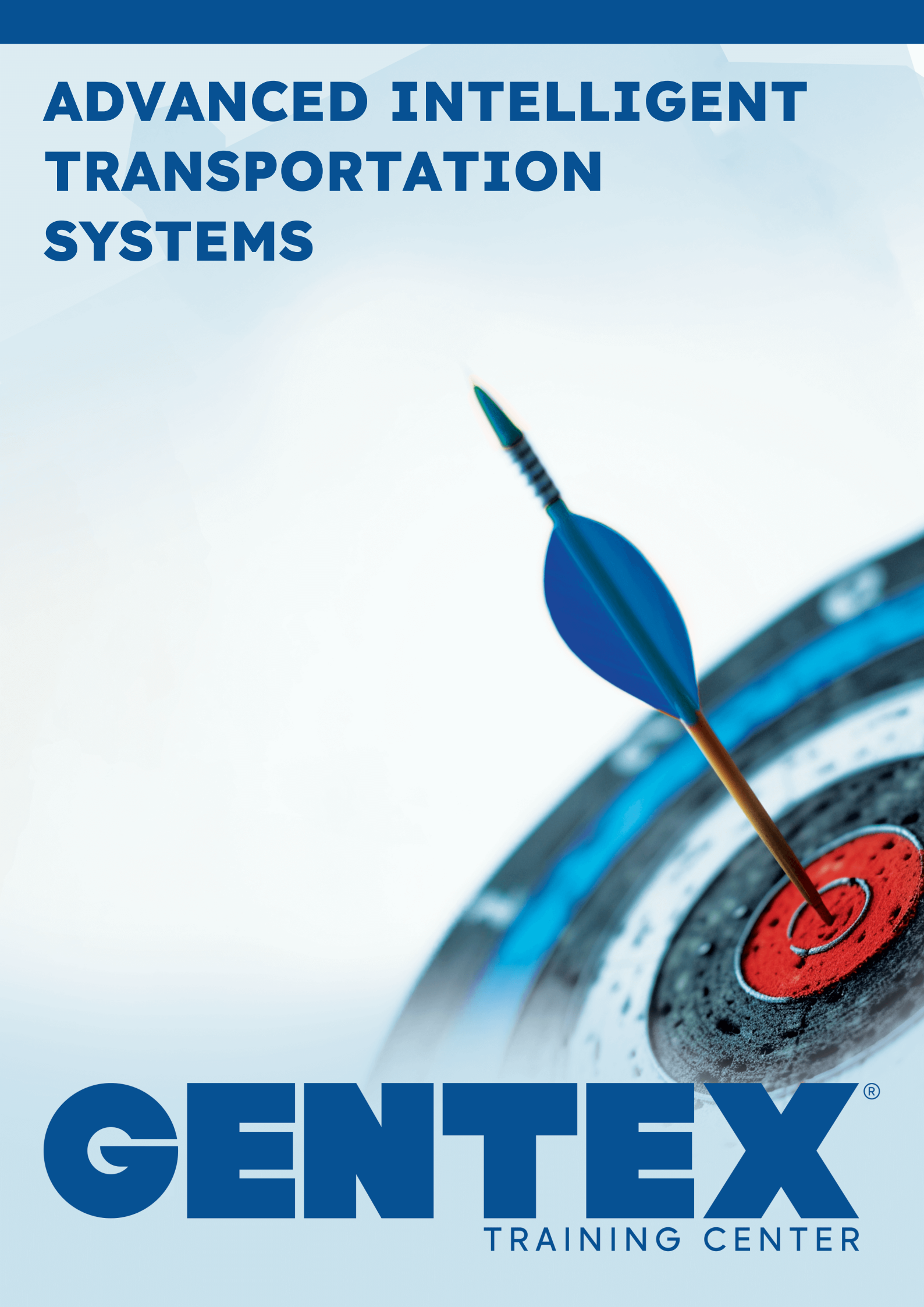
# ADVANCED INTELLIGENT TRANSPORTATION SYSTEMS



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# Introduction

Road networks lose capacity long before they run out of asphalt. Congestion, incidents, and poor traffic signal coordination waste more time than missing lanes ever could, and that waste carries a cost in fuel, emissions, and safety. This Advanced Intelligent Transportation Systems Training Course gives transport engineers, traffic managers, and technology professionals a complete method for designing and operating ITS. Participants learn how ITS architecture is structured, how detection and communication layers work, how traffic management centres operate, and how data feeds applications such as adaptive signal control, incident management, and traveller information. Furthermore, the course covers standards, procurement, cybersecurity, and evaluation of deployed systems.

# Advanced Intelligent Transportation Systems Course Objectives

- Apply the ITS architecture framework and reference architectures to system design.
- Select detection technologies: inductive loops, radar, video, and connected vehicle data.
- Design the communications layer: fibre, cellular, DSRC, and C-V2X options.
- Operate traffic management centres with incident detection and response procedures.
- Apply adaptive signal control systems to corridor and network optimisation.
- Design traveller information services and variable message sign strategies.
- Integrate connected and autonomous vehicle data into transport operations.
- Apply ITS standards: ISO 14813, NTCIP, and DATEX II data exchange.
- Manage ITS cybersecurity, data governance, and privacy requirements.
- Procure, test, commission, and evaluate ITS deployments with clear measures.

# Course Methodology

- Facilitated sessions built on real ITS deployments, network data, and standards.

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- Case workshops on congestion management, incidents, and system failures.
- Network modelling and signal timing exercises using corridor data.
- Simulation of a traffic management centre shift with incident scenarios.
- Group exercise on an ITS deployment plan with architecture and measures.

## Who Should Take This Course

- Transport and traffic engineers.
- Traffic management centre operators and supervisors.
- Highway and municipal transport planners.
- ITS project managers and system integrators.
- Telecommunications and network engineers supporting transport systems.
- Public transport and mobility technology officers.

## Advanced Intelligent Transportation Systems Course Outlines

## Day 1: ITS Architecture and System Framework

- ITS concept, scope, and user services taxonomy.
- Reference architectures and regional ITS architecture development.
- Stakeholder roles: authorities, operators, integrators, and users.
- Functional areas: traffic management, transit, freight, and emergency.
- Systems engineering process for ITS projects.
- Interoperability, scalability, and legacy system integration.
- Architecture documentation and conformance requirements.

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## Day 2: Detection, Communications, and Data Layers

- Detection technologies: inductive loops, radar, video analytics, and Bluetooth.
- Vehicle and probe data sources: GPS, mobile networks, and connected vehicles.
- Accuracy, coverage, and maintenance considerations per technology.
- Communications: fibre, cellular, DSRC, and C-V2X comparison.
- Network topology, redundancy, and resilience design.
- Data quality, fusion, and storage architecture.
- Standards for data exchange: NTCIP, DATEX II, and ISO 14813.

## Day 3: Traffic Management and Control Systems

- Traffic management centre functions and operator workflows.
- Incident detection, verification, response, and clearance practice.
- Adaptive signal control systems and corridor coordination.
- Ramp metering, variable speed limits, and hard shoulder running.
- Variable message signs and traveller information strategy.
- Enforcement technologies and compliance monitoring.
- Performance monitoring and control strategy tuning.

## Day 4: Connected, Autonomous, and Emerging Applications

- Connected vehicle concepts: V2V, V2I, V2P, and V2X.
- Cooperative ITS use cases: intersection safety and platooning.
- Autonomous vehicle data needs and infrastructure readiness.
- Smart parking, congestion charging, and mobility as a service.

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- Electric vehicle charging integration with transport networks.
- Real-time traveller applications and multimodal information.
- Pilot projects, sandbox testing, and scaling to deployment.

## Day 5: Cybersecurity, Procurement, and Evaluation

- ITS cybersecurity threats and risk assessment approach.
- Network segmentation, access control, and monitoring for ITS assets.
- Data privacy, anonymisation, and governance obligations.
- Procurement models: design-build, systems integrator, and managed service.
- Testing, acceptance, and commissioning of ITS systems.
- Performance measurement: travel time, delay, incident duration, and reliability.
- Building an ITS roadmap and investment case.

## Conclusion

By successfully completing the Advanced Intelligent Transportation Systems Training Course, participants will have acquired a thorough working knowledge of ITS architecture, detection and communication layers, traffic management centre operations, adaptive control, connected vehicle applications, ITS standards, cybersecurity, procurement, and performance evaluation. They will leave able to design systems that fit a real network, operate them under daily pressure, and justify investment with measurable outcomes. Gentex Training Center delivers this programme with transport and technology practitioners who deploy and operate ITS in live networks.

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# FAQs for the Advanced Intelligent Transportation Systems course

## Q1 What is the "Advanced Intelligent Transportation Systems" course about?

It is a five-day programme on designing, operating, and evaluating intelligent transportation systems. It covers ITS architecture, detection and communications technology, traffic management centre operations, adaptive signal control, connected vehicle applications, standards, cybersecurity, and performance evaluation.

## Q2 What are the key benefits of the "Advanced Intelligent Transportation Systems" course?

Participants design ITS that integrates with existing infrastructure instead of duplicating it, reduce congestion and incident duration through coordinated control, and procure and commission systems that actually work. They also gain evaluation measures that justify further investment with evidence.

## Q3 What skills will I gain from the "Advanced Intelligent Transportation Systems" course?

You will gain ITS architecture and systems engineering application, detection, communications, and data layer design, traffic management and adaptive control operation, and ITS cybersecurity, procurement, and performance evaluation.

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## Q4 What tools, methods, or standards are covered in the "Advanced Intelligent Transportation Systems" course?

The course works with ITS reference architecture frameworks and the systems engineering process, detection technologies including inductive loops, radar, video analytics and probe data, communications options covering fibre, cellular, DSRC and C-V2X, traffic management centre workflows and incident management procedures, adaptive signal control and corridor coordination, ramp metering and variable speed limits, variable message sign strategies, connected vehicle use cases for V2V, V2I and V2X, standards including ISO 14813, NTCIP and DATEX II, ITS cybersecurity risk assessment and network segmentation, and performance measures covering travel time, delay and incident duration.

## Q5 How is the "Advanced Intelligent Transportation Systems" course applied in real-world practice?

Teams apply it when developing a regional ITS architecture, designing a corridor signal upgrade, specifying detection and communication equipment in a tender, operating a traffic management centre shift, planning a connected vehicle pilot, and evaluating a deployed system against travel time and incident measures. It also guides ITS cybersecurity reviews and investment cases.