

University of Arkansas – Fort Smith  
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## General Syllabus

### CHEM 3604 Analytical Chemistry

Credit Hours: 4

Lecture Hours: 3

Laboratory Hours: 3

Prerequisite: CHEM 1413/1411 College Chemistry II/Laboratory

Effective: 2018~2019

## I. Course Information

### A. Catalog Description

The total analysis concept is introduced and developed. This framework encompasses the areas of experimental design, sample collection and treatment, and statistical evaluation of results, as well as standard analysis techniques. Basic theory and laboratory practice in analytical chemistry, including introduction to multiple equilibria and chemical separation methods are addressed.

## II. Student Learning Outcomes

### A. Subject Matter

Upon completion of this course, the student will be able to:

1. Apply statistical methods to evaluate analytical data.
2. Analyze experimental methods to determine their limitations and inherent inaccuracies, determine if errors are propagated through calculations.
3. Apply the principles of volumetric analysis to determine analyte concentration through acid-base and complexometric titrations.
4. Apply the principles of chemical equilibrium, including acid-base equilibria, solubility equilibria, and multiple equilibria.
5. Describe the principles and operation of an ultraviolet-visible spectrophotometer.
6. Analyze and apply the principles of analytical separations, including solvent extraction, column chromatography, and gas chromatography.
7. Use electrochemical methods in the analysis of chemical reagents.
8. Perform laboratory procedures safely, collect data through observation, and analyze the data to explain and describe chemical and physical processes.

### B. University Learning Outcomes

Analytical Chemistry enhances student abilities in the following areas:

### **Analytical Skills**

**Critical Thinking Skills:** Students will identify a problem or issue and will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues. Students will generate solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

### **Communication Skills (written and oral)**

Students will communicate proficiently. Students will compose coherent documents appropriate to the intended audience and effectively communicate orally in a public setting.

### **Ethical Decision Making**

Students will model ethical decision-making processes. Students will identify ethical dilemmas and affected parties and will apply ethical frameworks to resolve a variety of ethical dilemmas.

### **Global & Cultural Perspectives**

Students will reflect upon cultural differences and their implications for interacting with people from cultures other than their own. Students will demonstrate understanding or application of their discipline in a global environment and will demonstrate how their discipline impacts or is impacted by different cultures.

## **III. Major Course Topics**

- A. Statistical Treatment of Data
- B. Chemical Equilibrium
- C. Acid-Base Equilibrium
- D. Complexometric Titrations
- E. Gravimetric Analysis
- F. Spectrophotometry
- G. Analytical Separations
- H. Chromatography
- I. Electrochemistry