

## **CHEM 221-101/103: Analytical Chemical Methods**

**Fall 2014**

**Instructor: Dr. Larisa Krishtopa (ext. 5858, room 216 YCEES)**

**[Larisa.g.krishtopa@njit.edu](mailto:Larisa.g.krishtopa@njit.edu)**

**Office hours: Thursday, 2-3 p.m., room 216 YCEES or by appointment**

Textbook: Exploring Chemical Analysis, by Daniel C. Harris, 5<sup>th</sup> ed

Laboratory Manual: Analytical Chemical Methods, by S. Mitra, B. Kezbekus, R. Tomkins

*Grading: 80% Lab Reports and Accuracy and 20% for the Exam*

Week 1: Check –in.

Exp 1. Techniques in Preparing Solutions.

Chapter 1. Chemical measurements. Problems 1-9, 1-12, 1-15

Week 2, 3: Exp. 2. Determination of Sulfate.

Chapter 7. Gravimetric Analysis. Problems 7-6, 7-9

Week 4, 5: Exp. 3. Determination of % of Na<sub>2</sub>CO<sub>3</sub> in a sample.

Chapter 6. Good titrations. Problems 6-3, 6-5, 6-8

Chapter 8. Introducing Acids and Bases. Problems 8-9, 8-15, 8-30, 8-32

Week 6: Exp. 4. Determination of water hardness.

Chapter 13. EDTA Titrations. Problems 13-8, 13-14

Week 7, 8: Exp. 5. Potentiometric determination of an acid mixture.

Chapter 10. Acid-Base Titrations. Problems 10-6, 10-11, 10-20, 10-26

Week 9: Exp. 6. Quantitative determination of iron in a sample.

Chapter 18. Let there be light. Problems 18-16, 18-19

Week 10: Exp. 7. Simultaneous determination of Co and Ni using spectrophotometry.

Chapter 19. Spectrophotometry: Instruments and Application. Problem 19-11

Week 11: TEST

Week 12: Exp. 8. Determination of Na in a snack by FAAS.

Chapter 20. Atomic Spectroscopy. Problems 20-12, 20-16

Week 13: Exp. 9. GC lab: Analysis of Mixture of cyclohexane and toluene.

Chapter 21. Principles of Chromatography.

Chapter 22. Gas and Liquid Chromatography.

### **Learning outcomes:**

By the end of the course, you should be able to do the following:

1. Prepare accurately solutions of assigned concentrations.
2. Determine % of precipitate using quantitative gravimetry.
3. Titrate using indicator, pH probe and pH meter. Develop a titration curve and perform a graphical analysis of a titration curve to determine the equivalence point of titration.
4. Use a spectrophotometer to analyze single analyte and complex mixture containing several species without prior separation.
5. Prepare a sample for metal analysis using acid digestion. Have had hands on experience with flame atomic absorption spectrometer.
6. Have had hands on experience with gas chromatograph. Identify analytes in chromatogram and determine their concentrations quantitatively.