

**Educational Objectives:**

1. The focal point is to provide the students with a concise overview of theories, techniques, and practical aspects applicable knowledge, common analytical techniques and how to apply it to solve practical problems.

**Course Outcomes:**

2. This course provides participants with the knowledge and skills needed to successfully operate within a chromatographic laboratory.

3. **Course Contents:**

- a. Introduction to Chromatography
- b. Chromatographic Methods
  - (1) General concept of Column Chromatography
  - (2) Zone Migration
  - (3) Retention
  - (4) Band broadening
  - (5) Resolution
  - (6) Separation time
  - (7) Principle of Quantification
- c. The Gas Chromatography
  - (1) Introduction
  - (2) Pneumatic systems
  - (3) Thermal Zones
  - (4) Sample handling device
  - (5) Sample Inlets
  - (6) Supercritical Fluid Inlets
  - (7) Vapor sample Inlets

- (8) Coupled –Column Gas Chromatography
- (9) Detectors
- d. The Liquid Chromatography
  - (1) Introduction
  - (2) Solvent Delivery System
  - (3) Sample Inlet
  - (4) Column temperature Control
  - (5) Detectors
  - (6) Indirect Detection
- e. Thin-Layer Chromatography
  - (1) Introduction
  - (2) Attributes of Layers and Columns
  - (3) Theoretical Considerations
  - (4) Stationary Phases
  - (5) Sample application
  - (6) Development Techniques
  - (7) Method Development
  - (8) Detection
- f. Supercritical Fluid Chromatography
  - (1) Introduction
  - (2) Mobile phase
  - (3) Stationary Phase
  - (4) Kinetics optimization
- g. Separation of Stereoisomers
- h. Laboratory scale Preparative Chromatography
- i. Countercurrent chromatography
- j. Recent Developments.

**Recommended Books:**

1. **Introduction to Modern Liquid Chromatography** by Lloyd R. Snyder, Joseph J. Kirkland and John W. Dolan.

2. **Principles and Practice of Chromatography** (Chrom-Ed Book Series) by Raymond P.W. Scott.
3. **Chromatography: Concepts and Contrasts** by James M. Miller.
4. **Modern Practice of Gas Chromatography** by Robert L. Grob and Eugene F. Barry.
5. **Handbook of Process Chromatography**, Second Edition: Development, Manufacturing, Validation and Economics by Lars Hagel, Günter Jagschies and Gail K. Sofer.