

Máster online 100%

Master in Project, Construction and Maintenance of Infrastructure and Facilities on Railway Lines. High Speed Specialty + 60 ECTS Credits

Structuralia

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Master in Project, Construction and Maintenance of Infrastructure and Facilities on Railway Lines. High Speed Specialty + 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 Project, Construction and Maintenance of Infrastructures and Facilities on Railway Lines. High Speed Specialization is a high-level specialization for technical and management professionals in the railway sector who seek to update and deepen high-speed railway engineering. This program delves into the technical and strategic complexity required by the management of modern railway infrastructure, from project conception to execution and conservation. You will address the design and construction of the infrastructure subsystem, exploring the comprehensive management of railway projects, intermodality, and the particularities of platforms, earthworks, tunnels, bridges and viaducts. You will delve into the superstructure subsystem, analyzing the plan layout and track elevation, the specific materials and track assembly techniques. You will understand the essential facilities for railway operation and terminal development. Additionally, this program will equip you with expert knowledge on the design and construction of the power subsystem, a critical component for the operation of lines, especially high-speed lines. You will develop a global vision

that will allow you to face the challenges of efficiency, safety and sustainability that define the future of railway transport, consolidating your profile as a specialist in advanced railway projects.

Agenda

MODULE 1. DESIGN AND CONSTRUCTION OF THE INFRASTRUCTURE SUBSYSTEM

1. DIDACTIC UNIT 1. RAILWAY PROJECTS AND INTEGRAL MANAGEMENT. INTERMODALITY

1. railway projects
2. Quality management in railway projects
3. Environmental management in railway projects
4. Health and safety management in railway projects
5. Intermodality

2. DIDACTIC UNIT 2. PLATFORM AND EARTH WORKS

1. Geological and geotechnical phases
2. Constitution of the platform
3. Protective layers of the platform. Seat layers
4. Clearings and embankments
5. factory works

3. DIDACTIC UNIT 3. TUNNELS

1. The tunnel project
2. Tunnel excavation
3. Traditional excavation methods
4. Drill and blast
5. Mechanized excavation methods. roadheaders and tunnel boring machines

4. DIDACTIC UNIT 4. BRIDGES AND VIADUCTS

1. The project of a viaduct
2. Regulations and charges
3. Typologies
4. The construction of a viaduct
5. Reception of the viaduct

MODULE 2. DESIGN AND CONSTRUCTION OF THE SUPERSTRUCTURE SUBSYSTEM

1. DIDACTIC UNIT 1. PLAN LAYOUT AND ROAD ELEVATION

1. Layout components
2. Cant
3. Transition curves
4. Tracing transition curves
5. Other transition curves

2. DIDACTIC UNIT 2. ROAD MATERIALS

1. The ballast. Introduction

2. sleepers
3. Fastening system
4. Rail and welds
5. Track devices and railway facilities

3. DIDACTIC UNIT 3. TRACK ASSEMBLY

1. First track assembly operations
2. Track assembly operations (I)
3. Track assembly operations (II)
4. Track apparatus assembly operations
5. Track assembly methods

4. DIDACTIC UNIT 4. FACILITIES FOR THE OPERATION OF THE RAILWAY. TERMINALS

1. Infrastructure work and coordination with the exploitation
2. Commissioning of new infrastructure
3. Passenger terminals
4. Freight terminals
5. civil protection

MODULE 3. DESIGN AND CONSTRUCTION OF THE ENERGY SUBSYSTEM

1. DIDACTIC UNIT 1. RAILWAY ELECTRIC TRACTION

1. Electric railway traction
2. Railway electrification systems
3. Electric traction power systems
4. Components of the railway power system by overhead contact line
5. Reference regulations and Energy ETI

2. DIDACTIC UNIT 2. THE AIRLINE OF CONTACT

1. Geometric characteristics of the Overhead Contact Line
2. Mechanical characteristics of the Overhead Contact Line
3. Electrical characteristics of the Overhead Contact Line
4. Dynamic characteristics of the Overhead Contact Line
5. Conditions in the design of the Overhead Contact Line

3. DIDACTIC UNIT 3. SUBSTATIONS

1. Concepts and types of substations
2. Design of a substation
3. Elements of a traction substation
4. Protective equipment and ground network
5. Energy remote control

4. DIDACTIC UNIT 4. HIGH SPEED ENERGY SUBSYSTEM, METRO AND TRAM

1. Design parameters of high-speed lines
2. Design parameters of metro lines
3. Design parameters of tram lines

4. Railway energy efficiency
5. Tram-train and train-tram

MODULE 4. DESIGN AND CONSTRUCTION OF SIGNALING AND TELECOMMUNICATIONS SUBSYSTEMS ON RAILWAYS

1. DIDACTIC UNIT 1. SIGNALING SYSTEMS AND COMPONENTS

1. Generalities
2. Assembly Block Diagram
3. Train position detection systems
4. Signaling systems associated with detours and light signaling systems
5. Protection of level crossings

2. DIDACTIC UNIT 2. MAIN ATP SYSTEMS

1. Generalities
2. ASFA
3. The LZB system
4. ERTMS
5. The CBTC signaling system on metropolitan railways

3. DIDACTIC UNIT 3. TELECOMMUNICATIONS SUBSYSTEM. TRANSMISSION MEDIA AND TELECOMMUNICATIONS NETWORKS

1. Metal cable transmission media
2. Fiber optic and radio link transmission media
3. transportation network
4. PDH access network
5. Voice switching network and data network

4. DIDACTIC UNIT 4. TELECOMMUNICATIONS SUBSYSTEM. NETWORK MANAGEMENT AND SUPERVISION SYSTEMS, TELECOMMUNICATIONS SERVICES AND TECHNICAL ROOMS

1. Network management and supervision systems
2. Voice and data services
3. Mobile services - train-ground system
4. Mobile services - GSM-R system
5. Telecommunications rooms in buildings

MODULE 5. MAINTENANCE OF RAILWAY INFRASTRUCTURE

1. DIDACTIC UNIT 1. MAINTENANCE, OPERATION AND EXPLOITATION MODELS AND PLANS

1. Fundamental principles of maintenance
2. Types of maintenance
3. Coordination of maintenance and operation and incident management
4. Works on track. Personnel involved, work regime and risks
5. Traffic safety management systems

2. DIDACTIC UNIT 2. EARTH WORKS MAINTENANCE

1. Slope stability and auscultation elements
2. Slope protection elements. Metal nets, geotextiles, gabions and gunite
3. Retaining walls and earth pushes. Rankine theory
4. Ground thrusts. Coulomb theory and stability of retaining walls
5. Stability of embankments. Treatments

3. DIDACTIC UNIT 3. TUNNELS

1. Infrastructure and superstructure
2. Drain maintenance
3. Tunnels
4. Unique buildings and drones
5. Diagnosis and rehabilitation systems

4. DIDACTIC UNIT 4. BRIDGES AND VIADUCTS

1. Repair and inspection procedures
2. metal bridges
3. Reinforcements in piers and abutments. Treatments against oxidation
4. concrete structures
5. Damage categorization. Main bridge inspections

MODULE 6. MAINTENANCE OF THE RAILWAY SUPERSTRUCTURE

1. DIDACTIC UNIT 1. MAINTENANCE MODELS AND PLANS. OPERATIONS AND EXPLOITATION

1. Historical evolution of maintenance
2. Track maintenance programming
3. Operations constituting the conservation of the road
4. Typology of partially mechanized track maintenance work
5. Typology of fully mechanized track maintenance work

2. DIDACTIC UNIT 2. ROAD APPARATUS

1. Introduction to the maintenance of track materials
2. Ballast, sleepers, fastening systems and rail
3. Maintenance of track devices
4. Plate track
5. Latest trends in superstructure maintenance

3. DIDACTIC UNIT 3. CONTROL AND SUPERVISION OF WELDING

1. Electrical spark butt rail welding
2. Thermal aluminum rail welding
3. Inspections of aluminothermic welds
4. Ultrasonic detection of rail and weld effects
5. Typology of fully mechanized track maintenance work

4. DIDACTIC UNIT 4. ROAD QUALITY EVALUATION

1. Concept of road quality and quality quantification
2. Geometric and dynamic track monitoring

3. Analysis of geometric auscultation results. safety and comfort
4. Analysis of geometric auscultation results. tread condition - wave wear
5. Analysis of geometric auscultation results. tread condition - vertical, lateral and total wear; "mean gauge definition"

MODULE 7. MAINTENANCE OF RAILWAY ELECTRIFICATION

1. DIDACTIC UNIT 1. MAINTENANCE OF THE AIR CONTACT LINE

1. Maintenance of the overhead contact line
2. Types of overhead contact line maintenance
3. Contact overhead line maintenance planning
4. Objectives, maintenance indicators and advanced maintenance of the overhead contact line
5. Geometric auscultation of the catenary

2. DIDACTIC UNIT 2. CONTROL OF THE SUPPORT ELEMENTS OF THE AIR CONTACT LINE

1. Massifs and support posts
2. Support Bracket Assembly
3. Compensation system
4. aerial needles
5. Sectioning

3. DIDACTIC UNIT 3. THE MAINTENANCE OF TRACTION SUBSTATIONS

1. Introduction to traction substation maintenance
2. Reviews
3. Measurement systems and equipment
4. Tensions
5. AC substations

4. DIDACTIC UNIT 4. TROUBLESHOOTING

1. Catenary protection systems
2. Grounding
3. Grounding installations
4. Most frequent breakdowns
5. Assembly and routing of cables

MODULE 8. MAINTENANCE OF RAILWAY SIGNALING AND TELECOMMUNICATIONS SYSTEMS

1. DIDACTIC UNIT 1. MAINTENANCE OF INTERLOCKS, LOCKS AND CTC

1. Introduction to railway signaling. CMS TSI
2. Interlocks. Origins of electrical interlocks
3. Electronic interlocks
4. Installations to be governed by interlocks
5. Locking systems

2. DIDACTIC UNIT 2. MAINTENANCE OF ROAD CIRCUITS AND LEVEL CROSSINGS

1. Introduction to train detection systems. SIL

2. Track circuits separated by rail insulating joints
3. Train detection using axle counters
4. Protection systems using semi-barriers
5. Maintenance and troubleshooting at level crossings

3. DIDACTIC UNIT 3. SYSTEMS MAINTENANCE (ATP - ERTMS)

1. Introduction to ATP systems. EBICAB900 system
2. The LZB system. Maintenance
3. ERTMS system. Maintenance
4. Security remote control overview
5. Remote control subsystems

4. DIDACTIC UNIT 4. MAINTENANCE OF TELECOMMUNICATIONS SYSTEMS

1. Maintenance of communications and fiber optic cables
2. Transportation networks. Maintenance of transmission networks and DWDM networks
3. Maintenance of radio communications networks. Train-ground and GSM-R
4. Maintenance of networks and data and voice services
5. Information and control systems

MODULE 9. HIGH SPEED SPECIALTY

1. DIDACTIC UNIT 1. INFRASTRUCTURES FOR HIGH SPEED

1. Earth works
2. Layout
3. High Speed Structures
4. Tunnels and complementary works
5. Developments and news in High Speed

2. DIDACTIC UNIT 2. SUPERSTRUCTURES FOR HIGH SPEED

1. Ballast tracks
2. Plate tracks
3. Track materials. ballast and rail
4. Track materials. sleepers and fastenings
5. Track devices and railway facilities

3. DIDACTIC UNIT 3. ELECTRIFICATION AND SIGNALING FOR HIGH SPEED

1. High Speed Electrification and Overhead Contact Line
2. Characteristics of the Airline Contact Line and specific equipment
3. Substations
4. High Speed Signage
5. ERTMS

4. DIDACTIC UNIT 4. MAINTENANCE AT HIGH SPEED

1. Comparison in High Speed maintenance vs. Conventional lines
2. Maintenance of High Speed infrastructure
3. Maintenance of the superstructure at High Speed
4. Maintenance of High Speed electrification
5. Maintenance of high speed signage

MODULE 10. TFM. MASTER IN DESIGN, CONSTRUCTION AND MAINTENANCE OF INFRASTRUCTURES AND FACILITIES ON RAILWAY LINES. HIGH SPEED SPECIALTY

Qualification

University Degree in Master of Lifelong Training in Project, Construction and Maintenance of Infrastructures and Installations on Railway Lines. High speed Specialty issued by the Antonio de Nebrija University with 60 ECTS University Credits. Teachings not leading to obtaining an official qualification

Objectives

- • Lead the planning and execution of railway infrastructure projects, integrating comprehensive management and intermodality. • Develop advanced solutions for platforms, earthworks, tunnels, bridges and viaducts on high-speed lines. • Optimize the selection of materials and track assembly, improving the plan and elevation layout for the railway superstructure. • Implement strategies for the design and construction of operating facilities and railway terminals, guaranteeing their functionality. • Apply technologies for the design and construction of energy subsystems, essential for the operation of the lines. • Formulate strategic decisions in the modernization and construction of new lines, considering legal conditions and financing. • Integrate a global vision of the life cycle of the railway system, from the project to its conservation, to ensure sustainability. • Lead multidisciplinary teams in the drafting and execution of railway infrastructure projects, including high speed.

What does it prepare you for?

This program prepares you to lead the transformation of the railway sector, providing you with a comprehensive strategic and technical vision. You will develop the ability to design and manage complex railway projects, from the conception of the platform and earthworks, to the construction of tunnels, bridges and viaducts. You will learn to implement advanced solutions in railway superstructure design, including track layout, material selection and assembly. You will master the integration of railway energy systems and facilities for railway operation, optimizing their performance. You will make decisions based on predictive and corrective maintenance, ensuring operability and safety. The Master in Project, Construction and Maintenance of Infrastructure and Installations on Railway Lines trains professionals in the management of multidisciplinary teams for the execution of high-speed infrastructure, achieving efficient and safe projects. You will acquire the skills to face technical and regulatory challenges with solvency.

Who is it addressed to?

Aimed at professionals in the railway transport, engineering, construction and maintenance of infrastructure sectors who are looking for high-level specialization. Those who work in the design, execution or management of railway projects and wish to update their high-speed knowledge will find the necessary depth in this program. It is ideal for those seeking to master the comprehensive management of railway projects, from the platform and ground works to the superstructure and energy subsystems. It allows us to address the challenges of efficiency and sustainability, consolidating our role as a specialist in the sector through the application of the most advanced rail transport technologies.

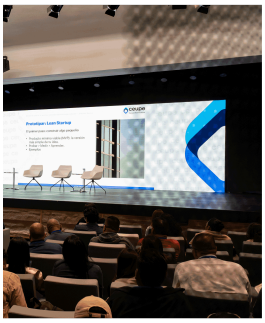
Official Character

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 design, construction and maintenance of railway infrastructure, with an emphasis on high speed, will position you to assume highly responsible roles in the engineering and construction sector. You will be able to lead teams as a Railway Infrastructure Project Director, managing the entire life cycle from conception to delivery. You will be in charge of the supervision and execution of complex works as Head of Construction of High Speed Lines, ensuring quality and regulatory compliance. You will also be able to develop as a Senior Consultant in Railway Engineering, providing your strategic vision in highly complex railway infrastructure projects for engineering, construction and operating companies. You will manage the operation and optimization of networks as a Railway Network Maintenance Manager, or you will specialize in the technical design of key subsystems. Your profile will be key to the modernization and expansion of railway networks.







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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Meet PHIA, your personalized learning assistant

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

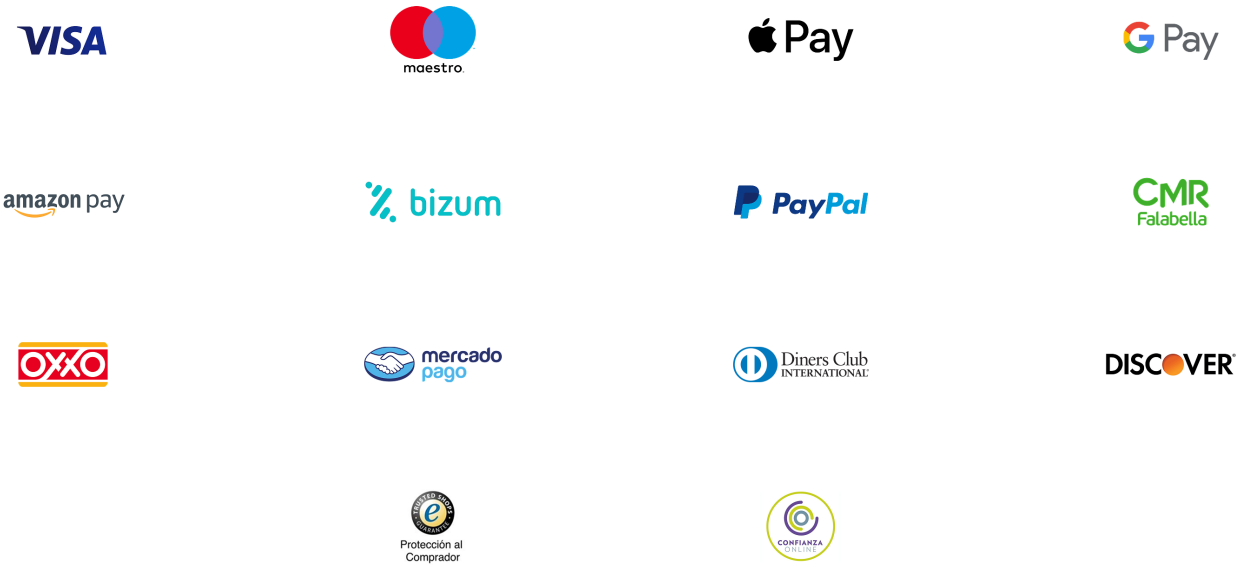
EDUCA EDTECH Group leads the digital revolution in education, promoting the continuous learning and technological transformation. The group is made up of recognized training institutions and its mission is to democratize access to education, promote the transfer of knowledge, technological development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



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20%
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