# EFFECTIVE: SEPTEMBER 2004
# CURRICULUM GUIDELINES

**A.** Division: Science and Technology

Effective Date: September 2004

**B.** Department / Program
Area: Chemistry

Revision [ ] New Course [X]

**M:** Course Objectives / Learning Outcomes

Upon completion of this course, the students will:

1. Apply the concepts of precision, accuracy and statistical analysis to a variety of chemical analytical techniques
2. Understand the concepts of gravimetric and volumetric analysis and apply them to a wide variety of problems in analytical chemistry
3. Understand the quantitative principles of aqueous solution equilibria as applied to metal-ligand complexes and carry out detailed calculations on these systems.
4. Understand the basic theory behind various spectrophotometric techniques, produce a block diagram of the associated instrumentation for each and discuss the purpose of each block plus describe the practial considerations appropriate for the application of each method to typical chemical analyses (e.g. sensitivity, detection limits, linear response ranges, interferences, etc).
5. [redacted]

**N:** Course Content:

1. The concepts of sampling, experimental error, precision, accuracy (introduced in earlier courses) will be expanded upon.
2. The concepts of statistical analysis and calibration as applied to analytical chemistry will be introduced.
3. Gravimetric and volumetric techniques of analysis will be briefly reviewed.
4. The quantitative principles of solution equilibria as applied to metal-ligand complexes will be explored in some detail and applications to complexometric titrations examined.
5. The principles of spectrophotometric analysis will be introduced and their practical application explored.
6. Electrochemical methods (e.g. potentiometry, coulometry, voltammetry) will be introduced, both from the point of view of theory and the associated instrumentation.
7. The principles of atomic spectroscopy will be introduced and the associated instrumentation examined.
8. The basic principles of chromatography will be introduced and the associated instrumentation examined; the focus will be on gas-liquid chromatography and high pressure liquid chromatography.

Laboratory Content:

A selection (approximately 10) of the following experiments will be performed in the laboratory period.

1. Statistics in Analytical Chemistry
2. Aqueous Chemical Equilibria – A Detailed Investigation
3. Detection of Fuel Components of Gas Chromatography
4. Complexometric Titrations
5. Potentiometry – Ion Selective Electrodes
6. Spectrophotometric Determination of Maganese and Chromium in a Mixture
7. Determination of Copper Using Flame Atomic Absorption Spectrometry
8. Separation and Identification of Fatty Acids in Commercial Oil Using Gas Chromatography
9. Soil Sample Extraction and Analysis for Magnesium and Calcium
10.

**Q:**