MAWA EVENTS

Address: No. 857, Block A2. Leisure Commerce Square - No 9., 46150 Petaling Jaya, Selangor, Malaysia

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APPLIED GAS CHROMATOGRAPHY

"Master the Science and Application of Gas Chromatography for Accurate Analytical Results."

Schedule

Venue (InHouse)	Fees
At Your Organization Premises	Ask For The Quotation

► **Available delivery methods:** In-House Training

Introduction

Gas Chromatography (GC) is one of the most widely used techniques in analytical chemistry for separating, identifying, and quantifying volatile and semi-volatile compounds. It plays a vital role in industries such as petrochemical, pharmaceutical, environmental, food and beverage, and forensic science. The technique provides high sensitivity, precision, and reproducibility, making it indispensable in quality control, research, and development laboratories.

The Applied Gas Chromatography course provides an in-depth understanding of both the theoretical and practical aspects of GC. Participants will gain comprehensive knowledge of GC system components, principles of separation, sample preparation techniques, detector functions, column selection, and troubleshooting strategies. Through hands-on exercises and case studies, attendees will learn how to optimize instrument parameters for improved accuracy and reliability.

This course bridges the gap between theoretical concepts and real-world applications, ensuring participants can apply GC techniques confidently in laboratory environments and industrial settings.

Objectives

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

- Understand the fundamental principles and theory of gas chromatography.
- Identify and describe key components of a GC system, including injectors, columns, and detectors.
- Select suitable stationary phases and carrier gases based on sample characteristics and analytical goals.
- Develop and optimize GC methods for qualitative and quantitative analysis.
- Recognize and correct common chromatographic problems such as peak tailing, ghost peaks, and baseline noise.
- Implement effective sample preparation, derivatization, and injection techniques.
- Apply GC for trace-level analysis in complex matrices.
- Integrate data interpretation, calibration, and quality control practices for reliable results.
- Utilize advanced techniques such as GC-MS and multidimensional GC for enhanced analytical performance.

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Why Attend

As industries demand higher accuracy, efficiency, and reliability in analytical results, mastering gas chromatography has become essential for laboratory professionals. This course offers participants the opportunity to build hands-on expertise with modern GC systems and deepen their understanding of method optimization and data interpretation.

Whether you are new to chromatography or seeking to refine your analytical skills, this course ensures you gain practical proficiency in operating and maintaining GC instruments. Attending this training will enhance your ability to troubleshoot analytical issues, improve workflow efficiency, and deliver consistent, high-quality results in your organization.

Target Audience

This course is designed for:

- Laboratory Analysts and Technicians working in analytical or quality control laboratories
- Chemists and Scientists involved in research and development
- Quality Assurance and Quality Control Professionals
- Environmental Analysts and Technologists
- Process and Production Engineers in the petrochemical and pharmaceutical industries
- Academic Researchers and Graduate Students in Chemistry and related fields
- Anyone involved in testing, monitoring, or analytical services requiring chromatographic analysis

Individual Benefits

- Gain a solid foundation in the principles and applications of gas chromatography.
- Develop confidence in operating, maintaining, and troubleshooting GC instruments.
- Enhance your understanding of method development and analytical optimization.
- Learn best practices for sample preparation, calibration, and quantification.
- Improve data accuracy and analytical reliability in your laboratory work.
- Increase your professional competence and career opportunities in analytical chemistry.
- Stay updated with modern advancements such as GC-MS and automated systems.

Organizational Benefits

- Strengthen in-house analytical capabilities and reduce outsourcing costs.
- Improve product quality, consistency, and compliance with regulatory standards.
- Increase laboratory productivity through optimized GC methods and maintenance.
- Reduce downtime and reanalysis costs by minimizing instrument-related issues.
- Enhance data integrity and confidence in test results across projects.
- Foster a technically skilled workforce capable of independent troubleshooting and method validation.

Instructional Methodology

This course follows a practical, application-oriented approach designed to ensure deep understanding and immediate usability of concepts. Training will include:

- Comprehensive theoretical sessions covering core GC principles and system components.
- Hands-on demonstrations of instrument operation, setup, and calibration.
- Practical exercises in method development and troubleshooting.
- Real-world case studies from environmental, petrochemical, and pharmaceutical applications.
- Interactive group discussions and problem-solving sessions.
- Guided data analysis and interpretation sessions.
- Continuous feedback, Q&A, and performance assessments for individual learning reinforcement.

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Course Outline

Module 1: Introduction to Gas Chromatography – Principles and Theory

- Overview of chromatography and its importance in analytical chemistry
- Understanding retention time, partition coefficient, and resolution
- Classification of chromatographic techniques

Module 2: Components of a GC System

- Gas supply and flow control systems
- Sample injection systems: split/splitless, on-column, PTV injectors
- Columns: capillary and packed types, stationary phases, and selection criteria
- Detectors: FID, TCD, ECD, FPD, and MS interfaces

Module 3: Method Development and Optimization

- Factors affecting separation efficiency and resolution
- Carrier gas selection and flow rate optimization
- Temperature programming and control
- Injection techniques and sample size considerations

Module 4: Sample Preparation and Derivatization Techniques

- Solid-phase extraction, headspace analysis, and microextraction methods
- Techniques to enhance volatility and stability of analytes
- Avoiding contamination and carryover

Module 5: Quantitative and Qualitative Analysis

- Calibration curves, standards, and internal standards
- Data integration and peak area measurement
- Statistical validation and result interpretation

Module 6: Troubleshooting and Maintenance

- Common GC problems and their solutions
- Preventive maintenance and column care
- Detector cleaning and system diagnostics

Module 7: Advanced Applications of GC

- Introduction to Gas Chromatography-Mass Spectrometry (GC-MS)
- Multidimensional and high-resolution GC techniques
- Automation and digital data management in GC systems

Module 8: Quality Control and Regulatory Compliance

- Method validation and standard operating procedures
- ISO and GLP compliance in chromatographic laboratories
- Documentation and audit readiness

Module 9: Case Studies and Practical Workshop

- Real-world problem-solving exercises
- Data interpretation and reporting formats
- Instrument setup and calibration exercises

Certification

Upon successful completion of the course, participants will receive a Certificate in Applied Gas Chromatography, acknowledging their technical proficiency and practical understanding of GC principles, operations, and applications. This certification validates their competence in performing accurate chromatographic analyses and contributes to their professional growth within analytical and industrial laboratories.

Why Choose MAWA Events

- **Global Expertise:** More than 17 years of experience in professional training and consulting.
- **Industry-Leading Faculty:** Courses delivered by seasoned professionals with hands-on experience.
- **Practical Insights:** Learn to turn theory into actionable strategies for real-world business impact.
- **Client-Focused Solutions:** Customized programs designed to achieve your organisation’s unique goals.

In-House / Customized Training Interested in running this course for your team? Please contact us:	TEL: **+601116373203**	EMAIL: **info@mawaevents.net**