

Doctoral Program in Transportation Infrastructures and Territory

Research Lines

- **Port and Coastal Engineering. Breakwaters and waves:**
 - Research line corresponding to infrastructures for maritime transportation, ports and coasts. Port design, wind waves, quays, vertical and mound breakwaters as well as effects on the environment (beaches, littorals processes and navigation). Research focused on designs orientated to products protected by industrial property rights (e.g. Cubipod®, anti-reflective caissons, etc.). Small scale physical experiments and optimization of coastal structures and modeling using intelligent systems (Neural networks, Genetic algorithms, etc.).
- **Land and sustainability:**
 - Research line on: public space and mobility; territorial aptitude for sustainable urban development; unsustainable urban and territorial development processes, urban sprawl; country-city interface and peri-urban areas; regeneration of degraded urban areas; territorial management; real state valuation.
- **Heuristic optimization models for infrastructure asset management:**
 - Research line on automated design and optimal infrastructure maintenance management. It includes research on infrastructure optimization such as bridges, walls, underpasses, etc. It also includes the economic optimization of treatments in the maintenance of road infrastructures with restricted budget scenarios.
- **Life cycle assessment for infrastructure sustainability:**
 - This research line focuses on the multi-criteria evaluation of the economic, social and environmental sustainability aspects of infrastructures throughout their entire life cycle. This line tries to incorporate metrics in decision making that optimize design, construction, maintenance and demolition or replacement criteria of infrastructures such as bridges, roads, etc.
- **Development and implementation of innovative methodologies in construction management:**
 - Research line focused on the application and assessment of new methodologies in construction management. It aims to systematize and analyze barriers using techniques such as Lean Construction, Last Planner, BIM, Just in Time, risk management, innovation systems, etc. in the management of construction companies as well as construction projects. It is also focused on facets such as emotional intelligence, leadership, internationalization, etc.
- **Transport planning and operation:**

- Activity-travel behavior analysis and modelling. Impact analysis of soft transport policies on travel behavior. Discrete choice models applied to transport. Design, implementation, and evaluation of Travel Behavior Change Programs to reduce car use in urban areas.
- **Highway engineering: design, construction, maintenance, and operation:**
 - Research line on the operational effects of highway geometric design on traffic operation, road safety, fuel consumptions and emissions. Another line is related to vulnerable road users, such as pedestrians, cyclists and motorcyclists, and urban traffic calming. Moreover, asphalt mixtures using waste materials, as ceramic tiles, and with advanced properties, as conductivity, are studied.
- **Railways engineering:**
 - There are four main lines of research: Structural and vibratory behaviour of railway tracks (including rail-vehicle interactions and new materials). Maintenance of railway superstructure (including track and vehicle monitoring and subsequent data processing and analysis). Energy efficiency (including optimization of the railway system in terms of energy consumption, track design, construction, and operation). Optimization of operation (including layout analysis and passenger comfort improvement).
- **Geology and Geotechnics of Transport and Territory Infrastructures:**
 - Research line focused on the Geological and Geotechnical Engineering applied to transport infrastructures, as well as to territory and its planning. This line tries to incorporate all those aspects of Geology and Geotechnics that allow to optimize decisions in the performance on territory as well as giving support to the transport infrastructures: Development of equipment for field and laboratory geotechnical tests; Foundations Engineering; Application of Rocks and Stone Granular Materials in Civil Engineering; Geosynthetics; Rock Mechanics; Environmental Geotechnics; Soil Improvement; Geological and geotechnical cartography; Physical and Numerical Modelling of Geotechnical Problems; Geotechnical Properties of Compacted and Natural Soils.