

ADVANCED GAS CHROMATOGRAPHY TECHNIQUES AND TROUBLESHOOTING

"Mastering Gas Chromatography for Accurate Analysis and Reliable Results"

Schedule

Date	Venue	Fees (Face-to-Face)
08 - 12 November 2026	Doha, Qatar	USD 3,495 per delegate

► **Available delivery methods:** Face-to-Face & Online Training

Introduction

Gas Chromatography (GC) is a cornerstone analytical technique widely used in chemical, pharmaceutical, environmental, and food laboratories. Mastery of GC instrumentation, method development, and troubleshooting is essential for obtaining accurate, reliable, and reproducible results.

This intensive 5-day training course provides advanced knowledge and hands-on skills in gas chromatography techniques, instrument operation, method optimization, and troubleshooting strategies. Participants will gain practical experience, learn to address common issues, and enhance their confidence in performing high-precision GC analysis.

Objectives

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

- Understand the theoretical principles of gas chromatography and detector technologies
- Optimize GC methods for separation, sensitivity, and reproducibility
- Perform advanced troubleshooting for common GC operational problems
- Implement preventive maintenance and system diagnostics
- Interpret chromatograms accurately and resolve integration issues
- Apply GC techniques in various industry-specific applications
- Ensure quality control and compliance with analytical standards

Why Attend

- Gain advanced practical knowledge of gas chromatography instruments
- Improve accuracy, sensitivity, and reliability of analytical results
- Learn to troubleshoot instrument issues effectively and reduce downtime
- Enhance professional expertise in laboratory operations and QC
- Apply best practices to optimize GC methods across applications

Target Audience

This program is designed for:

- Analytical chemists and laboratory scientists
- Quality control and R&D professionals
- Environmental, pharmaceutical, and food industry laboratory personnel
- Instrumentation and maintenance engineers
- HSE specialists involved in analytical monitoring
- Anyone preparing to enhance GC operational and troubleshooting skills

Individual Benefits

Key competencies that will be developed include:

- Advanced understanding of GC theory and detector technologies
- Expertise in method development, optimization, and validation
- Troubleshooting and preventive maintenance skills
- Accurate interpretation of chromatographic data
- Improved efficiency and reliability in laboratory operations
- Confidence in resolving complex GC system issues

Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Improved laboratory efficiency and reduced instrument downtime
- Enhanced accuracy and reliability of analytical results
- Reduced operational errors and associated costs
- Stronger compliance with quality and safety standards
- Better capacity for problem-solving and decision-making in GC operations

Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - In-depth exploration of GC principles, detector technologies, and analytical methods
- Case Studies - Real-world examples of instrument troubleshooting and method optimization
- Workshops - Hands-on exercises in method development, calibration, and system maintenance
- Peer Exchange - Group discussions on common laboratory challenges and solutions
- Tools - Practical guides, troubleshooting checklists, and instrument maintenance templates

MAWA EVENTS

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Course Outline

Detailed 5-Day Course Outline

Training Hours: 07:30 AM – 03:30 PM Daily Format: 3–4 Learning Modules Coffee Breaks: 09:30 & 11:15 Lunch Buffet: 01:00 – 02:00

Day 1: Fundamentals of Gas Chromatography

Module 1: Principles of Gas Chromatography (07:30 – 09:30)

- Introduction to GC and its applications
- Separation principles and retention mechanisms
- Types of columns and stationary phases

Module 2: GC Instrumentation Overview (09:45 – 11:15)

- Gas delivery systems, injectors, and detectors
- Flow control and temperature programming

Module 3: Sample Introduction Techniques (11:30 – 01:00)

- Split/splitless injection, headspace, and SPME
- Sample preparation and matrix considerations

Module 4: Workshop & Case Study (02:00 – 03:30)

- Identifying common setup and operational errors

Day 2: Detector Technologies and Method Development

Module 1: Detectors in GC (07:30 – 09:30)

- FID, TCD, ECD, FPD, and mass spectrometry detectors
- Selection criteria based on application

Module 2: Method Development Strategies (09:45 – 11:15)

- Optimizing separation, resolution, and sensitivity
- Column selection and temperature programming

Module 3: Practical Session (11:30 – 01:00)

- Running test samples and interpreting chromatograms

Module 4: Case Discussion & Troubleshooting Tips (02:00 – 03:30)

- Identifying method optimization challenges

Day 3: Advanced Troubleshooting Techniques

Module 1: Systematic Troubleshooting Approach (07:30 – 09:30)

- Common GC problems: baseline noise, peak tailing, ghost peaks
- Diagnostic techniques and root cause analysis

Module 2: Instrument Performance Verification (09:45 – 11:15)

- Leak detection, flow checks, and detector calibration

Module 3: Practical Troubleshooting Exercises (11:30 – 01:00)

- Simulated faults and problem-solving exercises

Module 4: Peer Discussion & Lessons Learned (02:00 – 03:30)

- Sharing experiences from real-world GC applications

Day 4: Quality Assurance, Data Interpretation, and Maintenance

Module 1: Chromatogram Analysis (07:30 – 09:30)

- Peak identification, integration, and quantification
- Common errors and correction strategies

Module 2: Preventive Maintenance (09:45 – 11:15)

- Routine maintenance schedules and best practices

Module 3: Advanced Techniques (11:30 – 01:00)

- Multicomponent analysis and trace detection

Module 4: Hands-on Practice (02:00 – 03:30)

- Method validation and system performance checks

Day 5: Application, Review, and Certification Preparation**Module 1: Industry Applications of GC (07:30 – 09:30)**

- Pharmaceutical, environmental, petrochemical, and food industries

Module 2: Review and Exam Preparation (09:45 – 11:15)

- Key concepts, troubleshooting strategies, and best practices

Module 3: Workshop & Practical Assessment (11:30 – 01:00)

- Performance evaluation and problem-solving exercises

Module 4: Final Discussion & Action Plan (02:00 – 03:30)

- Developing a GC troubleshooting and maintenance roadmap

Certification

Participants will receive a Certificate of Completion in Advanced Gas Chromatography Techniques and Troubleshooting, validating their advanced knowledge, hands-on skills, and practical expertise in GC method development, troubleshooting, and laboratory best practices.

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