Physical Chemistry Lab. 333-Syllabus—S02

Fall 2016 – Tu 2:50 – 5:50 pm Fulmer 218---Main Lab
Professor: Louis Scudiero http://www.wsu.edu/~pchemlab
Fulmer 261A, phone 335-2669 scudiero@wsu.edu

TA: Bita Khorasani, Wegner 307 - Office hours: M. 1:30 – 2:30PM bita.khorasani@wsu.edu

TEXT: Experiments in Physical Chemistry by Shoemaker, Garland, and Nibler; 6, 7 or 8th ed.; (McGraw-Hill)

HANDOUTS and a few short **VIDEO CLIPS** of the experiments listed below are available at \\Diamond3.ad.wsu.edu\instruction\PChem\Chem 333 that you can access by going to Start then run. Type \\diamond3\Instruction\Pchem\. You will be prompt for an id, type *ad\yourname* and then enter your *password*.

EXPERIMENTS: You are required to complete seven (7) experiments from the list on the back page of this handout. The experiments will be assigned to each student and listed on the sign-up sheet posted on the board between Fulmer 219 and 218 and on Blackboard. It is the student's responsibility to have read the textbook and/or handout pertinent to the assigned lab experiment prior to coming to class .

REPORTS: Your reports will consist of three types:

(1) **ORAL REPORT (1):** This will be presented to me, the TAs and peers. (See instructions at http://www.wsu.edu/~pchemlab). It must be scheduled with the TA and will be given at the end of the semester (***Nov. 29th, 2016 in Fulmer 101***). The student and his/her partner can do an oral on any one experiment from the list. It should be cleared and schedule with the TAs.

(2) **WRITTEN REPORT (1):** This should be written as if it is going to be published. Use the format in Chapter I of Shoemaker, Garland, and Nibler. The report will be graded and returned to you for revisions before a final score is given so it should be done on a computer. It is due before or at 5 PM on ***Nov. 18, 2016*** (No late reports will be accepted).

(3) **REPORTS IN "NOTEBOOK"(5):** These reports should be written up in a notebook or save on your personal computer. Submit a copy of your notebook or a print out from your computer for grading. They should include anything that would help you to repeat the experiment in the future. (Eg. Raw data, calculations, references, differences in the experiment, etc.) ***They are due two (2) weeks after the experiment is finished. They are NOT group reports, each student needs to write his/her own notebook report (not a copy of the lab partner's report).***

SCHEDULING: A sign-up sheet will be loaded onto Blackboard and also posted in the hall outside the Laboratory (between room 218 and 219). It will list the experiment you were assigned to perform that week. Make up labs might be possible only on 11/08. Make up labs will be allowed only for special cases.

RECORD BOOK: A notebook is required that can then be kept while the reports are being graded. You must keep it current during the experiments and the data must be dated and initialed by one of the TAs or me as soon as the experiment is done and attached to the report that is submitted for grading. (This is your responsibility.)

GRADING:

Oral Reports	20%	**Scale**		
Written Reports	20%	**90 →A**	**80 →B**	**68 →C**
Reports in Notebook	50%	**87 →A-**	**76 →B-**	**62 →D**
Laboratory Habits + online Eval.	5 + 5%	**84 →B+**	**72 →C+**	**< 62 →F**

EXPERIMENTS--CHEM 333

(Numbers and pages refer to Shoemaker, Garland, and Nibler)

Bold experiments are required

THERMOCHEMICAL EXPERIMENTS

Exp	Title	Room	Text/Handout	[Students, a *or* p] {Setups }
6	***Heats of Combustion***	***232&234***	***p.152, handout***	***[8,p] {4}***
9	Heats of Solutions	232&234	handout	[2,a] {2}
10	Freezing Point Depression - MW Determination of Sucrose	232&234	handout	[4,p] {2}

EQUILIBRIUM AND PHASE EXPERIMENTS

13	***Vapor Pressure of a Pure Liquid (S&SH)***	***Fulmer 101***	***p.199/handout***	***[16,a] {16}***
28	Viscosity of Polymer	218	p.215, handout	[4,p] {2}

KINETIC EXPERIMENTS

D	***H_2O_2 Catalysis by I^-***	***232&234***	***handout***	***[8,p] {4}***

LIQUID EXPERIMENTS

14	Cross-sectional Area of a Film (Surface Tension Measurement)	218	p.292, handout	[4,p] {2}
30	***Dipole Moment of Polar Molecules in Solution***	***234***	***p.336, handout***	***[2,p] {1}***

ELECTROCHEMICAL EXPERIMENTS

16	Transference of Ions: Moving Boundary Method	232&234	handout	[2,a] {2}

PROPERTIES OF GASES

2	***Joule-Thomson Effect (SH)***	***234***	***p.96***	***[2,p] {1}***

***** Square bracket [n, a *or* p] shows number of student and whether you will work alone (a) or with a partner (p), and {s} shows how many experimental set-ups exist for each experiment s = 1, 2. For example, you will work alone on experiment #16 but with a partner on experiment #1.

Students with Disabilities: I am committed to providing assistance to help you be successful in this course. Reasonable accommodations are available for students with a documented disability. Please visit the Disability Resource Center (DRC) during the first two weeks of every semester to seek information or to qualify for accommodations. All accommodations MUST be approved through the DRC (Admin Annex Bldg, Rooms 205). Call 509 335 3417 to make an appointment with a disability counselor.

Academic Integrity: I encourage you to work with classmates on lab reports. However, each student must turn in original work. No copying will be accepted. Students who violate WSU's Policy on Academic Integrity will receive an F for that report. Academic integrity is the cornerstone of the university. Any student who attempts to gain an unfair advantage over other students by cheating, will fail the course. You must do your own work.

THREE STEPS of ERROR ANALYSIS

1. **Before the experiment**, predict the approximate size of errors using the "propagation of errors" method; it gives the value of σ you can hope for when reporting your result: X ± σ. This helps to "design" the experiment: which measurement or procedure contributes most to σ? –That's the one to receive careful attention.

2. **During the experiment**, make enough measurements so that statistical analysis can provide a **measure** of the errors or uncertainties. This is the number that should follow your reported measured value: X ± *e* (don't use σ). It may be as simple as making duplicate measurements so that an average, X, and standard deviation, *e*, can be computed, or it might require another statistical method such as determining the uncertainty of the slope in a linear least squares fit.

3. **After the experiment**, compare:

a. If measured errors (*e*) are much bigger than propagated errors (σ) then evidently there is some source of error in addition to those that entered your propagation of error. Try to think what it might be.

b. If your measured values differ from accepted values by twice (or more) the measured error, $|X-X_{true}| \geq 2e$, then it is likely you have made a systematic (procedural or computational) error.

Note that two examples of error propagation calculations are also available at www.wsu.edu/~pchemlab