**ANALYTICAL CHEMISTRY (I)**

**Course Description**: An introduction to the theory of quantitative analysis. CHEM- 23223

**Textbooks:**

1. D. A. Skoog, D. M. West, F. J. Holler, and S. R. Crouch: “Fundamental of Analytical Chemistry”, 8th Edition.
2. Daniel C. Harris , “ Quantitative Chemical Analysis” , 5th or 6th Edition.

**Lectures Coverage:**

1. **The Nature of Analytical Chemistry**
2. **Concentration and Stoichiometry**
3. **Using Spreadsheets in Analytical Chemistry**
4. **Errors in Chemical Analyses**

- Types of errors in experimental data, The effect of systematic errors on

analytical results

1. **Random Errors in Chemical Analysis**

- Statistical treaetment of random error, properties of Gaussian curve, Standard deviation, Standard deviation of calculated results,…

1. **Statistical Data Treatment and Evaluation**

- Confidence limits and interval, Statitistical aids to hypothesis testing, T-test, Q-Test, F-Test

1. **Aqueous Solutions and Chemical Equilibria**
2. **Effect of Electrolytes on Chemical Equilibria**

- The effect of ionic strength, Activity and activity coefficients, Properties of activity coefficients, The Debye-Huckel equation, Equilibrium calculations using activity coefficients

1. **Solving Equilibrium Calculations for Complex Systems**

- Mass balance equations, Charge balance equation, Solving problems involving several equilibria

1. **Gravimetric Methods of Analysis**
2. **Titrimetric Methods; Precipitation Titrimetry**
3. **Principles of Neutralization Titrations**
4. **Titration Curves for Complex Acid/Base Systems**

-Titration of mixture of strong and weak acids or strong and weak bases, Titration of polyfunctional acids and bases, Buffer solution involving polyprotic acids, Calculation of the pH of solution for amphiprotic salts (e.g. NaHA),….

1. **Applications of Neutralization Titrations**

- Standardization, typical applications of neutralization titrations, the determination of inorganic substances ( e.g mixtures of Na2CO3 and NaHCO3), the determination of organic functional groups,…

1. **Complexation Reactions and Titrations**

- complexation equilibria, organic and inorganic complexing agents, Aminocarboxylic acid titrations( e.g. EDTA titrations), equilibrium calculations involving EDTA, conditional formation constants, EDTA titration curves, EDTA titration curves when a complexing agent is present, indicators for EDTA titrations,…