Structuralia
Engineering eLearning

UNIVERSIDAD
NEBRIJA

Master´s Degree in Green Hydrogen Projects + 60 ECTS Credits





Choose to learn at school
leader in online training

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ABOUT STRUCTURALIA

Structuralia is an online educational institution offering highly specialized postgraduate programs in engineering, infrastructure, construction, energy, building, digital transformation, and new technologies. Since our founding in 2001, we have been committed to providing quality training for the professional development of **engineers, architects, and STEM professionals.**

We provide a platform where you can acquire new skills and enhance your knowledge without being limited by time or location. Our methodology ensures an engaging, interactive, and **supportive educational experience,** equipping our students to meet future challenges in their respective fields of work.

More than **20** years of experience

Over **200k** student have learnt with us

More than **90** nationalities among our students



Specialize to
advance your career

STRUCTURALIA ALLIANCE AND NEBRIJA UNIVERSITY

Structuralia and the University of Nebrija successfully consolidate a strategic partnership. Thus, the collaboration between Structuralia and the University of Nebrija promotes a collaborative, innovative and accessible approach towards learning that is adapted to the individual needs of students.

The two institutions prioritize practical and flexible learning, adapted to the demands of today's working world, and which promotes the personal and professional development of each student. The purpose is to acquire new knowledge in a dynamic and didactic way, which facilitates its retention and contributes to developing the necessary skills to be ready to take part in a society in constant and rapid transformation.

Structuralia and the University of Nebrija have set as their main objective the democratization of education to bring it to even the most remote areas and taking advantage of the latest technological innovations. In addition, they have a team of highly specialized teachers and learning platforms that incorporate cutting-edge educational technology to provide academic support throughout the entire educational process.



STRUCTURALIA RANKINGS

Structuralia has achieved the recognition of different national and international rankings, thanks to its commitment to **democratize education** and bet on educational innovation to **achieve excellence.**

For the elaboration of these rankings, **indicators** such as online and offline reputation, the quality of the institution, social responsibility, educational innovation or the profile of professionals are used.















QS, seal of academic excellence

Structuralia: 5 stars in online education

BY EDUCA EDTECH

Structuralia is a brand endorsed by **EDUCA EDTECH Group,** which is composed of a group of experienced and recognized **educational institutions of online training.** All the entities that make it up share the mission of **democratizing access to education** and are committed to knowledge transfer, technological development and research.

EDUCA EDTECH Group

ONLINE EDUCATION

EUROINNOVA INTERNATIONAL ONLINE EDUCATION

inesem business school

INEAF BUSINESS SCHOOL

red educa.net

inesalud

EDU SPORT

EDUCA business school

ESIBE ESCUELA IBEROAMERICANA DE POSTGRADO

Educa.Pro

ceupe European Business School

UDAVINCI

CAPMAN testing solutions

Structuralia Engineering eLearning

UNIMIAMI International University of Miami

Educa PHAROS

LXP METHODOLOGY

The **EDUCA LXP** methodology enhances the learning experience by incorporating AI into e-learning processes. It utilizes highly customized predictive models based on the analysis of student interactions with their virtual environments.

EDUCA LXP is the outcome of **Research Results Transfer** from multiple interdisciplinary R&D+i projects, involving international universities dedicated to knowledge transfer, technological development and research.



1. Flexibility

100% online and flexible learning, allowing students to study where, when and how they want.



2. Accessibility

We believe in making education accessible to all, working to ensure that everyone has the opportunity to continue their learning journey.



3. Personalization

We offer customized learning paths tailored to each student's unique needs and preferences.



4. Accompaniment / Academic mentoring

Guidance and support. Our team of expert teachers provides academic guidance, advocating for educational quality and adapting to the needs of the ever-changing labor market.



5. Innovation

We are at the forefront of technological development, constantly evolving with AI-driven Learning Experience Platforms.



6. Educational excellence

Our didactic approach focuses on competence based learning, promoting practical and meaningful learning experiences to ensure professional development.



Programs

Our own university and official programs

WHY CHOOSIG STRUCTURALIA

1. Our Experience

- ✓ More than **20 years of experience**.
- ✓ More than **200.000 students** have already learnt in our virtual classrooms.
- ✓ More than **90 nationalities** among our student body.

2. Our Team

Currently, Structuralia has a team of **more than 550 professionals working in the STEM (Science, Technology, Engineering and Mathematics)**. Our staff is solidly framed in a structure that facilitates the highest quality in the attention to students.

3. Our Methodology



100% ONLINE

Study at your convenience, wherever you are. Access our virtual campus from any device.



LEARNING

We strive for a deep integration of new knowledge into your cognitive framework.



TEAM TEACHERS

Structuralia has a team of professionals to elevate your study experience with topquality education.



NOT BE ALONE

Receive continuous guidance from our tutoring team throughout your student journey.

4. AENOR Quality

- ✓ We are Collaboration Agency Nº99000000169 authorized by the Ministry of Employment and Social Security.
- ✓ Annual external audits are carried out to ensure the highest quality by AENOR.
- ✓ Our teaching processes are certified by AENOR under ISO 9001.

Master´s Degree in Green Hydrogen Projects + 60 ECTS Credits

LENGHT
1500 horas

MODE
ONLINE

ASSISTANCE
PERSONALIZED

CREDIT
60 ECTS

Certificacion

Master´s Degree in Green Hydrogen Projects with 60 ECTS Credits awarded by the Antonio de Nebrija University. Teaching not leading to an officially accredited qualification



Description

The Master’s degree in Hydrogen Energy Projects has been designed to grant students access to cross-cutting knowledge related to key aspects of the hydrogen energy production sector. As a matter of fact, it is intended to help students develop the necessary skills to successfully participate in different projects all the way from the conceptual to the strategic stage. Therefore, and to this end, this program has been structured into 9 modules that progressively delve into the characteristics of hydrogen as an element, as well as into its energy and environmental impact. This program also delves into the context of hydrogen as an energy source by analyzing the associated production technologies and the subsequent conversion process by means of fuel cells. It also goes into the storage and control systems within the supply chain, the repercussions of hydrogen in mobility and infrastructures, and of course, its uses and applications. In addition, other key aspects such as the construction of hydrogen filling stations, the strategic component and geopolitics of the sector, and finally, the economic and business aspects of hydrogen production, are also addressed. Furthermore, the program provides the necessary theoretical framework, case studies, and practical exercises for students to put the acquired knowledge into practice. Finally, at the end of the course, all knowledge and skills learned throughout the duration of the master’s degree will be tested by means of a final project.

Goals

By pursuing this master's degree, the student will be able to: - Learn about hydrogen in terms of properties as an element, as an energy vector, and its environmental impact. - Delve into hydrogen production and conversion methods. - Apply relevant storage and control systems. - Delve into the associated infrastructure and means of transport. - Master the use and applications of hydrogen. - Delve into the fundamental aspects of hydrogen fueling stations. - Learn about the key players involved through a strategic vision of the sector. - Master economic and business aspects associated with hydrogen energy projects

What does it prepare you for?

- Professionals in both the public and private sectors who require training in the hydrogen energy sector. - Professionals seeking to boost their careers within the private sector or promote strategic changes within their companies. - Anyone with either undergraduate or graduate education who is interested in learning more about the hydrogen energy sector in order to pursue a professional career in this area. - Management staff who require an overall understanding of the hydrogen sector for strategic decision-making.

Who is the target audience?

Structuralia’s Master’s degree in Hydrogen Energy Projects is the only program that integrates all the different areas involved in the hydrogen energy sector. The main aspects included in this program are

strategy design, Hydrogen as a product, associated infrastructures, and financing sources. By pursuing this master's degree, the student will be able to acquire suitable knowledge and skills that will enable him/her to manage hydrogen-related projects and respond to any situation that may arise while carrying out his/her duties.

Job opportunities

- Project engineer in consulting companies - Energy company manager - Project and technical studies manager in construction firms - Technical staff in public administration agencies - Process engineers - Energy process manager - Economist and developers in the energy sector - Energy operations manager - Energy business development

List of subjects

MODULE 1. HYDROGEN AS AN ENERGY VECTOR

UNIT 1. ENERGY AND HYDROGEN

1. The hystory of hydrogen
2. What is hydrogen?
3. Current electricity and energy matrix
4. Hydrogen as an energy carrier
5. Prospects for the hydrogen roadmap

UNIT 2. HYDROGEN GENERATION AND STORAGE

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

UNIT 3. POWER GENERATION AND OTHER APPLICATIONS

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

UNIT 4. HYDROGEN INSTALLATIONS

1. Refuelling stations
2. Sizing of main equipment
3. Safety considerations. Explosive atmospheres
4. Design of hydrogen and fuel cell installations
5. Examples of installation calculations

MODULE 2. HYDROGEN CONTEXT

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 demand and transition
5. Energy and the fuel future

UNIT 2. CLIMATE CHANGE AND ENERGY TRANSITION

1. Climate change
2. Effects and strategies related to climate change
3. The energy transition roadmap
4. The evolution of the energy transition
5. Carbon credits and ESG criteria

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

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 AND FUEL CELLS PRODUCTION

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

UNIT 2. GREEN HYDROGEN PRODUCTION

1. Electrolytic processes
2. Alkaline electrolysers
3. Polymer electrolyser
4. Green hydrogen production alternatives
5. Technological maturity level

UNIT 3. POLYMER FUEL CELLS OPERATION

1. Origin and operation of fuel cells
2. Composition and types of fuel cells
3. Operation of polymer batteries
4. Polymer battery components
5. Progress and future expectations

UNIT 4. OTHER TYPES OF FUEL CELLS

1. Solid oxide fuel cells. Geometries and materials
2. Fuel cell efficiency
3. Alkaline, phosphoric acid and molten carbonate batteries
4. Microbial fuel cell
5. Fuel cell design and costing

MODULE 4. HYDROGEN SUPPLY CHAIN

UNIT 1. STORAGE AND SUPPLY OF HYDROGEN GAS

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

UNIT 2. STORAGE AND SUPPLY OF LIQUID HYDROGEN

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

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

UNIT 4. HYDROGEN SYSTEM CONTROL

1. Control theory
2. Model-based Predictive Control (MPC)
3. Hydrogen system modeling
4. Control strategies
5. Associated standards and regulations

MODULE 5. HYDROGEN MOBILITY AND INFRASTRUCTURE

UNIT 1. LAND MOBILITY

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

UNIT 2. AIR AND MARITIME MOBILITY

1. Energy transition in air transport
2. Sustainable aviation fuels
3. Energy transition in maritime transport
4. Sustainable fuels for maritime transport
5. Evolution of air and maritime transport

UNIT 3. HYDROGEN MANAGEMENT

1. Risk of hydrogen
2. Hydrogen detection
3. Security aspects
4. Explosive environments
5. Hydrogen risk assesment

UNIT 4. TRANSPORT AND LOGISTICS

1. Hydrogen production pathways
2. Distributed generation systems
3. Comparison between generation systems
4. Environmental, health, and safety aspects of the hydrogen production pathways
5. Safety and risks associated with hydrogen transmissionn, distribution and storage

MODULE 6. HYDROGEN USE AND APPLICATIONS

UNIT 1. STATIONARY APPLICATIONS

1. Large-scale power production
2. Decentralized power generation systems
3. Power microgeneration systems
4. Uninterruptible Power Supply Systems (UPS)
5. Heat-energy combined systems

UNIT 2. MOBILE APPLICATIONS

1. Introduction and future perspectives on mobile applications
2. Forklift trucks
3. Passenger cars and buses
4. Air mobility and maritime mobility
5. Other vehicles

UNIT 3. PORTABLE APPLICATIONS

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

UNIT 4. POWER-TO-X

1. Power-to-X. Basis and concepts
2. Power-to-Gas (PTG)
3. Power-to-Liquid (PTL)
4. Power-to-Heat (PTH)
5. Hydrogen and applications worldwide

MODULE 7. HYDROGEN FILLING STATION

UNIT 1. INFRASTRUCTURE EQUIPMENT AND COMPONENTS

1. Materials, pipelines, and accessories
2. Feed systems and storage
3. Hydrogen compressors
4. Auxiliary components and systems
5. Hydrogen dispensers

UNIT 2. SET UP AND OPERATION OF A HYDROGEN FILLING STATION

1. Set up and operation of a hydrogen filling station
2. Instrumentation and control systems
3. Inspections protocols
4. Filling station operation
5. Maintenance tasks

UNIT 3. SAFETY ASPECTS

1. Safety fundamentals
2. Safety methodologies and risk assesment
3. Risk mitigation, explosive atmospheres, and the atex
4. Safety distance in hydrogen facilities
5. Protection measures against external agents

UNIT 4. APPLICABLE REGULATIONS

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

MODULE 8. HYDROGEN GEOPOLITICS

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

1. The basics of the geopolitics of the energy transition
2. Political history of hydrogen: bubbles and expectations
3. The arrival of hydrogen geopolitics
4. Hydrogen geopolitics in the context of climate change

5. Actors of hydrogen geopolitics

UNIT 2. ACTORS OF HYDROGEN GEOPOLITICS

1. Importers: the case of the European Union
2. Hydrogen in the Survival and Energy Transition of Petro-states: The Case of the Gulf Co-operation Council
3. Emerging exporters and neoexctractivism
4. Emerging tech superpowers: China
5. Emerging industrial power: the United States

UNIT 3. THE GEOPOLITICS OF HYDROGEN VALUE CHAINS

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

UNIT 4. THE STRATEGIC DIMENSION OF HYDROGEN

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

MODULE 9. HYDROGEN ECONOMY

UNIT 1. INVESTMENT DRIVERS

1. Europe's technological, economic and environmental potential
2. European deployment plans, the hydrogen valleys
3. Drivers for hydrogen and fuel cell investment
4. Supply and demand development initiatives
5. The route to technology commercialization

UNIT 2. CASE STUDIES

1. Fuel cell handling equipment
2. Residential use. Fuel cell cogeneration
3. Cogeneration CHP
4. Hydrogen production without CO2 capture. Part I
5. Hydrogen production with and without CO2 capture. Part II

UNIT 3. ECONOMY VIABILITY

1. Overview of economic viability
2. Economic viability plan
3. Investment and financing plan

4. Profitability and risks in hydrogen projects: a financial approach
5. Commercialisation strategies and feasibility in the hydrogen industry: economic and business perspectives

UNIT 4. FINANCING TOOLS

1. First steps towards the search for capital
2. Internal financing sources
3. External financing sources
4. Mixed financing sources
5. Financing negotiations

MODULE 10. MFP. MASTER´S DEGREE IN HYDROGEN ENERGY PROJECTS

Did you find this information interesting?

If you still have questions, our academic advising team will be happy to answer them.

Ask us about our training method, our teachers, scholarships or even just get to know us.

Request information without commitment.

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