

Master of Science in Mechanical Engineering

Railway Engineering

FA3



Contacts



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Track description

Railway transportation is experiencing a true renaissance in recent years: it is widely acknowledged as the greenest means of transportation and it provides the backbone for moving passengers and freights reducing traffic congestion in large urban areas and intercity routes.

The Railway Engineering track provides the student with a systemic approach to railways encompassing subjects traditionally related to mechanical engineering such as vehicle design, vehicle dynamics, lightweight materials, automation and control systems, together with topics from other areas of engineering such as electrical systems, railway tracks, signalling and communication, transportation planning, asset management. The track also looks at future/disruptive changes in railway transportation such as MAGLEV and Hyperloop.

Graduates from this track will be fully prepared to start their careers in a dynamic and rapidly evolving environment, becoming the designers and/or managers of the future generation of railway transportation systems.





Skills

Students will learn how to:

- master the principles of railway vehicle design and operation
- understand the interactions between all parts of a railway system (rolling stock, infrastructure, maintenance)
- identify needs for innovation in complex mechanical systems such as railway vehicles
- work in a team addressing multidisciplinary problems

FA3: Core Courses

Course Title	YEAR	SEM	ECTS	ECTS GROUP
Energy Conversion Technologies	1	1	5	5
Data Analysis for Future Transportation Systems	1	1	5	5
Control of Mechanical Systems	1	1	5	5
Advanced Dynamics of Mechanical Systems	1	1	10	10
Advanced Machine Design	1	2	10	10
Advanced Manufacturing Processes B	1	1	5	5

FA3: Track Specific Courses

Course Title	YEAR	SEM	ECTS	ECTS GROUP
Railway Vehicle Dynamics and Train-Track Interaction	1	2	10	10
Electrical Systems for Railway Transportation	1	2	10	10
Railway Vehicle Design	2	1	10	10
Elective courses (Traffic Engineering and Control, Structural Issues in Railways, Computational Fluid Dynamics - Fundamentals, Advanced Techniques For Vibro Acoustic Measurements, Human Response to Noise and Vibration, Aerodynamics of Transport Vehicles, Signalling and Control in Railway Systems, Vehicle Acoustics, Lightweight Design of Mechanical Structures - Fundamentals, Non-Distructive Testing and Evaluation for Materials and Components, Industrial Asset Management, Smart Maintenance Management, Electrical Drives For Industry And Transport Applications, Communication Technologies for Industrial and Vehicle Engineering, ...)	2	1-2	5	20
Lab course (Railway Engineering, ...)	2	2	5	5

FA3: Master's Thesis

Semi-active and full-active control of hunting vibration in a high-speed railway vehicle

Battery Electric Multiple Unit (BEMU) and Hybrid propulsion system with Zinc-Air fuel cells (ZAFC) and their application on Italian railway network

Measurement of FCG on full-scale axles subjected to corrosion-fatigue and its effect on axle durability

Curve squeal noise in tramways: numerical modelling and experimental testing

