BLACKBIRD FOR TRAINING

Automotive Diagnostics and Troubleshooting

29 August – 2 September 2027
Online



Automotive Diagnostics and Troubleshooting

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Introduction

Modern vehicles have become increasingly complex systems that integrate mechanical components, electronic control units, sensors, actuators, communication networks, and advanced software. As automotive technologies continue to evolve, effective diagnostics and troubleshooting have become essential for identifying faults accurately, reducing repair time, preventing unnecessary component replacement, and ensuring vehicle safety, reliability, and performance.

The Automotive Diagnostics and Troubleshooting course has been designed to provide participants with a comprehensive understanding of modern vehicle diagnostic systems and systematic fault-finding techniques. The programme combines automotive engineering principles with practical diagnostic methods, electronic testing, onboard diagnostic systems, scan tool applications, electrical troubleshooting, engine performance analysis, and preventive maintenance practices.

Throughout this intensive programme, participants will examine vehicle systems, diagnostic procedures, fault codes, electrical circuits, engine management systems, fuel and ignition systems, transmission controls, braking technologies, communication networks, and advanced troubleshooting strategies. Practical exercises, technical discussions, and real-world fault scenarios will enable participants to diagnose automotive problems accurately and apply effective corrective actions.

Course Objectives

By the end of this course, participants will be able to:



• Understand the principles of modern automotive diagnostic systems.
• Apply structured and systematic troubleshooting procedures.
• Use automotive scan tools and diagnostic equipment effectively.
• Interpret diagnostic trouble codes and live vehicle data.
• Diagnose faults in engine management, fuel, ignition, and emission systems.
• Test vehicle electrical circuits, sensors, actuators, and control modules.
• Identify faults in transmission, braking, steering, and suspension systems.
• Analyse communication network and electronic control unit faults.
• Improve diagnostic accuracy and reduce unnecessary repair costs.
• Apply international best practices in automotive maintenance and fault diagnosis.

Course Outline

Day 1: Automotive Diagnostic Fundamentals & Tool Introduction

- Introduction to automotive diagnostic principles and technology evolution.
- Overview of mechanical, electrical, and electronic vehicle systems.
- Common vehicle fault symptoms and diagnostic workflow logic.
- Safety procedures during automotive diagnostics.
- Diagnostic documentation and reporting.
- Types of diagnostic tools: scan tools, code readers, and digital multimeters.
- Automotive oscilloscopes, pressure and vacuum testing equipment.
- Battery and charging system testers and proper tool selection.



Day 2: Onboard Diagnostics, Fault Codes & Electrical Circuit Testing

- Onboard diagnostic system principles and diagnostic trouble code structure.
- Generic and manufacturer-specific fault codes.
- Freeze-frame data analysis and live data interpretation.
- Readiness monitors and emission diagnostics.
- Clearing codes and confirming repairs.
- Electrical circuit principles: voltage, current, and resistance testing.
- Wiring diagram reading and circuit interpretation.
- Open circuits, short circuits, high resistance faults, and grounding system diagnostics.
- Fuse, relay, and connector testing.
- Parasitic battery drain diagnosis.



Day 3: Engine Management, Fuel, Emission & Exhaust Systems

- Engine management system overview and engine control module functions.
- Air intake and fuel delivery system diagnostics.
- Fuel injection system and fuel pressure testing.
- Ignition system diagnostics.
- Engine sensor and actuator testing.
- Misfire, performance fault diagnosis, starting and stalling problems.
- Oxygen sensor diagnostics and exhaust gas recirculation system testing.
- Catalytic converter performance and evaporative emission control system diagnostics.
- Exhaust and emission fault troubleshooting.



Day 4: Transmission, Drivetrain, Braking, Steering & Suspension Diagnostics

- Automatic and manual transmission principles and transmission control systems.
- Transmission fluid condition, pressure testing, and shift quality analysis.
- Slipping problems, clutch and torque converter diagnostics.
- Differential and drivetrain fault diagnosis and electronic transmission fault codes.
- Hydraulic braking system diagnostics and anti-lock braking system testing.
- Electronic stability and traction control system diagnostics.
- Steering system fault diagnosis and suspension component inspection.
- Wheel alignment, tyre-related faults, noise, vibration, and handling problem analysis.



Day 5: Vehicle Communication Networks, Advanced Electronics & Practical Troubleshooting

- Electronic control unit communication and controller area network principles.
- Communication network fault diagnosis.
- Sensor signal analysis and module programming.
- Immobiliser and security system diagnostics.
- Advanced driver assistance system overview.
- Complex automotive fault analysis and intermittent fault diagnosis.
- Root cause analysis techniques and diagnostic decision-making.
- Real-world automotive case studies.
- Integrated practical troubleshooting workshop.
- Course review and technical discussions.



Why Attend This Course?

• Develop practical expertise in automotive fault diagnosis.
• Improve the ability to identify faults quickly and accurately.
• Gain confidence in using scan tools and testing equipment.
• Understand modern vehicle electronic and mechanical systems.
• Reduce unnecessary component replacement and repair costs.
• Strengthen electrical and electronic troubleshooting skills.
• Improve vehicle reliability, safety, and performance.
• Learn from practical fault scenarios and industry case studies.
• Apply systematic diagnostic procedures in workshop environments.
• Prepare to manage increasingly complex automotive technologies.

Conclusion

The Automotive Diagnostics and Troubleshooting course provides participants with a comprehensive understanding of modern vehicle diagnostic systems, testing methods, and systematic fault-finding procedures. By integrating mechanical knowledge with electrical and electronic diagnostic techniques, the programme enables participants to identify vehicle problems accurately, evaluate system performance, and implement effective repair solutions.

Upon completion of the programme, participants will possess the knowledge and practical skills required to diagnose complex automotive faults, operate diagnostic equipment confidently, reduce repair time, improve maintenance quality, and support the safe and reliable operation of modern vehicles.

