

**CHEMISTRY 301 LABORATORY**  
**PHYSICAL CHEMISTRY LABORATORY**  
*Tuesday 2:00 - 5:20*

**INSTRUCTOR:** Dr. Robert E. Barletta  
**OFFICE :** Physical Chemistry Laboratory  
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(251) 460-7424  
**OFFICE HOURS:** Tuesday and Thursday, 11:00 a.m. - noon, Room 133 Chemistry Building

**Text:** Physical Chemistry Lab Manual; additional reference (not required) C. W. Garland, J. W. Nibler, D. P. Shoemaker, *Experiments in Physical Chemistry (on reserve)*

**Material Covered:** See accompanying experiment list

**Attendance:** Attendance at laboratory is required. Failure to complete at least seven experiments and to submit satisfactory lab reports, and to present the oral final, will result in failure for the lecture course CH 301. Any student requiring special accommodations should notify the instructor as soon as possible so that arrangements can be made.

**Goals:** (1) Explore fundamental concepts of physical chemistry presented in the lecture component.  
(2) Develop problem-solving skills.  
(3) Develop experimental skills.

**Objectives:** (1) Perform real-time kinetics experiments.  
(2) Perform spectroscopic measurements on modern instrumentation.  
(3) Compose professional reports of laboratory work.  
(4) Develop data analysis and interpretation skills.  
(5) Experimentally construct phase diagrams.

**Grading:** Reports are to be roughly based upon the format presented in the laboratory manual. Lab reports should be written on such a level that other students in your course could understand them. You can assume the reader is familiar with the experimental details and background theory. You are NOT writing these reports to the instructor, you are writing these reports to explain your experimental data. You should include everything necessary for this explanation. References to the literature should be made in the appropriate style.

Grading roughly following the following scale:

Title	0
Abstract	5
Data (Laboratory Notes)	10
Data Section	20
Calculations	25
Error Analysis	10
Discussion of Results	25
Technique and Lab Skills	5
Total	100

Each of the nine experiments will be worth 100 points for a total of 900 points, the oral lab final is worth 200 points. The laboratory grade will be based on the best eight laboratory grades plus the oral lab final.

**DISABILITY:** In accordance with the Americans with Disabilities Act, students with bona fide disabilities will be afforded reasonable accommodation. The Office of Special Student Services will certify a disability and advise faculty members of reasonable accommodations.

## REQUIREMENTS:

1. All safety rules must be followed in the laboratory as described in the handout of safety rules.
2. At the beginning of the lab period, check inventory (both equipment and chemicals) for your experiment. If a piece of equipment is missing or damaged, the previous group will be held accountable. This procedure must be completed within 15 minutes of the beginning of the lab.
3. Each lab report is due after 1 week. Individual lab reports are required, one for each team member. All lab reports are due at 2:30 PM the week following the completion of the lab. Late penalties are as follows: **10% per academic day. After 2:30 PM, it is late, and will be graded as such.** (Disregard the late penalty guidelines in the manual.) Format for lab report is given below.
4. All reports must be typed with double spaced lines. The chemistry department has a group of computers available to handle the word processing needs. Data analysis can also be performed on these computers using such programs as EXCEL and MATHCAD. The lab manual introduces these programs if you have not used them before. Sample calculations may be written by hand, but the logical flow of calculations must be apparent.
5. The cover sheet must include the date the lab was performed, and the date it was submitted. If you submit a late lab report, you **MUST** have the date you actually submitted clearly indicated (or lose an additional 10%).
6. Anyone who misses a lab will receive a zero for that lab.
7. You must have a procedure in your lab notebook for that day's lab. The procedure should include all of the general elements of the lab, and any data sheets you will need. **If you do not have a procedure in the lab notebook, YOU WILL NOT BE ALLOWED TO PERFORM THE LAB, and will receive a zero. This is a safety concern.** You will be expected to answer questions about the lab you are to perform that day (part of technique and lab skills). All data will be recorded *in ink in the laboratory notebook* and a duplicate copy turned in to the instructor at the end of the period.

*Experiments:*

- #1 Enthalpies of Combustion Using a Bomb Calorimeter
- #2 Partial Molal Volume
- #3 pKa of a Weak Acid
- #4 Liquid/Vapor Equilibrium in an Azeotropic Mixture
- #5 Properties of a System of Three Partially Miscible Liquids
- #6 Thermodynamic Data from Electromotive Force Measurements
- #7 Conductance of Electrolytic Solutions
- #8 Mutarotation of Dextrose by Polarimeter
- #9 Kinetics of a 2<sup>nd</sup> Order reaction

Experimental Schedule

	<b>Week 1</b> 8/29	<b>Week 2</b> 9/5	<b>Week 3</b> 9/12	<b>Week 4</b> 9/19	<b>Week 5</b> 9/26	<b>Week 6</b> 10/3	<b>Week 7</b> 10/10	<b>Week 8</b> 10/17	<b>Week 9</b> 10/24
<b>Team A</b>	Expt 1	Expt 2	Expt 3	Expt 4	Expt 5	Expt 6	Expt 7	Expt 8	Expt 9
<b>Team B</b>	Expt 2	Expt 3	Expt 4	Expt 5	Expt 6	Expt 7	Expt 8	Expt 9	Expt 1
<b>Team C</b>	Expt 3	Expt 4	Expt 5	Expt 6	Expt 7	Expt 8	Expt 9	Expt 1	Expt 2
<b>Team D</b>	Expt 4	Expt 5	Expt 6	Expt 7	Expt 8	Expt 9	Expt 1	Expt 2	Expt 3
<b>Team E</b>	Expt 5	Expt 6	Expt 7	Expt 8	Expt 9	Expt 1	Expt 2	Expt 3	Expt 4
<b>Team F</b>	Expt 6	Expt 7	Expt 8	Expt 9	Expt 1	Expt 2	Expt 3	Expt 4	Expt 5

*Laboratory Oral:*

During the last laboratory session, you will give an oral presentation describing one of the experiments performed during the semester. The experiments assigned to each team are listed below. Each presentation should be approximately 15 minutes in duration describing what you are measuring and how you are measuring it. Include any relevant theory so that results are understandable. The experimental procedure should only be described in general terms. The presentation must include results obtained by each of the teams in the section treated in a statistically accurate manner. (It will be your responsibility to obtain these.) Your conclusions and at least one application based on the literature must also be included in your talk. There will be a short question-and-answer period after the talk.

Oral Presentation Schedule  
10/31

Team	Partner I Experiment	Partner II Experiment	Time
A	1	2	1:30 - 2:00
B	3	4	2:00 - 2:30
C	5	6	2:30 - 3:00
D	7	8	3:00 - 3:30
E	9	1	3:30 - 4:00
F	2	3	4:30 - 5:00
G	4	5	5:00 - 5:30