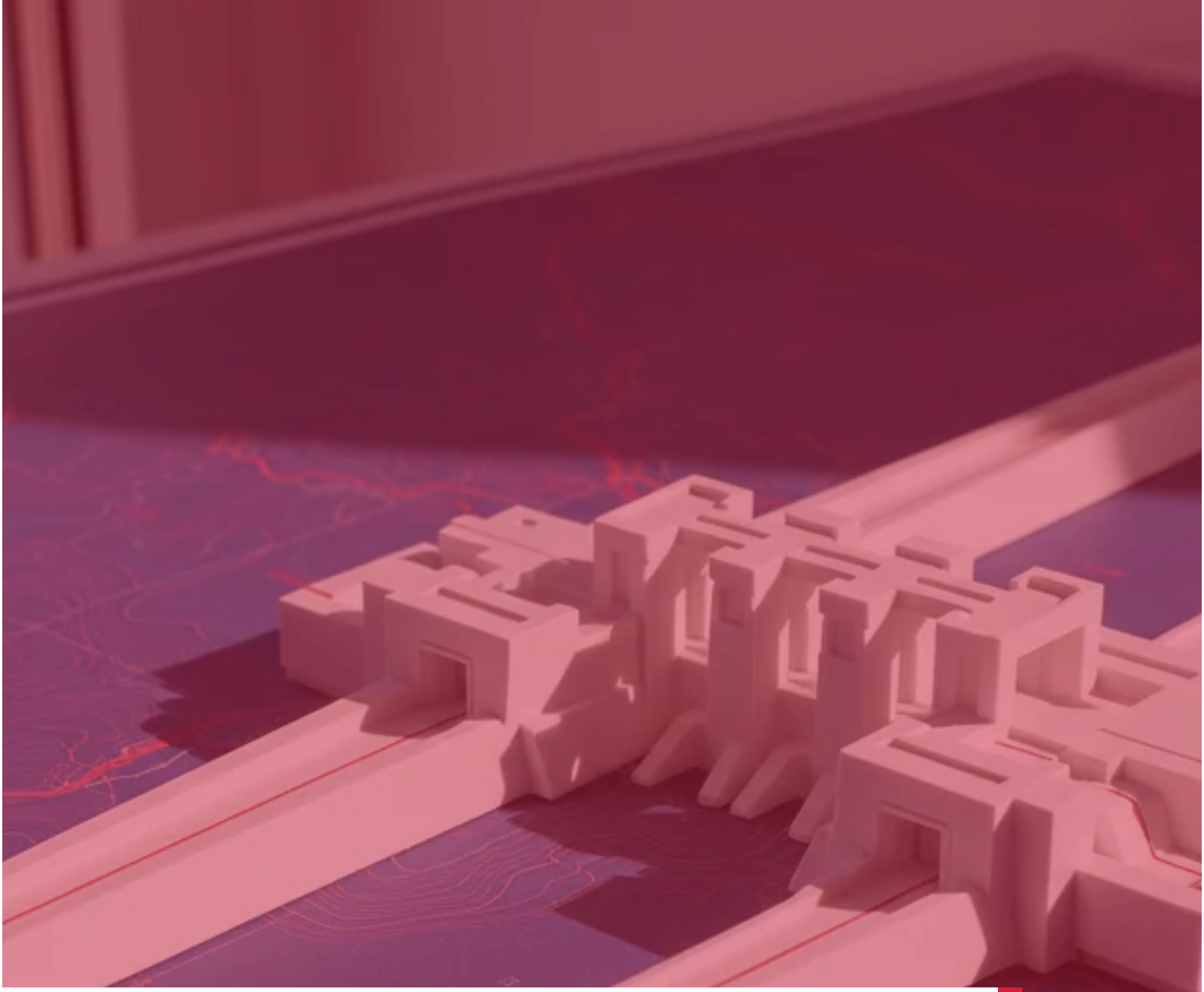


Máster online 100%

Advanced BIM Master in Modeling of Waterways and Hydraulic Infrastructures + 60 ECTS Credits

Structuralia

Máster online 100%

Advanced BIM Master in Modeling of Waterways and Hydraulic Infrastructures + 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 Advanced BIM Master in Modeling of Waterways and Hydraulic Infrastructures is a specialization program designed for civil and hydraulic engineering professionals who seek to update and deepen project management using the BIM methodology. This program responds to the digital transformation that redefines infrastructure engineering, directly impacting the activity of road, canal and port engineers, civil and industrial engineers involved in the development of hydraulic and port projects. The evolution towards digital construction (VDC) with BIM methodology in hydraulic infrastructures is essential to maintain professional competitiveness and relevance in the sector. Through this program, you will update your knowledge in the integration of BIM in all phases of the life cycle of a project, with a particular focus on the management of hydraulic engineering works. You will master the application of advanced BIM software such as GIS, Civil 3D and Revit, essential for accurate channel modeling and efficient infrastructure management. You will cover everything from the fundamental concepts of surface and river hydrology to the application of reference regulations, consolidating your profile to lead complex projects with a solid technical base. You will develop skills in the pre-process of cartographic preparation using Geographic Information Systems (GIS), including the delimitation of basins and channels with QGIS, and you will delve into the analysis of floods with HEC-HMS, mastering its design and evaluation parameters. This

comprehensive approach will allow you to implement and manage advanced and sustainable solutions in the water resources sector.

Agenda

MODULE 1. BIM. CONCEPTS ON HYDROLOGY AND HYDRAULICS. REFERENCE REGULATIONS.

1. DIDACTIC UNIT 1. BASIC CONCEPTS ON SURFACE HYDROLOGY.

1. Basic concepts on surface hydrology (I).
2. Basic concepts on surface hydrology (II). From rain to runoff
3. Basic concepts on surface hydrology (III). The rational method.
4. Hydrological modeling (I). The HEC-HMS model and transportation models.
5. Hydrological modeling (II). Geographic information systems.

2. DIDACTIC UNIT 2. BASIC CONCEPTS ON RIVER HYDRAULICS.

1. Basic concepts on river hydraulics (I).
2. Basic concepts on river hydraulics (II). One-dimensional and two-dimensional models.
3. Basic concepts on river hydraulics (III). Draft calculation.
4. Hydraulic modeling.

3. DIDACTIC UNIT 3. REFERENCE REGULATIONS.

MODULE 2. BIM. PRE-PROCESS. PREPARATION OF MAPPING USING GIS

1. DIDACTIC UNIT 1. REMINDER OF USE OF GIS

1. Geographic Information Systems
2. Data models
3. Digital terrain models
4. Spatial Data Infrastructures
5. Geographic Information Services and metadata
6. The free QGIS software. Application installation and structure

2. DIDACTIC UNIT 2. DELIMITATION OF BASINS AND WATERWAYS WITH QGIS

1. Reference regulations. Application of the Modified Rational Method
2. Layout of the work area. MDT download and trimming
3. Model preparation. Obtaining the flow network and the hydrographic basin
4. Calculation of hydrological parameters
5. Flow calculation using automated spreadsheet

MODULE 3. BIM. CALCULATION OF AVENUES AND BASINS WITH HEC-HMS.

1. DIDACTIC UNIT 1. INTRODUCTION TO HEC-HMS

1. Program versions. Download and installation. Documentation
2. Work scheme. Components
3. First component. Basin model manager
4. Second and third components. Time-Series Data Manager and Meteorological Model Manager
5. Fourth component (Control Specifications Manager) and visualization of results

2. DIDACTIC UNIT 2. DESIGN PARAMETERS

1. GIS functionalities (I)
2. GIS functionalities (II)
3. GIS functionalities (III)
4. Design parameters
5. Model Calibration

MODULE 4. BIM. 1D MODELING WITH HEC-RAS.

1. DIDACTIC UNIT 1. INTRODUCTION TO HEC-RAS

1. The HEC-RAS model
2. The HEC-RAS interface
3. Geometry of natural channels (I)
4. Geometry of natural channels (II)
5. Geometry of natural channels (III)

2. DIDACTIC UNIT 2. PREPARATION OF MAPPING FOR HYDRAULIC CALCULATION

1. The RiverGIS Plugin
2. The database
3. The territorial basis of the hydraulic model
4. Necessary cartography. Preprocess
5. The RiverGIS Database

3. DIDACTIC UNIT 3. 1D FLOOD STUDIES (I)

1. HEC-RAS Installation
2. The geometry file
3. The flow file
4. The hydraulic model
5. Viewing results

4. DIDACTIC UNIT 4. 1D FLOOD STUDIES (II)

1. Advanced options
2. Bridges and passage works
3. In-line, lateral structures and flow obstructions
4. The variable regime
5. Modeling of pond and dam failure

MODULE 5. BIM. 2D MODELING WITH IBER

1. DIDACTIC UNIT 1. THE TWO-DIMENSIONAL MODEL OF HEC-RAS

1. The two-dimensional HEC-RAS model
2. The digital elevation model in 2D modeling
3. Creating terrain with RAS Mapper
4. Creating geometry data with RAS Mapper
5. Hydraulic conditions in variable regime

2. DIDACTIC UNIT 2. MODELING WITH HEC-RAS

1. Creation of 2D geometries in HEC-RAS
2. Hydraulic conditions in two-dimensional modeling with HEC-RAS
3. Relationships between geometric elements
4. Hydraulic conditions in two-dimensional modeling with HEC-RAS
5. 2D simulation in variable regime

3. DIDACTIC UNIT 3. INTRODUCTION AND FLOW MODELING

1. Introduction to the IBER model and software installation
2. Hydraulic bases
3. Preparation of the IBER environment
4. Preparation and import of geometries
5. Fluid conditions and boundary conditions

4. DIDACTIC UNIT 4. CALCULATION AND RESULTS

1. Definition of roughness
2. Meshing typologies and methods
3. Calculation and reading of results
4. Getting sections
5. Hazard maps

MODULE 6. BIM. POSTPROCESSING IN HEC-RAS. OUTPUT OF RESULTS

1. DIDACTIC UNIT 1. DISPLAY AND OUTPUT OF RESULTS FROM HEC-RAS 1D

1. Graphic outputs in 1D hec-ras (I)
2. Graphic outputs in HEC-RAS 1D (II)
3. Visualization using tables
4. Incidents. Errors, warnings and notes
5. Flood contours and depth grids

2. DIDACTIC UNIT 2. VISUALIZATION AND OUTPUT OF RESULTS FROM HEC-RAS 2D

1. Visualization of results in 2D hec-ras
2. dynamic maps
3. 3D visualization
4. Static maps. Exporting results to GIS
5. Flood risk maps

MODULE 7. BIM. BIM AND GIS INTERACTION. VIRTUAL REALITY.

1. DIDACTIC UNIT 1. POINT CLOUDS

1. Point clouds and point cloud data on the web
2. Models from images with ReCap Photo and model generation with ReCap Photo
3. Modeling from images with ReCap Pro and generating models with ReCap Pro
4. Point clouds with Civil 3D
5. Point clouds with InfraWorks

2. DIDACTIC UNIT 2. GIS IN BIM PRELIMINARY PROJECTS

1. GIS in Civil 3D

2. GIS in InfraWorks
3. Preliminary projects for tenders
4. Presentations and Virtual Reality

MODULE 8. BIM. HYDROLOGICAL AND HYDRAULIC APPLICATIONS OF CIVIL 3D. HEC-RAS AND CIVIL 3D INTERACTION

1. DIDACTIC UNIT 1. HYDRAFLOW HYDROGRAPHS EXTENSION, HYDRAFLOW EXPRESS EXTENSION AND HYDRAFLOW STORM SEWERS

1. Presentation of the tools and introduction to Hydraflow Hydrograph Extension
2. Hydraflow Hydrographs Extension. Contact
3. Hydraflow Hydrographs Extension. Workflow and introduction to Hydraflow Express Extension
4. Components of Hydraflow Express Extension
5. Reference Tables and Starting Hydraflow Storm Sewers

2. DIDACTIC UNIT 2. HYDRAFLOW STORM SEWERS AND STORM AND SANITARY ANALYSIS (SSA)

1. Working with Hydraflow Storm Sewers
2. Storm and Sanitary Analysis (SSA) installation and presentation
3. SSA Components
4. Models and presentation in SSA
5. Networks and results in SSA

MODULE 9. BIM. BIM DESIGN OF RETENTION STRUCTURES AND IRRIGATION NETWORKS.

1. DIDACTIC UNIT 1. RAFT MODELING

1. Grading element
2. Grading criteria
3. footprint design
4. Creation of gradings
5. Volume measurement

2. DIDACTIC UNIT 2. DESIGN OF ELEMENTS OF THE IRRIGATION NETWORK

1. Element catalogs
2. Editing parts
3. Network modeling
4. Irrigation network profile
5. BIM deliverables

MODULE 10. BIM. BIM DESIGN OF CHANNELS AND PIPING.

1. DIDACTIC UNIT 1. ELEMENTS OF GEOMETRY

1. The SAC interface
2. Basic geometry elements (I)
3. Basic geometry elements (II)
4. Advanced geometry elements (I)
5. Advanced geometry elements (II)

2. DIDACTIC UNIT 2. CODE ORGANIZATION AND FIRST STEPS

1. Organizers, conditionals and lists
2. Definition of parameters and variables
3. SAC in Civil 3D
4. Lane design
5. Shoulder design

3. DIDACTIC UNIT 3. MULTI-PROJECT SECTION DESIGNS

1. ditch design
2. Generics and circular sections
3. tunnel design
4. Slope design
5. Transitions

4. DIDACTIC UNIT 4. COMPLEX SECTION DESIGNS

1. channel design
2. Design of a collector in SAC
3. Design of a collector in Civil 3D
4. Linear work to .IFC
5. Type sections for grading

MODULE 11. BIM. BIM DESIGN OF DAMS.

1. DIDACTIC UNIT 1. BIM MODEL OF EARTH DAMS

1. Loose material dams
2. Design profiles
3. Parametric sections
4. Foundation surface
5. BIM deliverables. Cross sections

2. DIDACTIC UNIT 2. BIM MODELING OF FACTORY DAMS (I)

1. Site study
2. Prey body modeling
3. Linear work of the dam body
4. Auxiliary linear works
5. BIM deliverables

3. DIDACTIC UNIT 3. BIM MODELING OF FACTORY DAMS (II)

1. Integration of the linear work and detailing of the work
2. Detail of the prey body
3. Modeling of maneuver elements
4. Modeling of control elements
5. Detail definition of the dam body model

4. DIDACTIC UNIT 4. CONSTRUCTION INFORMATION

1. Creation of parameters in 3D civil
2. Generating solids and adding properties to solids

3. Creating parameters in Revit
4. Exploiting parameters in Revit
5. Deliverables derived from parameters in Revit. Application to work monitoring

MODULE 12. BIM. BIM DESIGN OF SANITATION AND SUDS NETWORKS.

1. DIDACTIC UNIT 1. DESIGN OF URBAN NETWORKS WITH SWMM

1. The SWMM environment for hydraulic network designs
2. Definition of contribution basins
3. Design rain. time series
4. Hydraulic profile of the ducts
5. Analysis result. Visualization and reports

2. DIDACTIC UNIT 2. SIZING OF COLLECTORS AND SUDS

1. Hydrological - hydraulic study with Storm Sanitary Analysis
2. Analysis with SSA
3. Results. Reports, graphs and plans
4. SUDS BIM model

MODULE 13. BIM. BIM DESIGN OF WATER SUPPLY NETWORKS.

1. DIDACTIC UNIT 1. HYDRAULIC DESIGN OF URBAN NETWORKS IN EPANET

1. Introduction to EPANET. Main features
2. Definition of flows to be supplied
3. Model elements. Physical or visual objects
4. Model elements. Non-physical objects
5. Hydraulic pressure analysis

2. DIDACTIC UNIT 2. BIM MODEL OF THE SUPPLY NETWORK

1. Network Elements Library. Catalog and parts
2. Creating pipes and fittings
3. Plan and elevation design
4. Parametric sections of networks
5. BIM model management

MODULE 14. BIM. INTEROPERABILITY FROM PIM TO AIM. INFORMATION MANAGEMENT IN BIM MODELS WITH DYNAMO. HYDRAULIC WORKS

1. DIDACTIC UNIT 1. DYNAMO GEOMETRY

1. Dynamo C3D.
2. Geometry Bookstore.
3. Manage lists.
4. Dynamo Interactivity - Civil.
5. Creation of elements with Dynamo.

2. DIDACTIC UNIT 2. DYNAMO - CIVIL GEOMETRY

1. Creation of a planimetric axis.
2. Creation of profiles.

3. Creation of Corridor.
4. Data management.
5. Create 3D elements.

MODULE 15. BIM. PLANNING, COST CONTROL AND CERTIFICATIONS OF HYDRAULIC WORKS WITH BIM MODELS

1. DIDACTIC UNIT 1. 4D USE OF BIM MODELS. VISUAL PLANNING OF THE WORK

1. Basics
2. Work planning
3. Task management
4. Import objects
5. Construction simulation

2. DIDACTIC UNIT 2. 5D USE OF BIM MODELS. MEASUREMENTS, BUDGETS AND WORK CERTIFICATIONS

1. Basics
2. Measurements
3. Budget Coding
4. Import and export data from a model
5. Budget generation

MODULE 16. TFM. ADVANCED BIM MASTER IN MODELING OF WAYS AND HYDRAULIC INFRASTRUCTURES.

Qualification

University Degree in Master of Lifelong Training in Advanced BIM in Modeling of Waterways and Hydraulic Infrastructures issued by the Antonio de Nebrija University with 60 ECTS University Credits. Teachings not leading to obtaining an official qualification

Objectives

- • You will lead the integration of the Building Information Modeling (BIM) methodology in all phases of projects and construction management for hydraulic engineering infrastructures. • You will master the application of advanced software such as GIS, Civil 3D and Revit for channel modeling and water infrastructure management. • You will design cartographic pre-processing strategies using Geographic Information Systems (GIS) for the precise delimitation of basins and channels with QGIS. • You will implement hydrological models and flood calculations using HEC•HMS, managing their design parameters for a robust and reliable evaluation. • You will evaluate the impact of design and management decisions on water infrastructure projects, considering the reference regulations and sustainability criteria. • You will manage surface and river hydrological information, applying advanced concepts for making strategic decisions in the field of BIM hydrology. • You will optimize the planning and execution of complex hydraulic projects, integrating BIM modeling to improve efficiency and reduce risks. • You will analyze and apply innovative solutions for water resources management, addressing the current challenges of the sector with BIM technology.

What does it prepare you for?

This program prepares you to lead the digital transformation in the design and management of hydraulic infrastructure. You will develop a strategic vision to integrate the BIM methodology in all phases of complex projects, from conceptualization to operation and maintenance. The Advanced BIM Master in Modeling of Waterways and Hydraulic Infrastructures trains you in the modeling of waterways with BIM for the comprehensive optimization of hydraulic projects. You will learn to design advanced strategies for channel modeling and flood calculation, using specialized tools such as QGIS and HEC-HMS, and applying current reference regulations. You will make decisions based on the rigorous analysis of hydrological and hydraulic data, optimizing the planning and execution of projects with criteria of efficiency and sustainability. You will manage the preparation of cartography using Geographic Information Systems (GIS) and the precise delimitation of basins, ensuring the technical robustness and reliability of your proposals. You will implement innovative solutions that address current challenges in water resources engineering, raising the standard of quality and precision of your projects.

Who is it addressed to?

Professionals in Civil Engineering, Hydraulic Engineering, Civil Engineering, Canals and Ports, and Industrial Engineering who actively participate in infrastructure projects will find the specialization they are looking for in this master's degree. If you work as a project engineer, consultant or infrastructure designer and are looking for a high-level specialization in the integration of the BIM methodology in hydraulic Virtual Digital Construction (VDC) projects, this training is for you. It is designed for those who wish to update their knowledge in channel modeling and hydraulic infrastructure management, adapting to the demands and opportunities of digital construction. You will improve your professional competitiveness and master advanced tools for the design, planning and management of complex hydraulic projects, preparing you to assume roles of greater responsibility and leadership in the sector.

Official Character

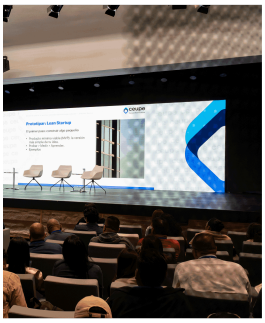
This training is not included within the scope of official regulated training (Early Childhood Education, Primary Education, Secondary Education, Official Vocational Training FP, Baccalaureate, University Degree, Master University Officer and Doctorate). It is therefore a complementary and/or specialization 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 BIM modeling of hydraulic channels and infrastructure will allow you to access strategic and highly responsible roles in the civil engineering and water resources sector. You will be able to assume responsibilities as a Senior Specialist in Hydraulic Modeling, designing and evaluating complex water and flood management projects with advanced tools such as HEC-HMS and Geographic Information Systems (GIS). You will establish yourself as Head of BIM Hydraulic Infrastructure Design, leading the integration of digital construction in all phases of the project life cycle, from conceptual planning to execution and maintenance. Additionally, you will be able to serve as an Expert Consultant in Water Resources, advising on the implementation of innovative solutions for sustainable water management, resource optimization and flood risk mitigation. Finally, you will prepare to be a Principal Flood Risk Analyst, using advanced predictive models and applying reference regulations for making strategic decisions in the protection of infrastructure and populations, contributing to territorial resilience.







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.

Our training proposal connects advanced technical knowledge, real employability and international projection, acting as key support in the professional evolution of those seeking to specialize, grow professionally and generate impact in their sector, with a firm commitment to the democratization of access to technical excellence.



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Students have gone through our virtual classrooms



+20 years

Experience in the training sector



5 stars

QS ranking in online education

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Group

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EDUCA LXP is more than a methodology, it is a completely educational experience personalized thanks to all the possibilities offered by artificial intelligence. Now the content adapts to you, your needs and preferences, while offering you access to updated and practical content that really makes a difference in the labor market.

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Artificial intelligence

Discover PHIA, your learning assistant that will help you every step of the way.

Teaching support

Human empathy and academic guidance from a specialized teaching team.

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Didactic approach oriented to work by competencies, which favors practical and meaningful learning.

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Meet PHIA, your personalized learning assistant

Use all the possibilities of artificial intelligence to get the most out of it match to your training

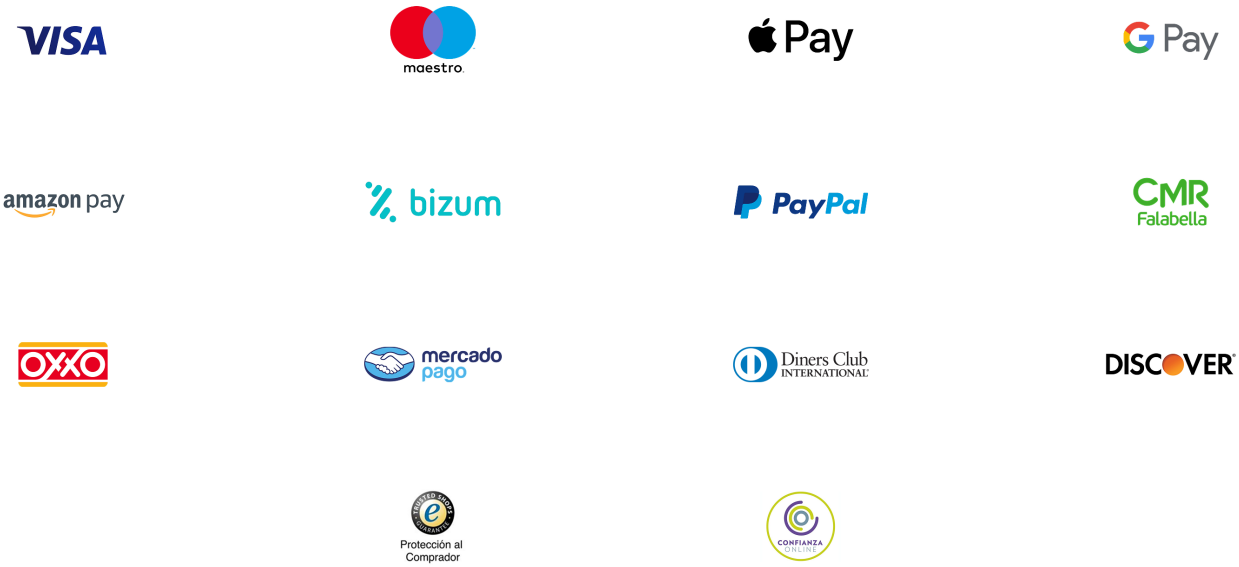
EDUCA EDTECH Group leads the digital revolution in education, promoting the continuous learning and technological transformation. The group is made up of recognized training institutions and its mission is to democratize access to education, promote the transfer of knowledge, technological development and research.

With the experience accumulated over more than 20 years, we have perfected our learning platform EDUCA LXP (Learning Experience Platform), the basis of our educational methodology, which provides students with online training practical and meaningful.



Discover all the payment facilities

We adapt to all international payment methods.



Funding and scholarships

Finance your course or master's degree and enjoy the available scholarships. Contact our expert team to know which one best suits your profile.

25%
Alumni Scholarship

15%
Scholarship recommended

20%
Functional Diversity Scholarship

20%
Unemployment scholarship

15%
GROUP Scholarship

20%
Scholarship for Professionals, Healthcare, members

15%
Entrepreneurship Scholarship

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