



PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

**PNRR 117 Research Field: ADVANCED MODELS FOR INTEGRATED AND OPTIMIZED
RAILWAYS SERVICES DESIGN USING MULTIPLE SOURCE DATA**

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
<p>Motivation and objectives of the research in this field</p>	<p>A relevant proportion of the resources of the Italian plan for recovery and resilience (PNRR) is allocated to modernization and strengthening of the railway network (PNRR Mission 3). In fact, the Plan envisages the completion of the main high-speed and high-capacity railway corridors, the integration between the high-speed rail services and the regional ones, and the integration with other modes of transport (inter-modality). In order to enhance transport passengers by rail and upgrade the level of inter-modality, railway services should be properly designed based on travellers' needs and perception of service quality along the entire journey.</p> <p>Nowadays, a mobility study about travel services and mode choices ought to take into account the complexity and the heterogeneity of people daily travel patterns at all scales (urban, regional and long-distance travels) deriving from new lifestyles. To this aim the research programme aims to develop advanced behavioural models for the design of integrated railway services including individual attitudes and latent behavioural factors. The ultimate goal is to assess transport policies towards more sustainable mobility, that would be critically be analyse and assessed with respect to the emerging innovations and mobility needs, contextualizing them in the Italian context.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The research will be conducted in collaboration with the Industrial Planning Department of TRENITALIA.</p>



	<p>Industrial Planning Department of TRENITALIA.</p> <p>To carry out this research the following methods and techniques will be developed:</p> <ul style="list-style-type: none"> - methods for OD estimation and prediction based on hybrid data sources; - advanced discrete choice mode/services models, to simulate travellers' behaviour, attitudes and perceptions about innovative technologies and new modes of transport; - schedule-based transit assignment models to simulate the impact of railways policies at national scale related to timetable modification and services integration; - New generation algorithms for Timetable optimization.
<p>Educational objectives</p>	<p>The project will provide candidate with:</p> <ul style="list-style-type: none"> - knowledge of the transportation sector, particularly the impact assessment of new mobility services; - methodological competences at both the theoretical and applied level; - problem setting and solving capabilities; - capabilities to interact with people of diverse background.
<p>Job opportunities</p>	<p>Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field. The research will be partly developed in a research project that Politecnico di Milano is developing with the Italian National Railways and Trenitalia.</p> <p>Besides, part of the research related to inter-modality will be developed in the framework of the Sustainable Mobility Center (Centro Nazionale per la Mobilità Sostenibile - MOST), Spoke 9 (Urban Mobility).</p>
<p>Composition of the research group</p>	<p>2 Full Professors 1 Associated Professors 2 Assistant Professors 4 PhD Students</p>
<p>Name of the research directors</p>	<p>Prof. Pierluigi Coppola</p>



Contacts

Research Supervisor:

Prof. Pierluigi Coppola (<https://www.mecc.polimi.it/ricerca/personale-docente/personale-docente/prof-pierluigi-coppola>)

E-mail: pierluigi.coppola@polimi.it *Phone:* +39 02 2399 8376

The Supervisor from Polimi will be supported by a tutor that will be designated by TRENITALIA S.p.A.

The research activities will be carried out at the Department of Mechanical Engineering of the Politecnico di Milano (Head of Department: prof. Marco Belloli)

For questions about scholarship/support please contact phd-dmec@polimi.it.

Additional support - Financial aid per PhD student per year (gross amount)

Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad

Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation

Company where the candidate will attend the stage (name and brief description)	TRENITALIA S.p.A.
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Universidad de Cantabria
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707, 13.

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed



by the regulations.