

## Syllabus for THERMODYNAMICS & KINETICS (Chem 335) Fall 2016

This course presents a study of chemical kinetics and chemical thermodynamics. Specific topics include rate laws and reaction mechanisms, reaction-rate theories, the laws of thermodynamics, thermochemistry, and properties of solutions, and equilibrium. Applications will be drawn from organic, and inorganic chemistry, as well as biochemistry.

### INSTRUCTOR:

Professor James S. Keller  
Tomsich 210 PBX: 5357  
e-mail: kellerj@kenyon.edu

### LECTURES:

Monday, Wednesday & Fridays 8:10–9:00 am

### OFFICE HOURS:

M noon–1pm; T 6–7pm; F 1–2pm  
or by appointment (e-mail preferred)

### TEXTBOOK:

PHYSICAL CHEMISTRY for the Chemical and Biological Sciences, 3<sup>rd</sup> Edition by  
Raymond Chang (University Science Books, Sausalito CA, 2000)

Today we identify over four million chemical compounds. Add to this list, the composite materials (like alloys and minerals) and intermediate species (like free radicals) and the number becomes staggering. The list of properties of interest to scientists is also vast.

One truly fascinating aspect of science is that only a few principles are needed to understand the behavior of a huge number of substances and their properties. Physical chemistry is the study of these principles.

- **Equilibrium thermodynamics**—principles that govern stability of materials under diverse conditions
- **Chemical kinetics**—those principles concerned with the theory of change

### LECTURE TOPICS:

- A. The Gas Laws
- B. The First Law of Thermodynamics
- C. The Second Law of Thermodynamics
- D. Gibbs and Helmholtz Energies
- E. Nonelectrolyte Solutions
- F. Chemical Equilibrium
- G. Chemical Kinetics
- H. Enzyme Kinetics

## COURSE REQUIREMENTS:

### A. Prerequisites

One year of Introductory Chemistry (Chem 121 or Chem 122; Chem 124 or Chem 125). Two semesters of calculus (through Calc II) are highly recommended. Proficiency in all these areas will be critical to your success in Chem 335.

### B. Lecture attendance

Lectures are an essential part of this course. You are expected to make every effort to attend **all** lectures. Excessive absences will lead to a lower grade and may lead to expulsion from the course. Please inform me if you must miss a class, and make arrangements to stay current with the material.

### C. Homework

Six sets of homework problems will be assigned during the semester. These homework sets are to be turned in at the start of the Wednesday class following their distribution. They will be graded and a significant penalty will apply to late problem sets (10% deduction per day). The homework component of your course grade will reflect your top five homework scores. I **strongly encourage** students to work in small groups and/or consult with me on these problems; however, I expect everyone to make a serious attempt to work the problems individually before consulting others.

### D. Exams

Two midterm exams will be given during the semester. The tentative dates are **Friday, October 14** and **Monday, November 14**. They will be administered during the regularly scheduled class time for those dates. Topics to be covered and review sessions will be discussed before each exam. A comprehensive, final examination will be given on **Wednesday, December 14** from **1:30–4:30 pm** (as scheduled by the Registrar). This time can only be rescheduled with the permission of the Associate Provost. Plan accordingly.

### E. Quizzes & Projects

Occasional quizzes will be administered in class. Some will be announced; others may not. **Bring a calculator and pencil to every class.** Project assignments will be announced during the semester. Some projects may involve group work. Some may involve in-class presentations or the publication of a webpage.

## EVALUATION:

Your grade will be based on the following distribution:

Homework sets:	15%
Midterm exams:	40%
Final exam:	30%
Class participation	5%
Quizzes & Projects	10%

The total points earned and an evaluation of your class participation will be used to assign a letter grade.

A: excellent work. Mistakes are rare. Unusually good effort.

B: very good work. Some mistakes, but the major concepts are well understood. Good effort.

C: good work. Small mistakes are common, but the major concepts are understood. Good effort.

D: poor work. Major conceptual mistakes. Effort is not enough.

F: unacceptable work. Major conceptual mistakes are common. Effort is minimal.

## **COLLEGE POLICIES:**

### **A. Academic Honesty**

Please read (or reread) the College policy on Academic Honesty in the *Kenyon College Course Catalog 2016-2017* ([Academic Policies and Procedures](#); [Academic Honesty](#)).

Examinations are to be taken without the aid of notes or fellow students. Homework sets cannot be copied. Project reports should be constructed in your own words with acknowledgement of outside sources where appropriate. Feel free to discuss with me how any aspects of Academic Honesty apply to this course.

### **B. Students with Disabilities**

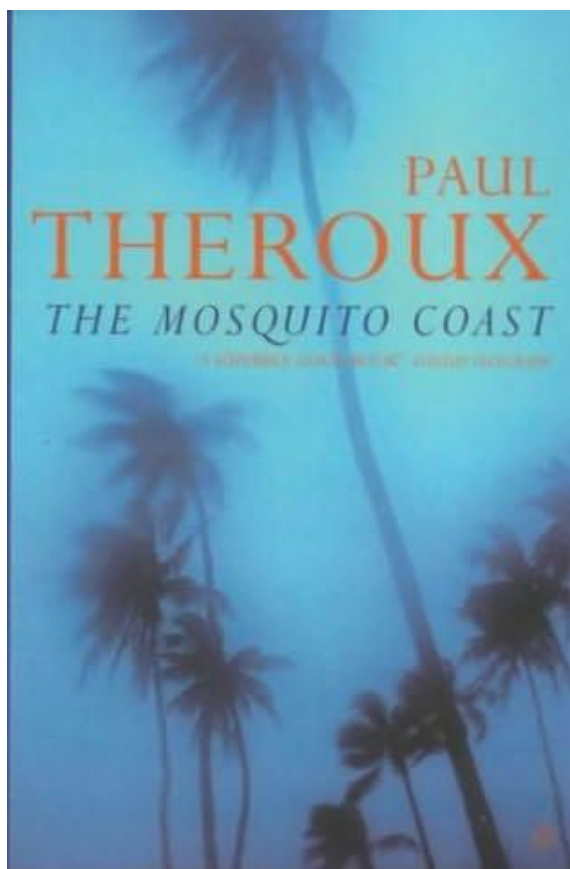
If you have a physical, psychological, medical or learning disability that may impact your ability to carry out assigned course work, I would urge you to contact the Office of Disability Services at x5453. The Coordinator of Disability Services, Erin Salva (salvae@kenyon.edu) will review your concerns and determine, with you, what accommodations are appropriate (*e.g.*, additional time for exams). Only the Coordinator of Disability Services can make recommendations, but please feel free to discuss your concerns in private with me. All information and documentation of disability is confidential.

### **C. Athletics and Extra-curricular Activities**

If your participation in athletics or extra-curricular activities conflicts with a class, scheduled exam time or project due date, please let me know as soon as possible, but at least two weeks in advance. Typically you will be expected to complete your work **before** (not after) the deadline for the rest of the class. Plan accordingly.

### **D. Title IX and VAWA**

As a member of the Kenyon College faculty, I am concerned about the well-being and development of our students, and am available to discuss any concerns. However, I want you to know that faculty members are legally obligated to share certain information with the University's Title IX coordinator. This is to ensure the student's safety and welfare is being addressed, consistent with the requirements of the law. These disclosures include but are not limited to reports of sexual assault, relational/domestic violence, and stalking.

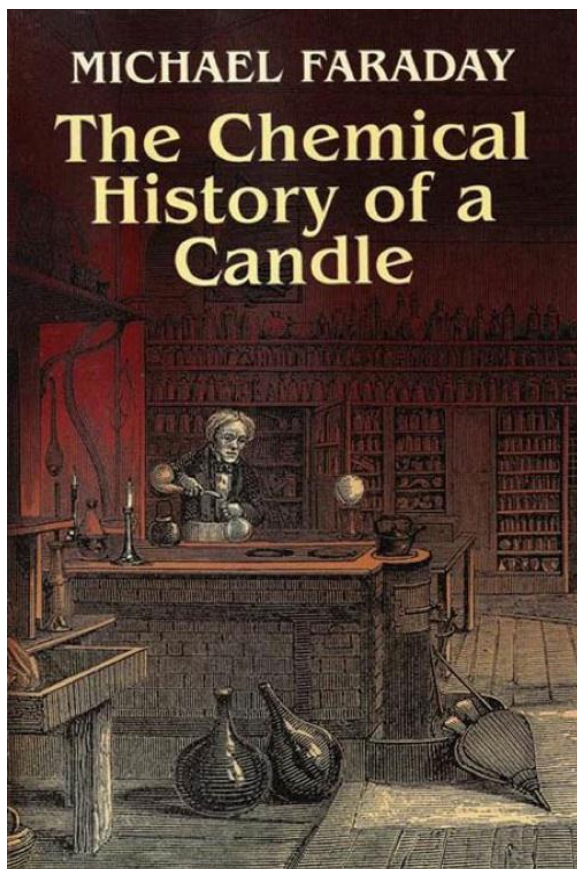


Suggested text:

**The Mosquito Coast**  
by *Paul Theroux*

printed in 1982

made into a motion picture in 1986



Suggested text:

**The Chemical History  
of a Candle**  
by *Michael Faraday*

printed in 1860