

# Physical Chemistry of Materials 1

## 재료물리화학 1 (445.213A)

### Spring 2017

Instructor: Byungwoo Park Mailstop 33-218 byungwoo@snu.ac.kr <http://bp.snu.ac.kr>

Text: P. W. Atkins and J. de Paula, Physical Chemistry, 10th ed., Oxford University, Oxford, 2014.

Prerequisite: No prerequisite is needed for this course

Time: Mon/Wed 3:30 p.m. - 4:45 p.m.

Classroom: Mailstop 33-225

TA: Alan Jiwan Yun Mailstop 131-413 880-7441 hangyeolee@snu.ac.kr

Instructor's Office Hours: Anytime or by an Appointment

Grading: 30 pts Quiz 1 (Mon/Apr/03/2017)  
30 pts Quiz 2 (Mon/May/08/2017)  
40 pts Final Exam (Jun/ /2017)

Grade Distribution: A (~30%), B (~30%), C (~30%), D or Lower (~10%).

#### Course Objective

This course is a comprehensive first course in physical chemistry. It emphasizes the fundamentals that provide a basis for understanding the nature of materials and the change of states. The objective of this course is to learn under what conditions the matter changes and to formulate the change in terms of thermodynamic variables, and also learn the basic principles of statistical thermodynamics for understanding the molecular motion, chemical reactions, and kinetics.

이 강의는 통년 재료물리화학의 첫 과목으로서, 물질의 성질과 상태 변화를 이해하기 위한 기초를 다룬다. 특히 물질의 변화가 일어나는 조건을 이해하고, 열역학적 변수들을 이용해 이를 표현하며, 나아가 통계열역학의 기본 원리를 통해 분자운동, 화학반응 및 속도론을 중점적으로 학습한다.

#### Course Outline

Physical chemistry deals with interpretation of physical and chemical phenomena in macroscopic, microscopic, atomic, and subatomic level through the principles of thermodynamics, statistical mechanics, and reaction kinetics. In this lecture, we first understand the core concepts of physical chemistry, and apply them to various situations with physical interpretation. Statistical thermodynamics, molecular motion, chemical kinetics, and catalysis will be covered next semester, and applied to chemical reactions.

물리화학은 열역학, 통계역학, 반응속도론 등의 원리를 통해 거시 및 미시, 원자 및 아원자 수준의 물리화학적 현상을 설명하고 이해하고자 하는 학문이다. 본 강좌에서는 물리화학의 핵심 개념을 이해하고 이를 다양한 현상에 적용하여 물리적으로 해석하는 방법에 대해 공부한다. 구체적으로 통계 열역학, 분자 운동, 화학반응 속도론, 촉매 등에 대해 강의하고, 이를 실제 여러 화학 반응에 적용하여 해석해본다.

#### Topics

1. Introduction: Fundamentals [Chapter Foundations]
2. The Properties of Gases [Chapter 1]
3. The First Law of Thermodynamics [Chapter 2]
4. The Second and Third Laws [Chapter 3]
5. Physical Transformations of Pure Substances [Chapter 4]
6. Simple Mixtures and Phase Diagrams [Chapter 5]
7. Chemical Equilibrium [Chapter 6]
8. Molecular Interactions [Chapter 16]