CHEM 205 (0 or 1 credit): Measurement Lab

Description: A laboratory introduction to the science of chemical measurement. Using classical techniques (quantitative analysis, spectroscopic techniques) students will learn to measure important physical and chemical properties, quantitate and minimize measurement errors, and obtain accurate calibrations. Laboratory experiments will focus on student development of precision and accuracy, data analysis and reporting as well as scientific writing. Prerequisite: CHEM 201

Course Goals and Objectives:
1. Demonstrate a basic understanding of the sources of errors in laboratory measurements, its propagation, and statistical analysis of error
   - Calibrate laboratory glassware (pipet, volumetric flask, buret, thermometer) and report data with 95% confidence interval
   - Compare and validate individual student’s data with the rest of the class using t-test and F-tests
   - For all laboratory projects, students will measure analytes multiple times and treat data with statistical tools

2. Be able to plan and prepare samples/reagents using appropriate calculations
   - Make standard solutions from available laboratory reagents
   - Making a solution of desired concentration from supplied stock solution through dilution

3. Understand the signal conversion process for all instrumental measurements
   - Understand the relationship between measured properties (pH, concentration, pressure) with the output signals (voltage)
   - Predict the output signal based on known relationship with measures quantities

4. Understand the use of standard references and calibration plots for determination of unknown quantities
   - Design and develop calibration plots for determination of unknown parameter
   - Recognize the limitations of calibration plots

5. Effectively communicate the laboratory results through oral and scientific writing
   - Write partial/full report using ACS style
   - Support your conclusions with acquired data and literature sources