

**PHYSICAL CHEMISTRY LABORATORY**  
**CHM 333 / 343**  
**TERM I, 2004-05**

**COURSE DESCRIPTION:** Determination of physiochemical properties and behavior of chemical compounds.

**PREREQUISITES:** CHM 228, CHM 230

**PREREQUISITES BY TOPIC:** Organic Chemistry Laboratory I and Organic Chemistry Laboratory II.

**REQUIRED TEXT:** D.P. Shoemaker, C.W. Garland, & J.W. Nibler, McGraw-Hill, *Experiments in Physical Chemistry*, 1996, 6<sup>th</sup> Edition.

**INSTRUCTOR:** Dr. Shulamith Schlick, C102  
E-Mail: [schlicks@udmercy.edu](mailto:schlicks@udmercy.edu)  
Telephone: 313-993-1012 (office), 313-993-1258 (messages)

**OFFICE HOURS:** 3-5 pm Monday, or by appointment.

**LABORATORY HOURS:** 2-5 p.m. T (CHM 334) Room C 101  
2-5 p.m. T and TH (CHM 344) Room C 101

**COURSE OBJECTIVE:** To illustrate established principles in Physical Chemistry, to provide a clear understanding of instrumentation, experimental procedure, data analysis, and to acquire experience in report writing. Also the importance of the literature data search will be emphasized.

**COURSE OUTCOMES:** After taking this course, students will be able to:

1. Determine the molecular weight of polymers by determination of the intrinsic viscosity (Exp. 28)
2. Determine head-to-head attachments in single polymers (Exp. 28)
3. Determine the surface tension of solutions (Exp. 25)
4. Determine the surface concentration of solutes (Exp. 25)
5. Determine the equivalent entry-layer thickness of solutions of electrolytes (Exp. 25)
6. Describe how changes of pressure and temperature affect the boiling characteristics of liquids (Exp. 13)
7. Measure the vapor pressure with temperature variation and determine the molar heat of vaporization using Clapeyron equation (Exp. 13)
8. Use the phase rule to interpret liquid-vapor composition diagram of two-component system (Exp. 14)
9. Construct liquid-vapor phase and boiling point diagrams (Exp. 14)
10. Determine the azeotropic composition and boiling point of two-component system (Exp. 14)
11. Calculate the equilibrium constants in terms of concentration of aqueous solutions (Exp. 12)

**COMPUTER USAGE:** Students should be familiar with graphing and mathematical functions.

**STUDENT RESPONSIBILITIES:** Students must study and understand the experiment thoroughly before coming to the lab. Each student **MUST** have a detailed record of the experiment in the notebook. Data and calculations at the end of each experiment will be examined and signed by the TA or instructor after the preliminary calculations have indicated that the experiment was properly carried out.

**ADDITIONAL READING:** Chapter I in the Text **before** your first experiment, and Chapter II in the Text **before** your first report.

The notebook must be hard-covered and the pages must be numbered. **Students will be allowed to perform their experiments only if they brought the notebook to the lab.**

**Students must wear goggles in the lab at all times.**

**COURSE REQUIREMENTS:**

3 experiments (CHM 333).

5 experiments (CHM 343).

Students will be assigned experiments from different categories. Experiments will be performed individually or by 2 students, as determined by the TA. Notebooks will be collected by the TA at the end of the term.

Students will replace one experiment by **searching** the literature for an experiment appropriate for this lab, **documenting** the search process in the Lab Book, and give a **Class Presentation** (in lieu of report). It is expected that the students perform the experiment, if possible, in Term II; please consult with the instructor and/or TA. As sources I recommend **The Journal of Chemical Education**, and other **Experiments in Physical Chemistry** books.

**FULL LAB REPORT MUST BE SUBMITTED NOT LATER THAN AT 5 P.M. ON FRIDAY OF THE WEEK FOLLOWING THE COMPLETION OF THE EXPERIMENT. THE REPORTS MUST BE TYPED USING A TEXT EDITOR, AND THE GRAPHS MUST ALSO BE DONE BY COMPUTER SOFTWARE.**

**Students who are late with their report will receive no credit.**

Students are expected to come on time to all sessions. Attendance will be taken 10 minutes after the hour. Punctuality, or the lack of, will be reflected in your final grade.

Periodic minilectures (10-20 min.) on supplemental material will be scheduled over the course, to clarify the theory and experimental procedure, and to indicate modification of the procedure. Students are strongly encouraged to ask questions both on the experimental procedure and the theory behind it.

**Course Grade for CHM 343:**

4 completed experiments	<b>30 pts</b>
4 completed reports	<b>30 pts</b>
Library Search and Presentation	<b>30 pts</b>
Experimental technique and attendance (assessed by TA)	<b>10 pts</b>
<b>Total</b>	<b>100 pts</b>

**Grading:** A: 100-95% A-: 94-90%

B+:	89-85%	B:	84-80%	B-:	79-75%
C+:	74-71%	C:	70-65%	C-:	64-61%
D:	60-50%	F:	below 50%		

**Extra Credit:** points (maximum of 2 pt. per lecture) will be given to students who submit a one-page typed report of the Seminar Lecture. Please include in your report the main topics discussed, how you benefited (or not!) from the lecture, and any comments and suggestions for improving the lecture and the Lecture Series in general. **The report must be submitted on the Friday of the week following the lecture.** Late reports carry no credit.

Lectures are on Tuesdays at 5:15 p.m. in C 114. The Seminar Lecture Program for Term I will be posted in the Chemistry office.

**Important Dates:**

Last date to add a class:	September 13, 2004
Last date to drop a course without a "W":	October 1, 2004
Midterm grades due:	October 26, 2004
Last date to withdraw from class:	November 22, 2004

**Academic Integrity:**

Students are expected to conform to a high standard of honesty and integrity in this course. Please refer to the University Catalog for a further explanation of academic integrity.

**Food, drinks and cell phones are not allowed in the lab!**