



National  
Technical  
University  
of Athens

# Department of Transportation Planning and Engineering

February 2024

# Presentation Outline



1. The NTUA Department of Transportation Planning and Engineering (7)
2. Transportation Engineering (4)
3. Education (8)
4. Research (2)
5. Cooperations and Partners(6)
6. Laboratories (17)

The NTUA  
Department of  
Transportation  
Planning and  
Engineering



# The NTUA Department of Transportation Planning and Engineering

- The Department of Transportation Planning and Engineering ([www.transport.ntua.gr](http://www.transport.ntua.gr)), established in 1982, is a **Center of Research and Innovation Excellence in Transportation**, with global recognition [ranked 4<sup>th</sup> in Europe, 26<sup>th</sup> worldwide ([EduRank](#) 2023), 41<sup>st</sup> in Europe, 168<sup>th</sup> worldwide ([ShanghaiRanking](#) 2023)]
- within the **School of Civil Engineering** (one of the five Departments) [ranked: 2<sup>nd</sup> in Europe and 5<sup>th</sup> worldwide ([ShanghaiRanking](#) 2023), ranked: 11<sup>th</sup> in Europe and 31<sup>st</sup> worldwide ([EduRank](#) 2023), 21<sup>st</sup> in Europe and 69<sup>th</sup> worldwide ([QS](#) 2023)]
- of the **National Technical University of Athens** (the oldest of the eight engineering Schools) [the oldest (since 1837) and most prestigious Greek Technical University] [ranked: 195<sup>th</sup> (7%) in Europe and 494<sup>th</sup> (4%) worldwide ([EduRank](#) 2023), 422<sup>nd</sup> (30%) worldwide ([QS](#) 2023)]



NTUA

- [EduRank 2023](#): Ranked 195<sup>th</sup> (7%) in Europe and 494<sup>th</sup> (4%) Globally
- [QS 2023](#): Ranked 422<sup>nd</sup> (30%) Globally
- [Research.com](#): Ranked 44<sup>th</sup> Globally



Civil Engineering

- [EduRank 2023](#): Ranked 11<sup>th</sup> in Europe and 31<sup>st</sup> Globally
- [Shanghai 2023](#): Ranked 2<sup>nd</sup> in Europe and 5<sup>th</sup> Globally
- [QS 2023](#): Ranked 21<sup>st</sup> in Europe and 69<sup>th</sup> Globally



Transportation

- [EduRank 2023](#): Ranked 4<sup>th</sup> in Europe and 26<sup>th</sup> Globally
- [Shanghai 2023](#): Ranked 41<sup>st</sup> in Europe and 168<sup>th</sup> Globally



Road Safety

- [PubMed 2023](#): Ranked 4<sup>th</sup> in Europe and 45<sup>th</sup> Globally
- [AAP 2019](#): Ranked 2<sup>nd</sup> in Europe and 6<sup>th</sup> Globally



Prof. George Yannis

- [PubMed 2023](#): Ranked 2<sup>nd</sup> in Europe and 9<sup>th</sup> Globally
- [AAP 2019](#): Ranked 2<sup>nd</sup> in Europe and 3<sup>rd</sup> Globally



# Mission

The **Mission** of the NTUA Department of Transportation Planning and Engineering is:

- to **educate scientists** engineers,
- to **promote science** and
- to **support development**

in the field of transportation planning and engineering

**High scientific standards and performance** are key objectives in all education and research activities of the Department



# Vision

The Vision of the NTUA Department of Transportation Planning and Engineering is a future with highly **efficient, green and safe** transport systems in Greece, in Europe and globally,

through high level **scientific research** and technological development supporting evidence based decision making in all aspects of all transport modes and types



# Department People

A dynamic team of more than 80 renowned scientists

- Faculty **5**
- Emeritus Professors **6**
- Special Lab & Teaching Staff Member **2**
- Post Doctoral Researchers **16**
- PhD Candidates **33**
- Technical and Administrative Staff **6**
- Research Assistants **14**



# Department Faculty



George Yannis  
Professor, Director



Eleni Vlahogianni  
Professor



Christina Plati  
Professor



Stergios Mavromatis  
Assistant Professor



Konstantinos Gkiotsalitis  
Assistant Professor





# Alumni Careers

Postgraduate/PhD students and PostDoc researchers of the Department demonstrate **excellent careers in Greece and globally:**

- Academia (TUMunich, TU Delft, ENPC Paris, EPFL, ULoughborough, UCyprus, UPatras, etc.)
- Ministries (Transport, Development, Economy)
- Transport Authorities (Motorways, Metro, Public Transport, Airports, Ports, Railways)
- Regional and City Authorities (Athens, other cities)
- Engineering Firms and Consultancies
- Industry (road, rail, air, sea, intermodal)
- International Organisations



# Supporting Development

The scientists of the Department have served **Greek Government** at all levels (Ministers, Secretary Generals, Chairmen, BoD Members, Minister Advisors, etc.) at:

- Ministry of Infrastructure and Transport
- Ministry of Development and Investments
- Ministry of Finance
- City of Athens
- Hellenic Railways
- Athens Transport Authority
- Athens Metro
- Athens Airport
- Athens Master Plan Authority



**ATHENS**  
INTERNATIONAL AIRPORT  
ELEFTHERIOS VENIZELOS



ΟΡΓΑΝΙΣΜΟΣ  
ΡΥΘΜΙΣΤΙΚΟΥ  
ΣΧΕΔΙΟΥ &  
ΠΡΟΣΤΑΣΙΑΣ  
ΠΕΡΙΒΑΛΛΟΝΤΟΣ  
ΑΘΗΝΑΣ



# Transportation Engineering



# Transport Infrastructure in Greece

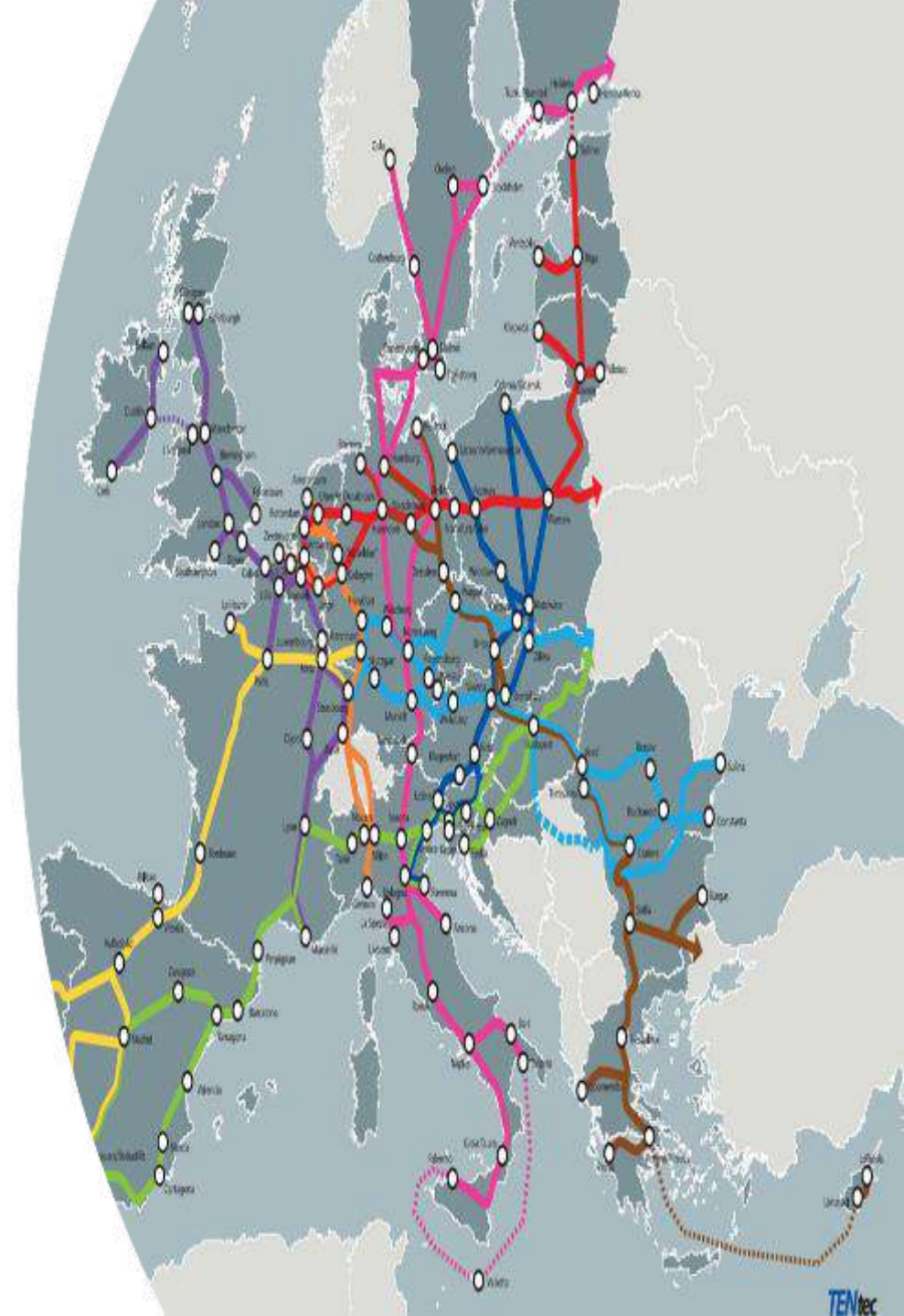
- 42.000 km Interurban Road Network
- 2.500 km Railway Network
- 40 Major Airports
- 60 Major Ports
- >100.000 km Urban Road Network



# Transport Infrastructure in Europe

The Trans-European Transport Network (TEN-T) comprises:

- > 7.200.000 km Main Road Network
- > 330.000 km Main Railway Network
- > 850 Major Airports
- > 3.000 Major Ports



# Transportation Engineering Scope (1/2)

## Transport Modes

- Road transport
- Rail transport
- Water transport
- Air transport
- Combined transport

## Transport Types

- Transport of people and goods
- Urban and interurban transport
- National and international transport
- Terminals



# Transportation Engineering Scope (2/2)

## Transportation projects in all phases

- Planning
- Design (Conceptual, Preliminary, Final General and Detailed)
- Tendering
- Construction
- Delivery for operation
- Operation
- Management
- Maintenance



# Education

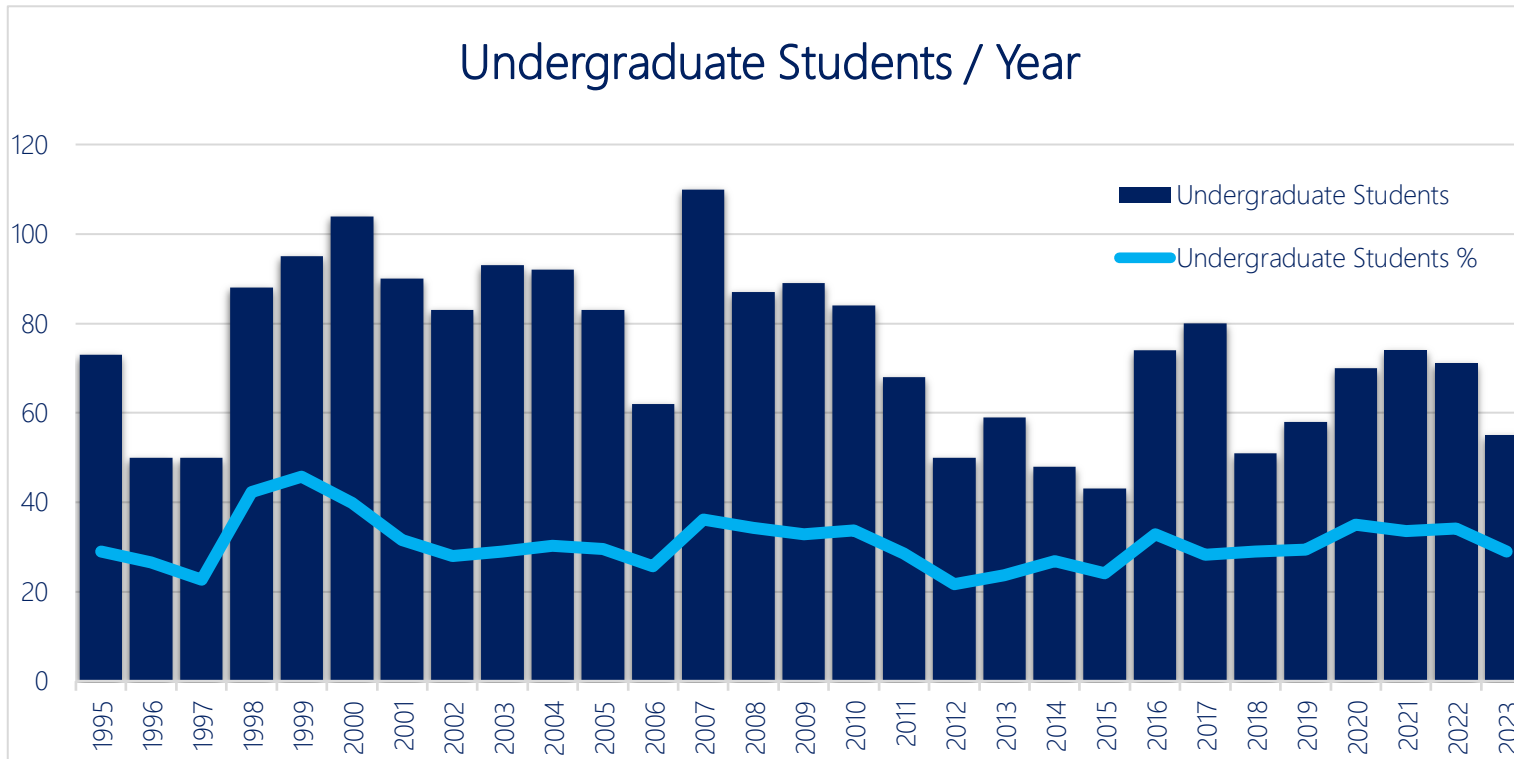




# Undergraduate Students

## Civil Engineering - Transportation Cycle

Undergraduate Students / Year



Every year, we train more than 1/3 of the total number of students of the School.



# Courses

The Department offers:

- **22 undergraduate courses** at the School of Civil Engineering (compulsory and elective for all civil engineering students and all students of the transportation cycle)
- **3 undergraduate courses** at NTUA Engineering Schools
- **5 postgraduate courses** at NTUA Engineering Schools



# Courses - Transportation Cycle

- Traffic Flow
- Design of Road and Airfield Pavements
- Urban Road Networks
- Railway Engineering
- Advanced topics on Roads Geometric Design
- Public Transit Planning
- Traffic Management and Road Safety
- Airport Planning and management
- Pavement Evaluation and Maintenance
- Combined Transport - Advanced Systems
- Analysis Methods in Traffic Engineering
- Pavements - Special Topics
- Quantitative Methods in Transportation
- Integrated Project in Transportation Engineering



# Courses - Other

## Courses at the School of Civil Engineering and other Schools

- Laboratory on Materials
- Roads Geometric Design
- Roads Construction
- Transportation Systems Planning
- Environmental Impacts
- Practical Training
- Highway Engineering IV (Construction elements of road works), SRSGE
- Special Topics on Roads Geometric Design
- Planning - Design - Operation of Road Works, SRSGE
- Environment and Development, NTUA

## Contribution to MSc Programs

- Shipping and Maritime Transport, **Water resources science & technology**
- Optimization of Infrastructure Networks, **Water resources science and technology**
- Transport and Traffic - modern vehicles, **Energy Production and Management**
- Urban Transport systems, **Architecture - Spatial Design**
- Data driven models in civil engineering problems, **Data science and machine learning**

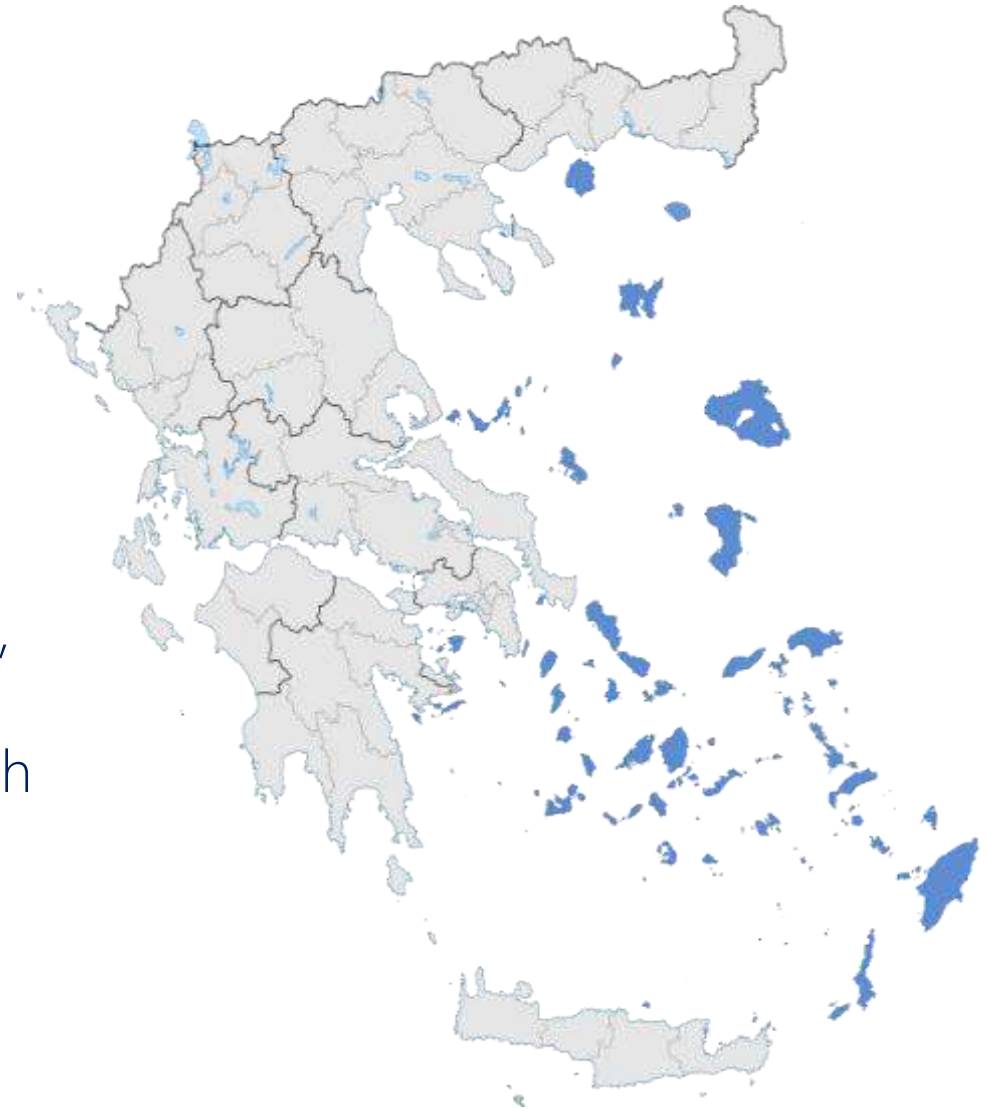


# Integrated Transport Planning Project

## Greek Island Transport Plan Development

Exploitation of real data in a project that covers all transportation engineering disciplines, combining all different transport and development objectives in a **comprehensive and integrated approach**:

- Full **analysis** of current transportation situation
- **Transportation** (Internal and external transport analysis, Planning passenger / cargo ports and airports)
- **Traffic Engineering** (Traffic Analysis, Identification of high risk sites, Urban Mobility Plan)
- **Road construction** (Configuration of critical junctions, Pavement upgrade program)
- **Technical and economic** analysis of the overall plan of transportation development (cost-benefit)



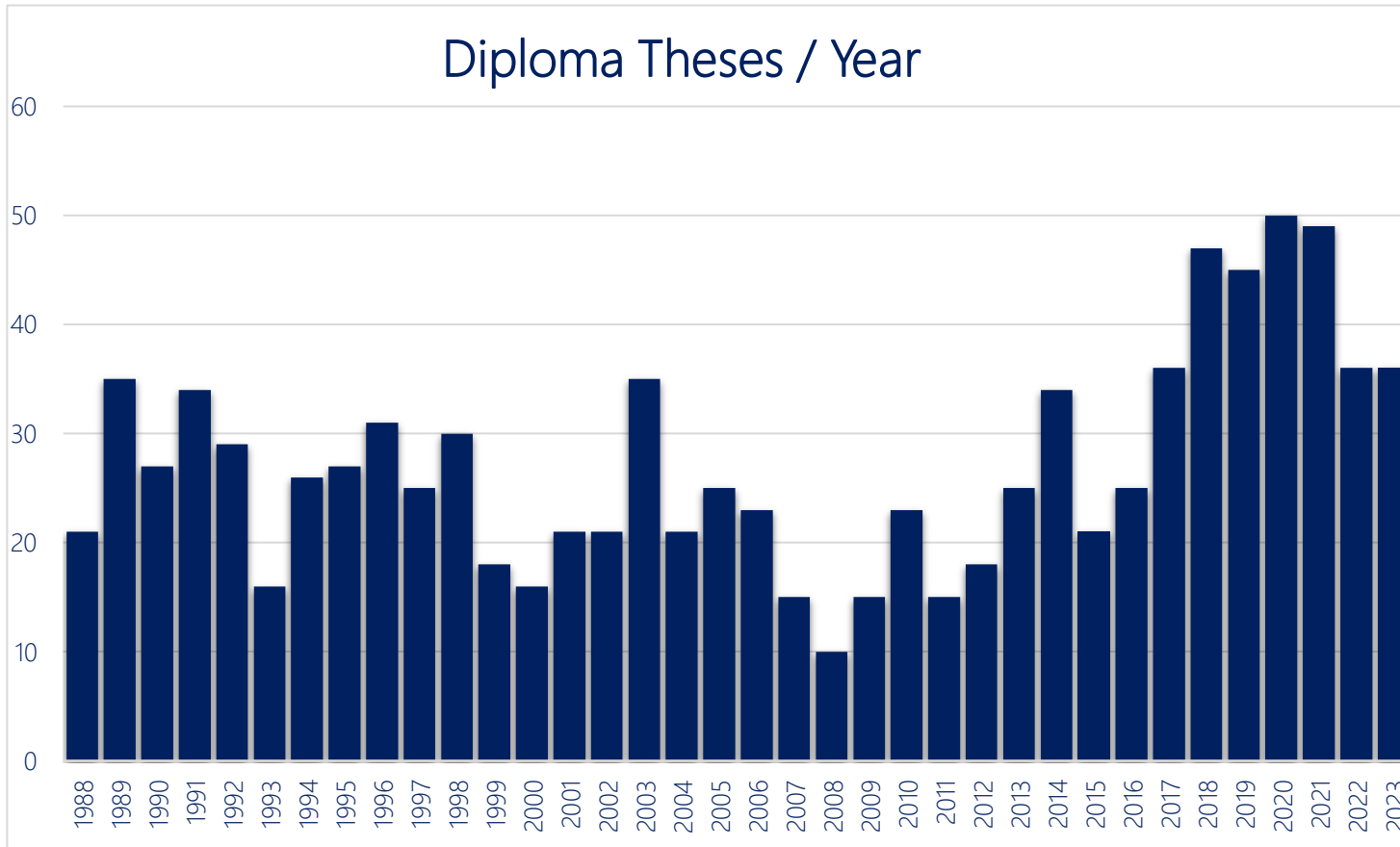
# Diploma Theses (10<sup>th</sup> semester)

1305 Diploma Theses  
since 1975

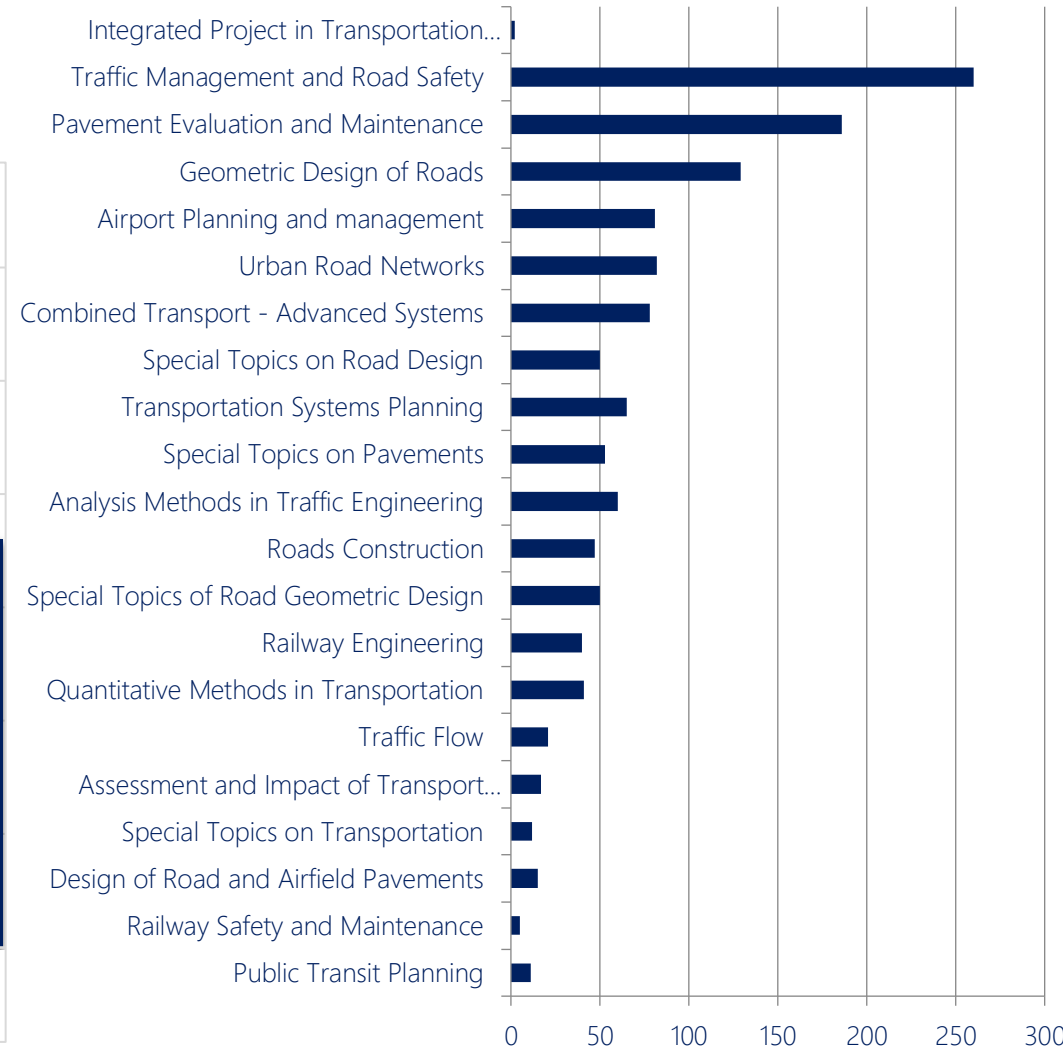


27 Diploma Theses  
per year

Diploma Theses / Year

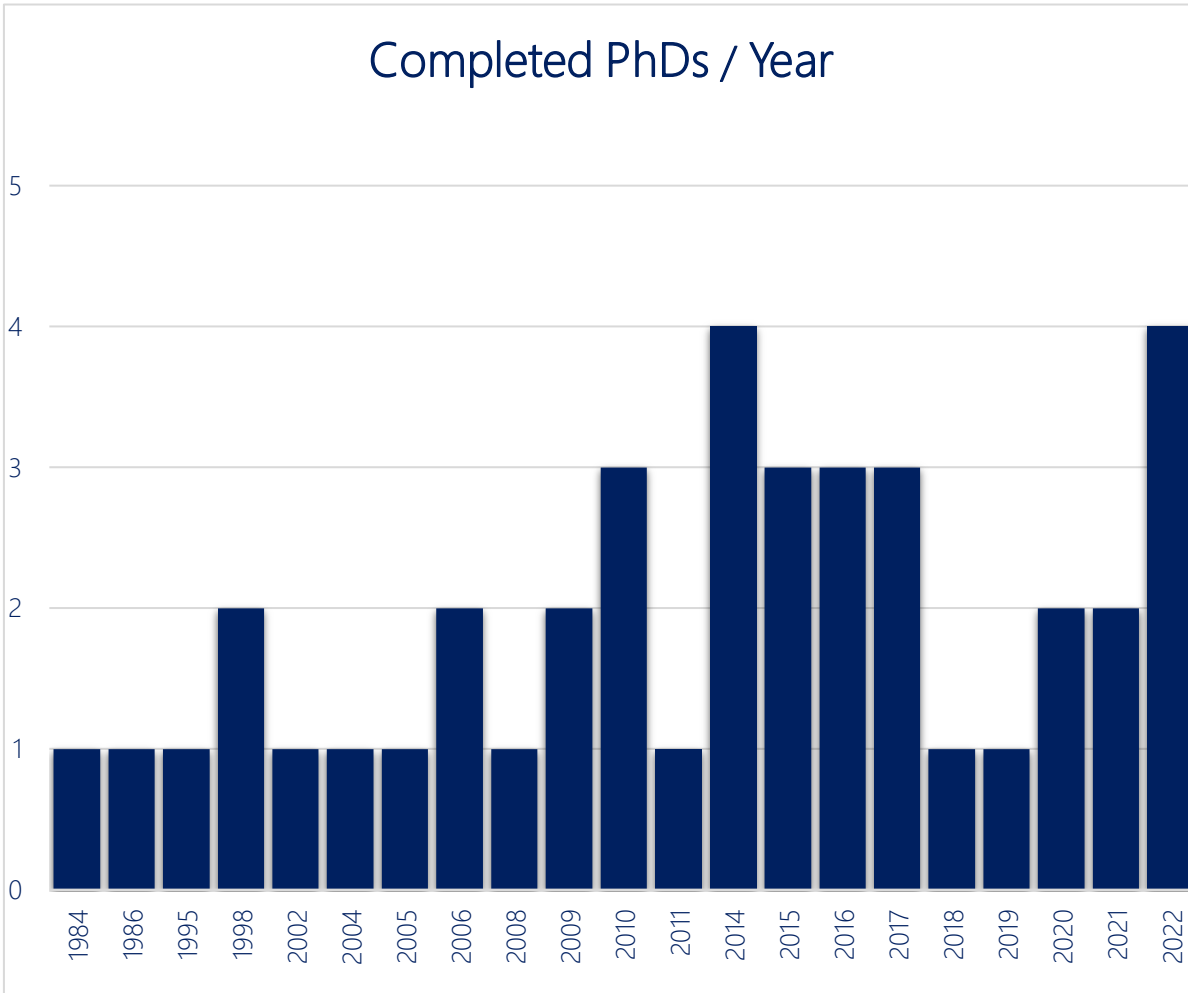


Diploma Theses / Course

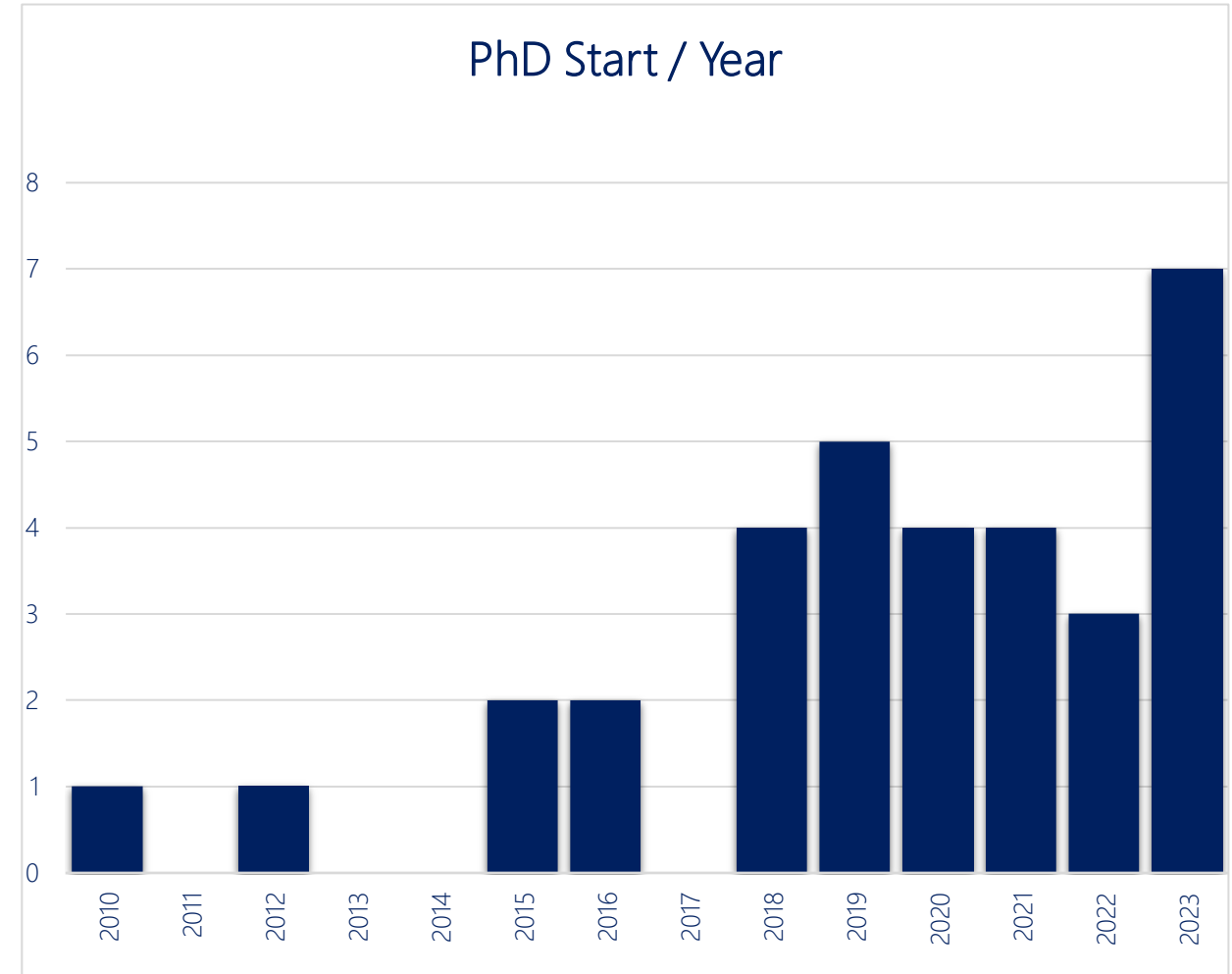


# PhD Theses

40 PhD Theses Completed



30 PhD Theses Under Preparation



# Conferences – Workshops

- Telematics boosting mobility behaviour, NTUA - NRSO, 22/11/2023
- Road Safety Research Challenges, NTUA - NRSO, 19/5/2023
- Telematics and Driver Behaviour Workshop, NTUA - NRSO, 4/4/2023
- Data Requirements for Freight Transport Planning and Operation, NTUA – ENIRISST, 22/2/2023
- Road Safety & Simulation 2022, NRSO - HITE, 8/6/2022
- Innovation in Road Safety Research Workshop online, NRSO, 20/5/2021
- PIONEERING Solutions for the Smart City Challenge, NTUA - Pioneer Alliance, 15/4/2021
- NTUA - Innovation in Road Safety Research, NRSO, 17/5/2019
- Digitalisation and Road Safety Research Workshop, NTUA, 17/5/2019
- Training course on the use of the **Aimsun Next Traffic Simulation** Program, AIMSUN - NTUA - TUMunich, 4/11/2018
- hEART2018 - 7th Symposium of the European Association for **Research in Transportation**, NTUA - TUMunich, 5-7/9/2018
- 10th International Conference on the **Bearing Capacity of Roads**, NTUA - TU Delft, 28-30/6/2017
- The **Future of Road Safety Research** Workshop, NTUA , 15/5/2017
- **Cognition, Behaviour and Driving Inter-disciplinary** Conference, NTUA - UOAthens, 26/6/2015
- 6th Pan-Hellenic Conference on **Road Safety**, NTUA - HITE, 12-13/3/2015
- **Road Infrastructure Safety Equipment** Technical Conference, NTUA - European Road Federation - HITE, 12-13/2/2015





Research



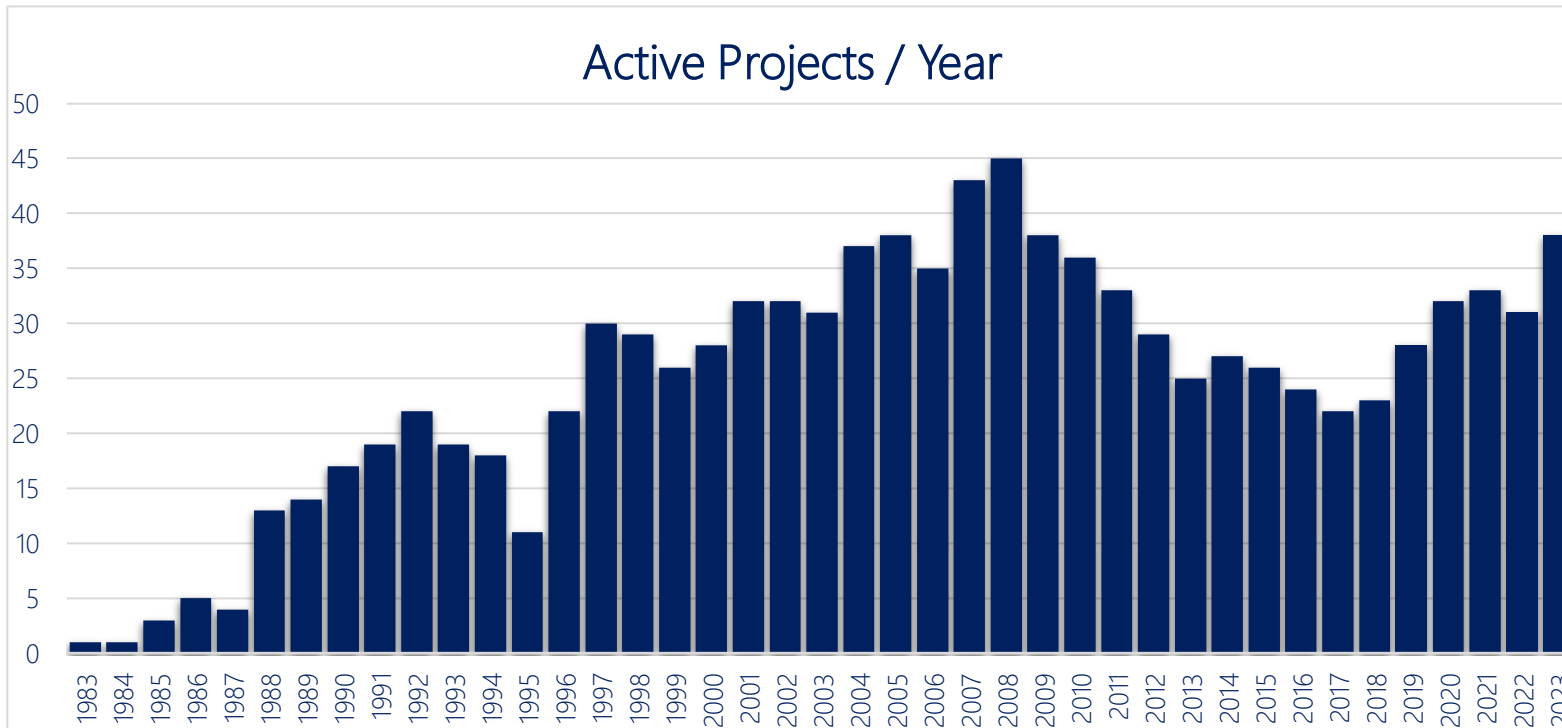
# Research Projects

More than 390 Research Projects

- > 135 International
- > 255 Greek

With more than 500 international partners

More than 200 through highly competitive procedures



# Scientific Publications

Publications in Journals > 500

Publications in Conferences >1.000

Presentations in Conferences > 500

Citation Index – Scopus > 7.000

Citation Index - Google Scholar > 12.000



# Cooperations and Partners



# Our Cooperations Greece



# Our Cooperations - Europe



# Our Cooperations - Worldwide



# Our Cooperations - European Universities





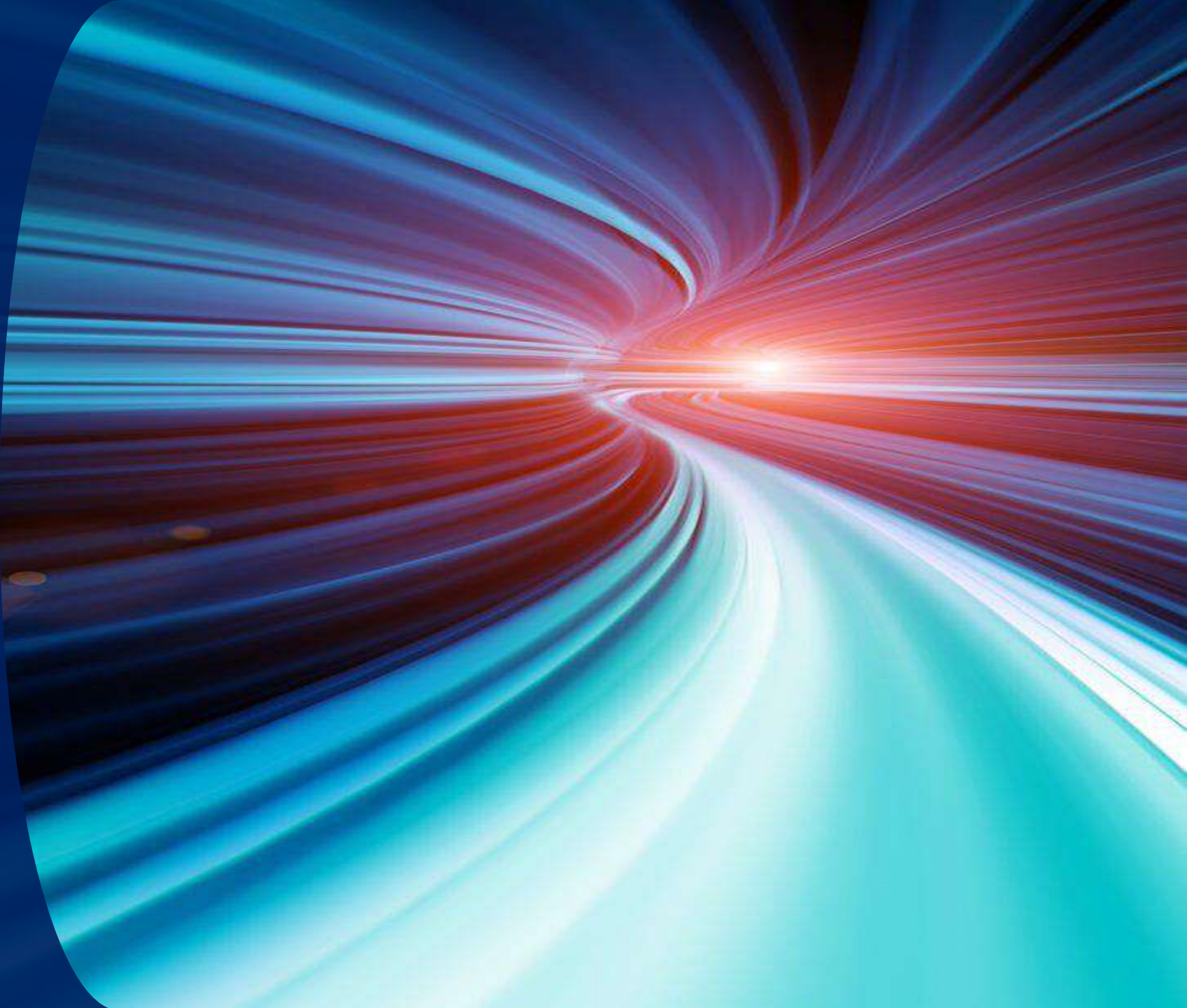
# Our Cooperations - Universities Worldwide



# Our Cooperations - Research Institutes



Laboratories



# Laboratories



# Laboratory of Pavement Engineering Scientific Disciplines

*Established in early '60s*

Section of Pavement Materials,  
Testing and Characterization

Section of in-situ  
pavement testing and evaluation



Education  
Research

National and International collaborations



# Laboratory of Pavement Engineering

## Research Infrastructure and Priorities (1/3)

### Section of Pavement Materials, Testing and Characterization

- Evaluation and proportioning of raw materials
- Materials (bound or unbound) testing and mechanical characterization
- Compaction
- Low-energy mixes testing and evaluation
- Assessment of alternative materials for pavement construction

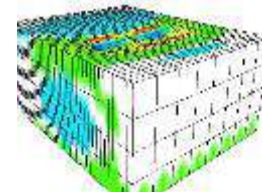
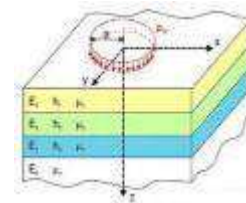
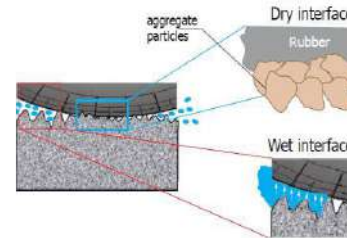


# Laboratory of Pavement Engineering

## Research Infrastructure and Priorities (2/3)

### Section of in-situ pavement testing and evaluation

- Non Destructive Testing (NDT) in the field
- Pavement instrumentation (fiber optics)
- In-situ performance evaluation of pavement materials
- Pavement evaluation (structural and functional)
- Bearing capacity of roads and airfields

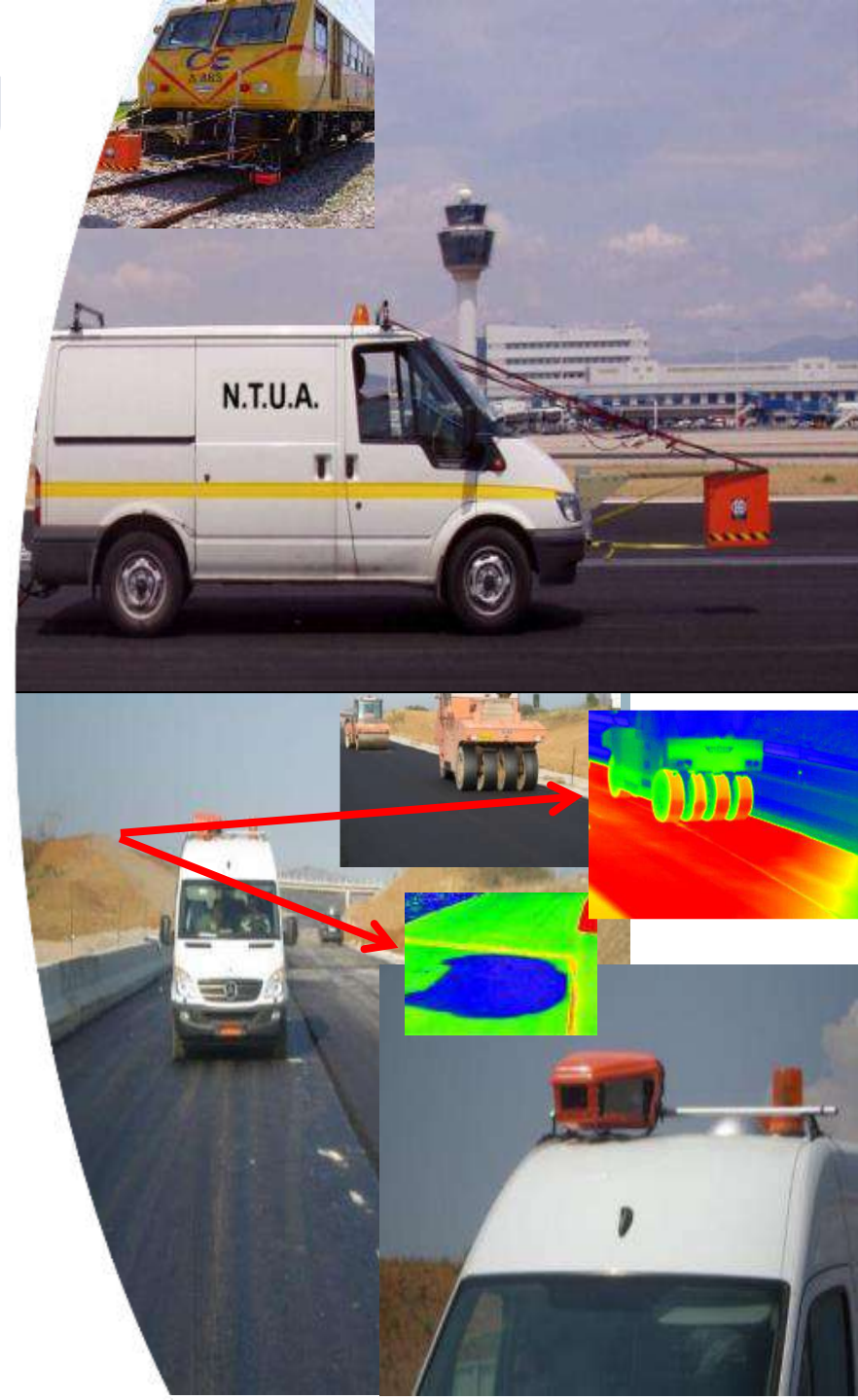
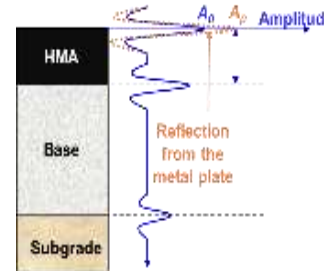


# Laboratory of Pavement Engineering

## Research Infrastructure and Priorities (3/3)

### Section of in-situ pavement testing and evaluation

- Geophysics applications using Ground Penetrating Radar (GPR)
- Dielectric properties of pavement materials
- Pavement structure inspection (layers, cracks, moisture)
- Railway ballast assessment using GPR
- Post compaction assessment - Quality control
- Thermal camera use - Quality control



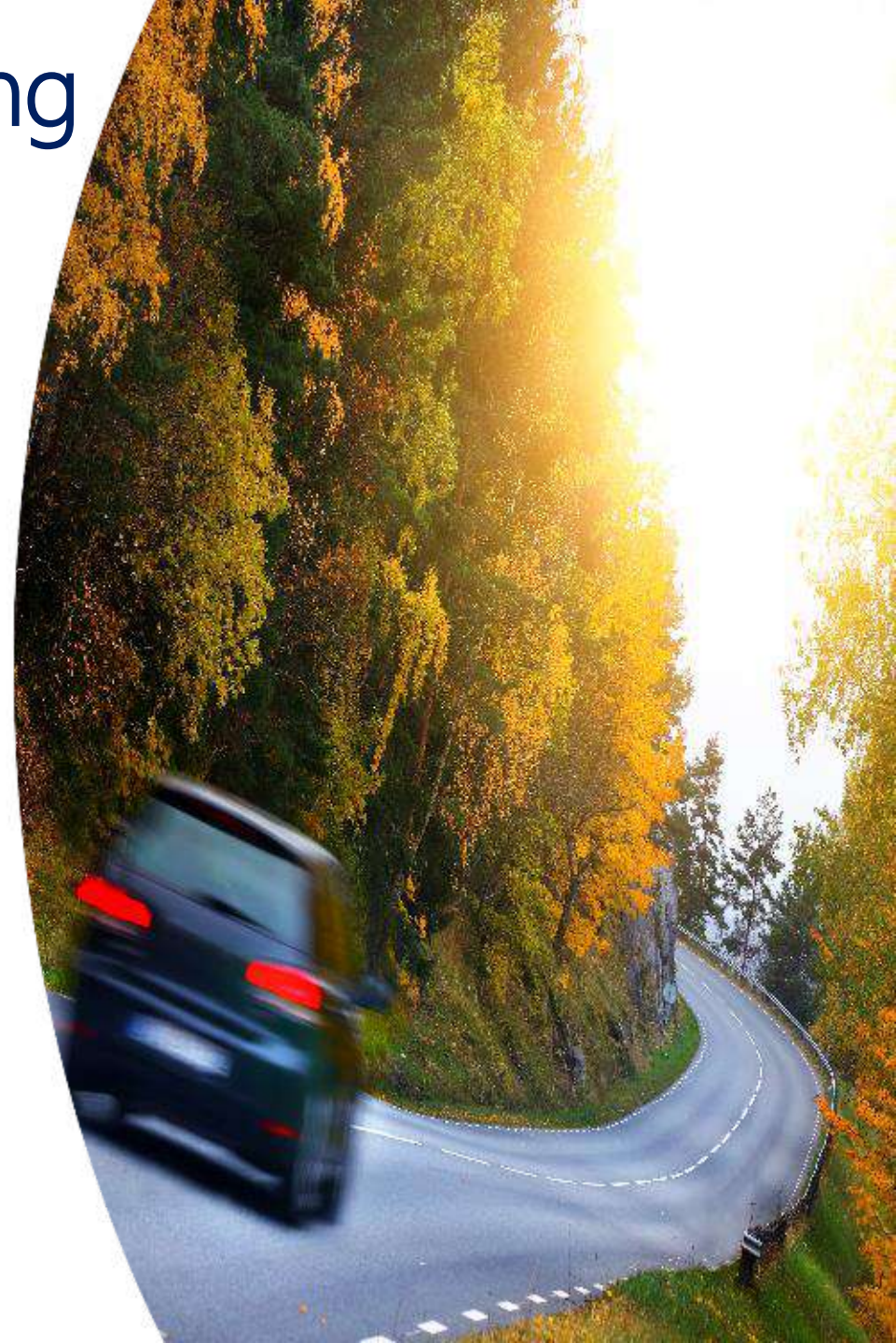


# Laboratory of Pavement Engineering

## Key Research Priorities

### Section of Road Design

- Safety assessment of road design guidelines through **vehicle dynamics – 3D road** surface interaction
- Infrastructure design for Autonomous and Connected Vehicles
- ADAS deployment in vehicle automation environment
  - guidance
  - sight distance (stopping, passing, intersection)
  - speed adaptation
- Safety and operational assessment of heavy vehicle



# Laboratory of Pavement Engineering International Collaboration

**FEHRL**

Brussels

Decision making and excellence

Greek FEHRL Group  
(since 2004):



Ministry of Infrastructure and Transport  
Central Public Works Department



Laboratory of Pavement Engineering  
of the School of Civil Engineering of NTUA



# Laboratory of Pavement Engineering

## Key Research Goals

- Sustainable and innovative pavement materials – adaptation on **climate changes**
- **Remote and automated systems** for pavement rehabilitation
- Advances in **systems assessing** pavement condition
- Using **vehicle communication** systems for assessing pavement performance
- Pilot studies for assessing the performance of pre-fabricated pavements that contain **sensors**
- **Life Cycle Assessment (LCA)** of pavements



# Laboratory of Railways & Transport Research Areas

Established in: 1962

- Public Transport planning and control
- Freight Transport and Logistics
- Airport planning and operations
- Railway design and maintenance

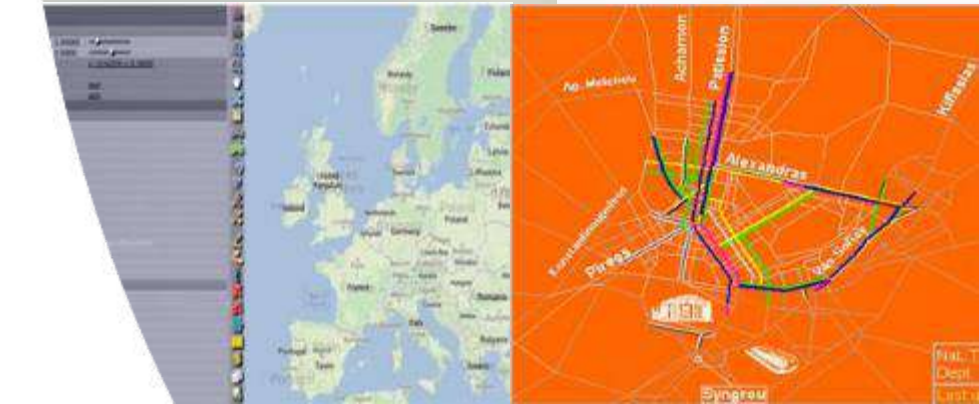
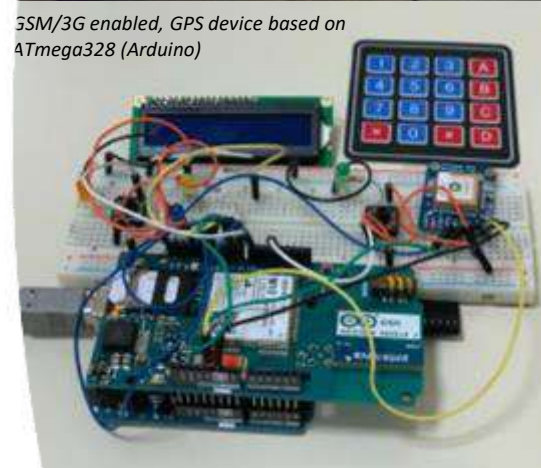


# Laboratory of Railways & Transport Research Infrastructure

- Traffic load meters
- Traffic congestion map of Athens
- Rail stress measurement sensors
- Sound meters, video cameras and endoscopic cameras
- Oscilloscope, microcontroller application development tools
- Servers
- Geographic Information System (GIS)
- Specialised software (AIMSUN, ARENA, AnyLogic, Gurobi)



5SM/3G enabled, GPS device based on ATmega328 (Arduino)



# Laboratory of Railways & Transport

## Example Key Projects

### Impulse, ITIP, CREAM

- Simulation & Prototyping of Innovative Handling Systems
  - AGV/ASC container handling equipment
  - Moving Train
  - ISU handing system for conventional semitrailers



### F-MAN, iCS

- Wagon fleet management
- Intermodal transport
  - Development of iCS service (Athens – Thessaloniki)
  - Wagon loading algorithm
  - Decision support for truck dispatching



# Laboratory of Railways & Transport

## International Partnerships



UNIVERSITY  
OF TWENTE.



**CHALMERS**  
UNIVERSITY OF TECHNOLOGY



**EPFL**



EUROPE MAP



# Laboratory of Railways & Transport

## Key Research Priorities

- Optimization of Passenger and Freight Transport Systems
- Optimization of Transport Systems Planning
- Creation of Intelligent Transport decision making Systems
- Development of **research infrastructure** for transport & logistics
- **Wagon fleet management** (Balkan countries, development of smart OBD)
- Analysis of Greek **coastal** shipping and **air** services
- **Urban Freight** Truck routing
- **Freight villages** (legislation modernization)





# Laboratory of Traffic Engineering

## Research Areas

### Traffic Management

- Data driven traffic flow analysis and forecasting
- Mobility as a service, electromobility, connected/shared mobility
- Network level traffic prediction and management
- Design and operation of traffic management & parking systems

### Road Safety

- Driver Safety Behavior & Telematics
- Road Infrastructure Safety
- Road Safety Data, Knowledge & Management Systems

### Intelligent Transportation Systems

- Smartphone sensing and analytics, driving telematics & analytics
- Traffic Automation
- Impact assessment of ITS, mobility, environment and safety



# Laboratory of Traffic Engineering Research Infrastructure

- **Driving Simulator** (Foerst 1/4 cab, moving base) for driver behavior experiments
- Unmanned Aerial Vehicles (**Drones**) for traffic monitoring
- On-Board Diagnostics Devices (**OBD**) for driver behavior monitoring
- **Cameras** for traffic monitoring
- **Other devices** for traffic counts, speed monitoring, position monitoring (GPS)



# Laboratory of Traffic Engineering Data and Knowledge Systems

## Information Systems

- NTUA Road Safety Observatory >2.220 items, >30.000 visits/month
- Digital Road Safety Library > 6.500 key Reports
- International Bibliography databases (scopus, science direct)
- Analysis tools (traffic, simulation, statistics)

## Databases

- SANTRA - Greek Road Accident Database with disaggregated data (1985 - 2019, 1,3 million recordings)
- CARE - European Road Accident Database with disaggregated data (1991 - 2020, 40 million recordings)
- IRTAD International Road Accident Database with aggregated data
- Databases of International Organizations (WHO, IRF, ERF, UITP)
- Databases with Aggregated Data (Vehicle fleet, veh-km, driver behavior, etc.

The screenshot displays the website of the National Technical University of Athens (NTUA) Road Safety Observatory. The top navigation bar includes links for Home, About, Knowledge, Data, Conferences, News, and Links. The main content area is organized into several sections:

- Systems:** A vertical list of logos for various systems, including the European Road Safety Observatory, SafeFITS, pract-repository, levitate, and smartmaps.
- Cooperations:** A section titled "Europe" featuring logos for the Mobility and Transport Observatory, Research & Innovation Center, European Research Bank, UNECE, ETSC, CEDR, FEHRL, ectri, and ERF.
- Key Resources:** A large banner image showing a speed limit sign (30) and a map of Europe, with the text "NTUA - Key Resources on Cities with 30km/h speed limit, November 2023".
- ICSC2024:** A detailed announcement for the 12th International Cycling Safety Conference in Imabari, Japan, November 2024, including a description of the event and a submission deadline for abstracts.
- 4th Access Management International Conference:** An announcement for a conference in Boston, June 2024, organized by the Transportation Research Board (TRB).
- ICTCT - 1st AfroSAFE conference:** An announcement for a conference in Dar Es Salaam, Tanzania, June 2024, organized in cooperation with the Department of Transportation and Geotechnical Engineering of the University of Dar Es Salaam.
- Upcoming Events:** A section listing various international congresses and conferences, such as the 56th CIECA Congress in Dubai 2024 and the IRF World Congress 2024.
- News and Updates:** A section titled "Road Safety Update" with a "newsletters since 2007" link.
- Search and Newsletter:** A search bar at the top right and a "Subscribe to our newsletter" form at the bottom right.



# Laboratory of Traffic Engineering

## Example Key Projects

### Driver-Vehicle-Environment Interactions and Safety Tolerance Zone

i-Dreams (2019-2023)

- Driving telematics from smartphones  
Identification of safety-relevant behavior  
Assessment and prediction of risk
- **600 operators Experiment**  
4-stage 5-country experiment  
across 4 transport modes (car, bus, truck, train)  
Big data handling and processing
- **Intervention selection and testing**  
Real-time effectiveness (safety critical events, etc.)  
Post-trip feedback (driver state, etc.)
- Definition, development, testing and validation of a context-aware **Safety Tolerance Zone**



### SHared Automation Operating Models for Worldwide Adoption

Show (2019-2024)

- Deployment of shared, connected, cooperative, **electrified fleets of autonomous vehicles**
- **In coordinated:**  
Public Transport (PT)  
Demand Responsive Transport (DRT)  
Mobility as a Service (MaaS) and  
Logistics as a Service (LaaS)  
Operational chains
- **In real-life urban demonstrations in:**  
5 Mega  
6 Satellite and  
3 Follower Pilots
- Taking place in **20 cities across Europe**



# Laboratory of Traffic Engineering

## Key Research Priorities

- Automation and Connectivity
- Driving **Telematics** (smartphones & wearables)
- **Drone** based traffic monitoring and analysis
- Traffic and driving **simulation**
- **Smart Cities**
- 5G traffic
- Traffic and Safety **Big Data**
- Traffic and Safety **Information Systems**





## Welcome

The mission of the Department of Transportation Planning and Engineering is to provide the best education and scientific research in the field of transportation planning and engineering. High scientific standards and performance are key objectives in all education and research activities of the Department of Transportation Planning and Engineering.

The Department of Transportation Planning and Engineering is composed by three Laboratories: Pavement Engineering, Railways and Transport & Traffic Engineering, comprises more than 70 highly qualified personnel (7 Faculty members), offers 16 undergraduate courses at the School of Civil Engineering

# [www.transport.ntua.gr](http://www.transport.ntua.gr)

## Transport Tools

NTUA Road Safety Observatory

[www.nrso.ntua.gr](http://www.nrso.ntua.gr)



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