ELECTRICAL POWER GENERATION AND OTHER APPLICATIONS

1. fuel cells
2. PEM fuel cells
3. AT fuel cells
4. Hydrogen turbines and engines
5. Fuel cell vehicles

4. DIDACTIC UNIT 4. HYDROGEN INSTALLATIONS

1. refueling stations
2. Sizing of main equipment
3. Security considerations. Explosive atmospheres
4. Design of facilities related to hydrogen fuel cells
5. Installation calculation example.

MODULE 2. CONTEXT OF HYDROGEN

1. DIDACTIC UNIT 1. ENERGY AND PRODUCTION

1. Energy production and its evolution
2. Fossil fuels, the change of an era
3. Strategies for sustainability
4. Energy demands and transition
5. Energy and future

2. DIDACTIC UNIT 2. CLIMATE CHANGE AND ENERGY TRANSITION

1. Climate change
2. Effects and strategies related to climate change

3. Energy transition roadmap
4. The evolution of the energy transition
5. Carbon rates and ESG criteria

3. DIDACTIC UNIT 3. TECHNIQUES AND TECHNOLOGIES FOR DECARBONIZATION I

1. Vectors of the energy transition
2. Renewable electricity generation, electrification and storage
3. Mobility and transportation
4. Carbon capture and storage
5. Circular economy and new materials

4. DIDACTIC UNIT 4. TECHNIQUES AND TECHNOLOGIES FOR DECARBONIZATION II

1. Hydrogen (H2)
2. Bioenergy
3. Integration between bioenergy processes and other technologies
4. The cities of the future (Smart Cities)
5. Entrepreneurship and enabling technologies and developments for decarbonization

MODULE 3. HYDROGEN PRODUCTION AND FUEL CELLS

1. DIDACTIC UNIT 1. HYDROGEN PRODUCTION FROM FOSSIL FUELS

1. Hydrogen production
2. Hydrocarbon reforming
3. Partial oxidation and other hydrocarbon-based processes
4. Coal and biomass gasification
5. Advantages and disadvantages. Comparison between the different processes

2. DIDACTIC UNIT 2. GREEN HYDROGEN PRODUCTION

1. Electrolytic processes
2. Alkaline electrolyzers
3. Polymeric electrolyzers
4. Green hydrogen production alternative
5. Technological maturity level

3. DIDACTIC UNIT 3. POLYMERIC FUEL CELLS OPERATION

1. Origin and operation of fuel cells
2. Composition and types of fuel cells
3. How polymer batteries work
4. Components of polymer batteries
5. Advances and future expectations

4. DIDACTIC UNIT 4. OTHER TYPES OF FUELS CELLS

1. Solid oxide batteries. Geometries and materials.
2. Fuel cell efficiency
3. Alkaline, phosphoric acid and molten carbonate batteries
4. Biopiles

5. Design and cost calculation of a fuel cell

MODULE 4. HYDROGEN SUPPLY CHAIN

1. DIDACTIC UNIT 1. STORAGE AND SUPPLY OF GASEOUS HYDROGEN

1. Features and storage systems
2. Storage in the form of compressed hydrogen gas
3. Pressure vessels, types, characteristics and development objectives
4. EIHP (European Integrated Hydrogen Project) specifications
5. Examples of development projects

2. DIDACTIC UNIT 2. STORAGE AND SUPPLY OF LIQUID HYDROGEN

1. Characteristics and storage systems of liquid hydrogen
2. Storage, distribution and dispensing of liquid hydrogen
3. Liquid hydrogen tanks, types, characteristics and development objectives
4. EIHP (European Integrated Hydrogen Project) specifications
5. Examples of development projects

3. DIDACTIC UNIT 3. STORAGE AND SUPPLY OF HYDROGEN IN SOLIDS

1. General concepts
2. Metal hydrides
3. Intermetallic compounds
4. Carbonaceous materials and organic polymers
5. glass microspheres

4. DIDACTIC UNIT 4. CONTROL OF HYDROGEN SYSTEMS

1. Control theory
2. Model-based predictive control
3. Modeling of hydrogen systems
4. Control strategies
5. Associated regulations

MODULE 5. HYDROGEN MOBILITY AND INFRASTRUCTURE

1. DIDACTIC UNIT 1. LAND MOBILITY

1. Light transport.
2. Heavy transport
3. Captive fleets
4. Railway sector
5. Infrastructure

2. DIDACTIC UNIT 2. AIR AND MARITIME MOBILITY

1. Energy transition in air transport
2. Sustainable Aviation Fuels (SAF)
3. Energy transition in maritime transport
4. Sustainable fuels for maritime transport
5. Evolution of air and sea transport

3. DIDACTIC UNIT 3. THE HANDLING OF HYDROGEN

1. Hydrogen risks
2. Hydrogen detection
3. Security aspects
4. Explosive environments
5. Hydrogen Risk Assessment

4. DIDACTIC UNIT 4. HYDROGEN TRANSPORTATION AND LOGISTICS

1. Hydrogen journey
2. Distributed generation systems
3. Comparison between management systems
4. Environmental, health and safety considerations in the hydrogen journey
5. Safety and risk in the transmission, distribution and storage of hydrogen

MODULE 6. USES AND APPLICATIONS OF HYDROGEN

1. DIDACTIC UNIT 1. STATIONARY APPLICATIONS

1. Large scale electricity production
2. Distributed generation
3. Microgeneration systems
4. Interruptible power supply systems
5. Combined heat and power systems

2. DIDACTIC UNIT 2. MOBILE APPS

1. Introduction and future perspectives in mobile applications
2. Forklifts
3. Cars and buses
4. Air mobility and reduced mobility
5. Other vehicles

3. DIDACTIC UNIT 3. PORTABLE APPS

1. Reversible fuel cells
2. Space applications
3. Micro fuel cells
4. Portable generators
5. Other systems

4. DIDACTIC UNIT 4. POWER-TO-X

1. Bases and concepts of Power-to-X
2. Power-to-gas (PTG)
3. Power-to-liquid (PTL)
4. Power-to-heat (PTH)
5. Applications in the world of hydrogen

MODULE 7. HYDROGEN SERVICE STATIONS

1. DIDACTIC UNIT 1. EQUIPMENT AND COMPONENTS OF THE INFRASTRUCTURE

1. Materials, pipes and accessories
2. Feeding and storage systems
3. Hydrogen compressors
4. Components and auxiliary systems
5. Hydrogen dispensers

2. DIDACTIC UNIT 2. INSTALLATION AND OPERATION OF THE HYDROGEN SERVICING STATION

1. Installation and operation of the hydrogen filling station
2. Control and instrumentation systems
3. Inspection protocols
4. Service station operation
5. Maintenance work

3. DIDACTIC UNIT 3. SAFETY CONSIDERATIONS

1. Fundamental security considerations
2. Security methodologies and risk assessment
3. ATEX risk mitigation and explosive atmospheres
4. Safety distances in hydrogen installations
5. Protection measures against external agents

4. DIDACTIC UNIT 4. APPLICABLE REGULATIONS

1. ISO 14687. Hydrogen fuel quality
2. ISO 17268. Hydrogen supply devices
3. ISO 19880-1. General requirements at service stations
4. ISO 22734. Electrolyzers
5. IEC 62282-3-100. Stationary fuel cell power generation systems

MODULE 8. GEOPOLITICS OF HYDROGEN

1. DIDACTIC UNIT 1. GEOPOLITICS OF THE ENERGY TRANSITION: WHY DOES HYDROGEN MATTER?

1. Geopolitical keys to the transition
2. Political history of hydrogen: bubbles and expectations
3. The advent of hydrogen geopolitics
4. The geopolitics of hydrogen in the context of climate change
5. The actors of the geopolitics of hydrogen

2. DIDACTIC UNIT 2. THE ACTORS IN THE GEOPOLITICS OF HYDROGEN

1. Importers: the case of the European Union
2. Hydrogen in the survival and energy transition of petrostates: the case of the Gulf Cooperation Council
3. Emerging exporters and neo-extractivism
4. Emerging technological powers: the case of China
5. Emerging industrial powers: the case of the United States

3. DIDACTIC UNIT 3. THE GEOPOLITICS OF THE HYDROGEN VALUE CHAIN

1. Hydrogen in the new globalization of derisking, decoupling and friendshoring
2. Strategic minerals for the hydrogen economy
3. Geopolitics of electrolyzers
4. Hydrogen and the reconfiguration of industrial value chains
5. Hydrogen and the return of industrial policy

4. DIDACTIC UNIT 4. STRATEGIC ASPECTS OF HYDROGEN GEOPOLITICS

1. Hydrogen diplomacy
2. Hydrogen and the geopolitics of infrastructure
3. Hydrogen and green colonialism
4. Allies and rivals in the geopolitics of hydrogen
5. Comparative study of hydrogen strategies in the European Union "

MODULE 9. HYDROGEN ECONOMY

1. DIDACTIC UNIT 1. INVESTMENT DRIVERS

1. Technological, economic and environmental potential of Europe
2. European deployment plans, hydrogen valleys
3. Factors driving investment in hydrogen and fuel cells
4. Supply and demand development initiatives
5. The route to technology commercialization

2. DIDACTIC UNIT 2. PRACTICAL CASES

1. Fuel cell handling equipment
2. Residential use. Fuel cell microcogeneration
3. CHP cogeneration
4. H2 production without CO2 capture (I)
5. Hydrogen production without and with CO2 capture (II)

3. DIDACTIC UNIT 3. ECONOMIC VIABILITY

1. The feasibility plan
2. Production and expense plan
3. Investment and financing plan
4. Reports; operating account, balance sheet and treasury
5. Main indicators, analysis and simulations

4. DIDACTIC UNIT 4. FINANCING TOOLS

1. First steps in the search for capital
2. Internal financing sources
3. Sources of external financing
4. Mixed financing sources
5. How to negotiate our financing

MODULE 10. TFM. MASTER OF HYDROGEN

Qualification

University Degree in Master of Lifelong Training in Green Hydrogen Projects issued by the Antonio de Nebrija University with 60 ECTS University Credits. Teachings not leading to obtaining an official qualification

Objectives

- • Lead the conceptualization and design of initiatives of this vector, integrating its role as an energy vector and its environmental impact. • Direct the implementation of advanced methods for the production and conversion of energy from this resource, optimizing processes and resources. • Design strategies for the storage and control of this resource, guaranteeing the safety and operational efficiency of the facilities. • Manage the development of energy infrastructure and means of transportation of this vector, considering logistics and applicable regulations. • Evaluate the applications of this vector in the generation of electrical energy and other industrial uses, identifying opportunities for innovation. • Make strategic decisions about the financing of sustainable projects and their economic viability, from their initial phase. • Integrate decarbonization techniques and technologies in the planning of sustainable energy projects. • Analyze the context of climate change and the energy transition to position high-impact projects.

What does it prepare you for?

This program prepares you to lead the formulation and execution of projects for this green technology, providing you with a comprehensive strategic vision that ranges from generation and storage to infrastructure and final applications. You will develop the ability to analyze this energy vector, understanding its environmental impact and its key role in the global energy transition. The Master in Green Hydrogen Projects trains professionals in the management of complex production and conversion systems of this resource to implement advanced storage and control solutions. You will be trained to make informed decisions about the use and applications of this vector, including the development of service stations and other facilities, leading decarbonization initiatives and transforming your organization's energy challenges.

Who is it addressed to?

Aimed at professionals in the energy sector, both public and private, who already operate with energy generation, distribution or consumption technologies and are seeking high-level specialization in the field of this energy vector. If you work in engineering, business development, project management or consulting, and feel the need to integrate a global vision of the value chain of this resource for industrial decarbonization, this training is for you. It is ideal for those who want to boost their professional career, assuming greater responsibilities in the formulation and execution of strategies related to the energy transition and the implementation of new energy sources, leading the transformation in their organization or in the market.

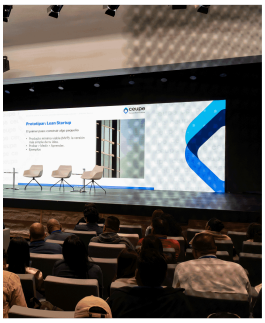
Official Character

This training is not included within the scope of official regulated training (Early Childhood Education, Primary Education, Secondary Education, Official Vocational Training FP, Baccalaureate, University Degree, Master University Officer and Doctorate). It is therefore a complementary and/or specialization training, aimed at the acquisition of certain competencies, skills or aptitudes of a professional nature, which can be assessed as merit in job boards and/or competitive examinations, always within the section of Complementary Training and/or Continuous Training. It is always essential to review the specific grading requirements of the specific public job boards to which we wish to apply.

Professional Outings

- Specialization in the green hydrogen sector positions you to assume highly responsible roles in an expanding market. You will be able to lead multidisciplinary teams as Hydrogen Project Director, leading initiatives from conception to implementation, ensuring their technical and economic viability. You will make your way as a Business Development Manager in energy or technology companies, identifying opportunities and forging strategic alliances for the expansion of hydrogen solutions. Your profile will be highly valued as a Strategic Consultant in clean energy, advising public and private organizations in the formulation of policies and the execution of large infrastructures. Additionally, you will be able to work as a Hydrogen Infrastructure Manager, supervising the construction and operation of production, storage and distribution plants. This training prepares you to be a key specialist in the energy transition, promoting the adoption of this energy vector in various industrial and mobility areas.







Live Madrid

Live the International Week

As an additional complement to your training, you can be part of the SIM: Week International in Madrid. A unique meeting that brings together students from all over the world. For seven days you can live an academic and cultural experience in the heart of Europe, culminating with the graduation ceremony in Madrid.

- Conferences and workshops with international experts
- Visits to companies and reference organizations
- Networking with students from different countries
- Cultural activities and discovery of Madrid
- graduation ceremony

Structural

Structuralia is a leading educational institution in postgraduate and highly specialized online training, focused on the fields of engineering, architecture, construction, energy, technology and digital transformation.

Founded in 2001 with a strong industrial DNA, the result of collaboration between large companies in the sector and the Universitat Politècnica de Catalunya (UPC), for more than 25 years we have accompanied technical professionals in their academic and professional development through practical, flexible training aligned with the reality of the labor market.

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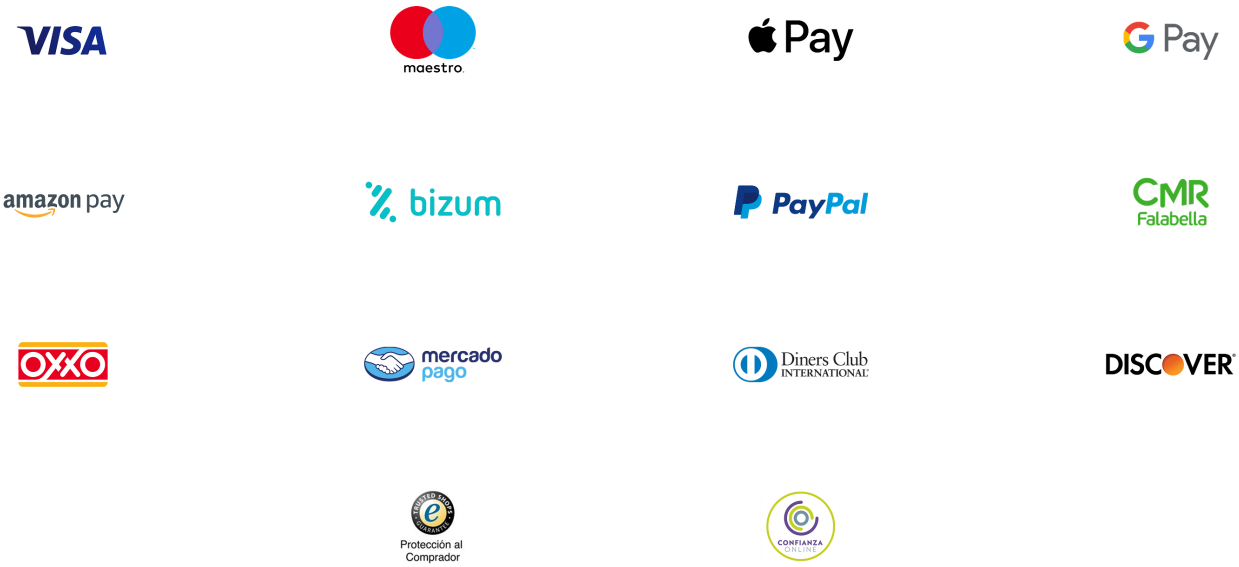
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