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INTERNATIONAL ONLINE EDUCATION



Structuralia
Engineering eLearning



UCAM
UNIVERSIDAD
CATOLICA DE MURCIA

Master's Degree in Railway Infrastructure Design, Construction and Maintenance. Specialty in High-speed Railway Infrastructures + 60 ECTS Credits





Elige aprender en la escuela
líder en formación online

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SOMOS STRUCTURALIA

Structuralia es una **institución educativa online de posgrados de alta especialización** en ingeniería, infraestructuras, construcción, energía, edificación, transformación digital y nuevas tecnologías. Desde nuestra fundación en 2001, estamos comprometidos con la formación de calidad para el desarrollo profesional de **ingenieros, arquitectos y profesionales del sector STEM**.

Ofrecemos una plataforma donde poder adquirir nuevas habilidades y actualizarse sin límites de tiempo o espacio. Gracias a nuestra metodología proporcionamos a nuestros estudiantes una **experiencia educativa comprometida** interactiva y de apoyo para que puedan enfrentarse a los desafíos del futuro en sus respectivos campos de trabajo.

Más de
20
años de
experiencia

Más de
200k
estudiantes
formados

Más de
90
nacionalidades entre
nuestro alumnado

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Especialízate para
avanzar en tu **carrera profesional**

ALIANZAS STRUCTURALIA Y UNIVERSIDAD UCAM

Structuralia y la Universidad Católica de Murcia cierran una colaboración de forma exitosa. De esta forma, Structuralia y la Universidad Católica de Murcia apuestan por un aprendizaje colaborativo, innovador y diferente, al alcance de todos y adaptado al alumnado.

Además, ambas instituciones educativas apuestan por una educación práctica, que promueva el crecimiento personal y profesional del alumno/a. Todo con el fin de interiorizar nuevos conocimientos de forma dinámica y didáctica, favoreciendo su retención y adquiriendo las capacidades para adaptarse a una sociedad global en permanente cambio.

La democratización de la educación es uno de los objetivos de Structuralia y la Universidad Católica de Murcia, ya que ambas instituciones apuestan por llevar la educación a los rincones más remotos del mundo, aprovechando las innovaciones a nivel tecnológico. Además, gracias al equipo de docentes especializados, se ofrece un acompañamiento tutorizado a lo largo de la formación.



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RANKINGS DE STRUCTURALIA

Structuralia ha conseguido el reconocimiento de diferentes rankings a nivel nacional e internacional, gracias por su apuesta de **democratizar la educación** y apostar por la innovación educativa para **lograr la excelencia**.

Para la elaboración de estos rankings, se emplean **indicadores** como la reputación online y offline, la calidad de la institución, la responsabilidad social, la innovación educativa o el perfil de los profesionales.



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BY EDUCA EDTECH

Structuralia es una marca avalada por **EDUCA EDTECH Group**, que está compuesto por un conjunto de experimentadas y reconocidas **instituciones educativas de formación online**. Todas las entidades que lo forman comparten la misión de **democratizar el acceso a la educación** y apuestan por la transferencia de conocimiento, por el desarrollo tecnológico y por la investigación.



ONLINE EDUCATION



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METODOLOGÍA LXP

La metodología **EDUCA LXP** permite una experiencia mejorada de aprendizaje integrando la AI en los procesos de e-learning, a través de modelos predictivos altamente personalizados, derivados del estudio de necesidades detectadas en la interacción del alumnado con sus entornos virtuales.

EDUCA LXP es fruto de la **Transferencia de Resultados de Investigación** de varios proyectos multidisciplinares de I+D+i, con participación de distintas Universidades Internacionales que apuestan por la transferencia de conocimientos, desarrollo tecnológico e investigación.



1. Flexibilidad

Aprendizaje 100% online y flexible, que permite al alumnado estudiar donde, cuando y como quiera.



2. Accesibilidad

Cercanía y comprensión. Democratizando el acceso a la educación trabajando para que todas las personas tengan la oportunidad de seguir formándose.



3. Personalización

Itinerarios formativos individualizados y adaptados a las necesidades de cada estudiante.



4. Acompañamiento / Seguimiento docente

Orientación académica por parte de un equipo docente especialista en su área de conocimiento, que aboga por la calidad educativa adaptando los procesos a las necesidades del mercado laboral.



5. Innovación

Desarrollos tecnológicos en permanente evolución impulsados por la AI mediante Learning Experience Platform.



6. Excelencia educativa

Enfoque didáctico orientado al trabajo por competencias, que favorece un aprendizaje práctico y significativo, garantizando el desarrollo profesional.



Programas

**PROPIOS
UNIVERSITARIOS**

RAZONES POR LAS QUE ELEGIR STRUCTURALIA

1. Nuestra Experiencia

- ✓ Más de **20 años de experiencia**.
- ✓ Más de **200.000 alumnos** ya se han formado en nuestras aulas virtuales.
- ✓ Más de **90 nacionalidades** entre nuestro alumnado.

2. Nuestro Equipo

En la actualidad, Structuralia cuenta con un equipo humano formado por más **550 profesionales que trabajan en el sector STEM (Science, Technology, Engineering and Mathematics)**. Nuestro personal se encuentra sólidamente enmarcado en una estructura que facilita la mayor calidad en la atención al alumnado.

3. Nuestra Metodología



100% ONLINE

Estudia cuando y desde donde quieras. Accede al campus virtual desde cualquier dispositivo.



APRENDIZAJE

Pretendemos que los nuevos conocimientos se incorporen de forma sustantiva en la estructura cognitiva



EQUIPO DOCENTE

Structuralia cuenta con un equipo de profesionales que harán de tu estudio una experiencia de alta calidad educativa.



NO ESTARÁS SOLO

Acompañamiento por parte del equipo de tutorización durante toda tu experiencia como estudiante



4. Calidad AENOR

- ✓ Somos Agencia de Colaboración N°99000000169 autorizada por el Ministerio de Empleo y Seguridad Social de España.
- ✓ Se llevan a cabo auditorías externas anuales que garantizan la máxima calidad AENOR.
- ✓ Nuestros procesos de enseñanza están certificados por **AENOR** por la ISO 9001.



Master's Degree in Railway Infrastructure Design, Construction and Maintenance. Specialty in High-speed Railway Infrastructures + 60 ECTS Credits



DURACIÓN
1500 horas



**MODALIDAD
ONLINE**



**ACOMPANIAMIENTO
PERSONALIZADO**



CREDITOS
60 ECTS

Titulación

Master's Degree in Continuing Education in Railway Infrastructure Design, Construction and Maintenance. Specialty in High-speed Railway Infrastructures with 60 ECTS Credits awarded by the Catholic University of Murcia in collaboration with Structuralia

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Descripción

This program is a compendium of the railway system as a whole. As a matter of fact, it provides knowledge about the entire life cycle of the railway system, from its initial project phases, through its construction process to its subsequent maintenance. It also clearly reflects the technological evolution in the railway field, the existing regulations, and the modern means of railway maintenance. Due to its comprehensive nature, this program goes into the different railway subsystems such as infrastructure, superstructure, power, signalling and telecommunications from both construction and maintenance perspectives, where each technique has its own material resources, construction procedures and specific maintenance. Furthermore, the master's degree offers the opportunity to focus and specialize in two particularly attractive fields with a high degree of growth, such as high-speed and urban railway systems.

Objetivos

The general objective of this program is to build the student's capacities in different technical and management-related disciplines that are necessary for the design, construction and maintenance of railway systems and structures. The specific targets associated with this program are: - Learn the aspects related to the management of railway line construction, as well as those related to the modernization of existing lines in terms of legal constraints, financing of infrastructures, environmental management, supplier relationship, etc. - Learn the main specific parameters necessary to design and draft railway infrastructure projects, whether for conventional, high-speed, metro or tram lines. - Address technical aspects related to civil works involved in the construction of railway infrastructures such as viaducts, tunnels, earthworks, leveling, etc. - Learn the current specifications necessary for the design and construction of railway systems in relation to track superstructures, electrification, substations, signalling, communications, etc. - Have extensive knowledge of

crosscutting aspects of railway maintenance management, such as quality, environment, safety, railway maintenance models developed by different European countries. - Study the different infrastructure and superstructure track maintenance techniques, weld inspection and maintenance, expansion device regulations, etc. - Learn maintenance techniques applied to electrification installations such as the catenary, substations, grounding installations, etc. - Analyze and apply knowledge of railway signalling system maintenance: CTCs, interlocks, blockades, automated level crossings, etc. - Learn maintenance techniques applied to railway network telecommunications and information systems. - In relation to each of the specialties (High-Speed or Urban Railways), their objectives is for the student to learn the specific particularities in the Design, Construction and Maintenance of railway infrastructures in these two fields"

Para qué te prepara

This program is intended for technicians from different specialties who are interested in building their capacities in the design, construction, and maintenance of railway lines, civil engineers (Roads, canals and ports), civil work technical engineers, industrial engineers, technical industrial engineers, telecommunications engineers, etc. More specifically, this program is intended for: - Professionals with current or past experience in any of the different areas within the railway sector, who wish to acquire base knowledge and skills in order to join railway companies - Professionals with current or past experience in any of the different areas within the railway sector, who wish to acquire multi-disciplinary knowledge and skills above their current level or specialty.

A quién va dirigido

This program is aligned with the current trends in the railway sector, thus providing a 360° view of the sector and the complete life cycle of each railway subsystem. From the initial tasks to the techniques and means available to tackle railway construction projects, and the most innovative maintenance methodologies, this program intends to lead the student to a global and continuous understanding of the railway sector as a whole from different perspectives related to structural subsystems: infrastructure, superstructure, power, telecommunications and signalling.

Salidas laborales

Once the student completes this master's degree, he/she will be able to apply for different positions within the railway field. There is a wide variety of professional opportunities related to railway design and construction, and infrastructure maintenance. In addition, other opportunities include project designer/author, railway specialist, railway technician, production manager, construction manager, technical assistance manager or construction manager, track technologist, railway consultant, maintenance base technician, maintenance manager, railway system auditor, etc. Bear in mind that these opportunities will also be based on previous qualifications and years of experience in the sector which, along with the different skills and knowledge of railway infrastructure, superstructure, power, telecommunications and signalling design, construction and maintenance acquired throughout this

program, will be multiplied.

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TEMARIO

MODULE 1: DESIGN AND CONSTRUCTION OF INFRASTRUCTURE SUBSYSTEMS

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

UNIT 2. PLATFORM AND EARTHWORKS

1. Geological and geotechnical phases
2. Constitution of the platform
3. Platform protective layers. Settlement layers
4. Cuts and embankments
5. Engineering structures

UNIT 3. TUNNELS

1. The project of a tunnel
2. Excavation of a tunnel
3. Traditional excavation methods
4. Drilling and blasting
5. Mechanized excavation methods: headers and tbms

UNIT 4. BRIDGES AND VIADUCTS

1. Viaduct project
2. Regulations and loads
3. Typologies
4. Viaduct construction
5. Viaduct reception

MODULE 2: DESIGN AND CONSTRUCTION OF SUPERSTRUCTURE SUBSYSTEMS

UNIT 1. GROUND LAYOUT AND TRACK ELEVATION

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

UNIT 2. TRACK MATERIALS

1. Ballast. Introduction
2. Sleepers
3. Fastening System
4. Rail and welding
5. Switches and crossings and railway installations

UNIT 3. TRACK ASSEMBLY

1. Initial track assembly operations
2. Track assembly operations (I)
3. Track assembly operations (II)
4. Track devices assembly operations
5. Track assembly methods

UNIT 4. RAILWAY OPERATION FACILITIES. TERMINALS

1. Infrastructure and coordination works with rail operations
2. Commissioning of new infrastructures
3. Passenger terminals
4. Freight terminals
5. Civil protection

MODULE 3: DESIGN AND CONSTRUCTION OF POWER SUBSYSTEMS

UNIT 1. RAILWAY ELECTRIC TRACTION

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

UNIT 2. OVERHEAD CONTACT LINE

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. Constraints in the design of overhead contact line

UNIT 3. SUBSTATIONS

1. Concepts and types of substations
2. Design of a substation
3. Elements of a traction substation
4. Protective equipment in direct current outputs
5. Energy remote monitoring

UNIT 4. ENERGY SUBSYSTEM IN HIGH-SPEED, METRO AND TRAM

1. Design parameters of high-speed lines
2. Design parameters of metro lines
3. Design parameters of tram lines
4. Energy efficiency of the railway
5. Tram-train and tram

MODULE 4: DESIGN AND CONSTRUCTION OF SIGNALLING AND TELECOMMUNICATIONS SUBSYSTEMS

UNIT 1. SIGNALING SYSTEMS AND COMPONENTS

1. General considerations
2. Block assembly diagram
3. Train position detection systems
4. Signaling systems associated with turnouts and light signaling systems
5. Level crossing protection

UNIT 2. MAIN ATP SYSTEMS

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

UNIT 3. TELECOMMUNICATIONS SUBSYSTEM. TRANSMISSION MEDIA AND TELECOMMUNICATION NETWORKS

1. Means of transmission by metallic cables
2. Means of transmission by fiber optics and radio links
3. Transport network
4. PDH access network
5. Voice switched network and data network

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

1. Management network and supervision systems
2. Voice and data services
3. Mobile services (I). Train-ground system
4. Mobile services (II). GSM-R system
5. Telecommunications rooms in buildings

MODULE 5: RAILWAY INFRASTRUCTURE MAINTENANCE

UNIT 1. MAINTENANCE MODELS AND PLANS, OPERATION AND EXPLOITATION

1. Fundamental principles of maintenance
2. Types of maintenance
3. Coordination of maintenance and exploitation and incident management
4. Works on the track. Personnel involved, work regimen and risks

5. Traffic safety management systems

UNIT 2. MAINTENANCE OF EARTHWORKS

1. Stability of slopes and evaluation elements
2. Slope protection elements: metal nets, geotextiles, gabions and shotcrete
3. Retaining walls and earth pressure. Rankine theory
4. Earth pressure: coulomb theory and stability of retaining walls
5. Stability of embankments. Treatments

UNIT 3. TUNNELS

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

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. Categorization of damage. Main inspections on bridges

MODULE 6: RAILWAY SUPERSTRUCTURE MAINTENANCE

UNIT 1. MAINTENANCE MODELS AND PLANS OPERATION AND EXPLOITATION

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

UNIT 2. TRACK COMPONENTS

1. Introduction to the maintenance of track components
2. The ballast, the sleepers, the fastening systems and the rail
3. Maintenance of track components (switches and crossings)
4. Slab track
5. Latest trends in superstructure maintenance

UNIT 3. WELDING CONTROL AND SUPERVISION

1. Flash-butt electric welding for rails
2. Aluminothermic rail welding
3. Inspections of aluminothermic weldings
4. Ultrasonic detection of rails and welding effects

5. Type of fully mechanized track maintenance work

UNIT 4. TRACK QUALITY EVALUATION

1. Concept of track quality and quality quantification
2. Geometric and dynamic track auscultation
3. Analysis of geometric auscultation results: safety and comfort
4. Analysis of geometric auscultation results: rolling surface condition - wave wear
5. Analysis of the geometric auscultation results: rolling surface condition - vertical, lateral and total wear; average track gauge definition

MODULE 7: RAILWAY ELECTRIFICATION MAINTENANCE

UNIT 1. MAINTENANCE OF THE OVERHEAD CONTACT LINE

1. Maintenance of the overhead contact line
2. Types of overhead contact line maintenance
3. Overhead contact line maintenance planning
4. Objectives, maintenance indicators and advanced maintenance of the overhead contact line
5. Geometrical and dynamic catenary monitoring

UNIT 2. CONTROL OF OVERHEAD CONTACT LINE SUPPORT ELEMENTS

1. Support blocks and posts
2. Support corbel assembly
3. Compensation system
4. Overhead switches
5. Overlapping

UNIT 3. TRACTION SUBSTATION MAINTENANCE

1. Introduction to traction substation maintenance
2. Checks
3. Measurement systems and equipment
4. Voltages
5. Alternating current substations

UNIT 4. TROUBLESHOOTING

1. Catenary protection systems
2. Grounding
3. Installation of a grounding system
4. Most frequent malfunctions
5. Assembly and laying of cables

MODULE 8: MAINTENANCE OF RAILWAY SIGNALLING AND TELECOMMUNICATIONS SYSTEMS

UNIT 1. MAINTENANCE OF INTERLOCKINGS, BLOCKS AND CTCS

1. Introduction to railway signalling. TSI on CCS

2. Lockout devices. Origins of Electrical Interlocks
3. Electronic interlockings
4. Installations to be controlled by the interlockings
5. Signalling Block Systems

UNIT 2. MAINTENANCE OF TRACK CIRCUITS AND LEVEL CROSSINGS

1. Introduction to train detection systems. SIL
2. Track circuits separated by insulating rail joints
3. Train detection by axle counters
4. Half-barrier protection systems
5. Maintenance and troubleshooting in level crossings

UNIT 3. MAINTENANCE OF SYSTEMS (ATP - ERTMS)

1. Introduction to ATP systems. EBICAB900 system
2. The LZB system. Maintenance
3. ERTMS system. Maintenance
4. General description of the safety remote control
5. Remote control subsystems

UNIT 4. MAINTENANCE OF COMMUNICATIONS SYSTEMS

1. Communications and fiber optical cable maintenance
2. Transportation Networks. Maintenance of Transmission Networks and DWDM networks
3. Maintenance of radio communications networks. Tren-Tierra and GSM-r
4. Maintenance of networks and data and voice services
5. Information and control systems

MODULE 9: HIGH-SPEED RAILWAYS

MODULE 10: MFP. MASTER'S DEGREE IN RAILWAY INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE. SPECIALTY IN HIGH-SPEED RAILWAY INFRASTRUCTURES

¿Te ha parecido interesante esta información?

Si aún tienes dudas, nuestro equipo de asesoramiento académico estará encantado de resolverlas.

Pregúntanos sobre nuestro método de formación, nuestros profesores, las becas o incluso simplemente conócenos.

Solicita información sin compromiso

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!Encuétranos aquí!

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