

University of Arkansas - Fort Smith  
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## General Syllabus

### CHEM 4504 Physical Chemistry I

Credit Hours: 4

Lecture Hours: 3

Laboratory Hours: 3

Prerequisites: CHEM 1413/1411 College Chemistry II/Laboratory and PHYS 2923/2931  
University Physics II/Laboratory

Effective: 2018~2019

#### I. Course Information

##### A. Catalog Description

Topics includes thermodynamics, chemical equilibrium, phase equilibrium, and chemistry of solutions. Offered every other year; consult with faculty advisor.

##### B. Additional Information - None

#### II. Student Learning Outcomes

##### A. Subject Matter

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

1. Analyze and apply the fundamental laws that govern energy flow through chemical interactions on a macroscopic scale.
2. Evaluate and describe macroscopic thermodynamics using the principles of statistical mechanics.
3. Derive thermodynamic equations.
4. Evaluate mathematical models to describe chemical properties and reactivity.
5. Analyze the behavior of non-ideal gases.
6. Evaluate the properties of solutions using physical models and mathematical equations.
7. Evaluate chemical systems into components that can be described by mathematics.

##### B. University Learning Outcomes

Physical Chemistry I enhance 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. Classical Thermodynamics
- B. Statistical Thermodynamics
- C. Gas Laws
- D. Chemical Equilibrium
- E. Phase Equilibria
- F. Solutions