

CHE 347: Physical and Analytical Laboratory

Syllabus

Physical Chemistry is the part of chemistry that is specifically focused on the quantitative relationships between measurements of macroscopic physical and chemical properties of matter and energy and microscopic theories of nature. What is actually known about such fundamental and far-reaching things has resulted from literally centuries of careful experimentation and comparison with theory. During this semester we will concentrate on measurements of various kinds that reveal directly either the molecular nature of matter such as spectroscopy or thermodynamic quantities/measurements that need have no explicit connection with the microscopic properties of matter. We shall be interested in the kinds of information that is accessible via quantitative theoretical interpretation of both kinds of results. This exposure will not be exhaustive but should serve as a basis for the student to utilize as he or she progresses into new areas on their own.

All analytical techniques originated as physical chemistry experiments. Thus, analytical chemistry is concerned with the art and science of obtaining precise and accurate characterization of chemical and physical systems. As such some of our exercises will focus on the measurement process itself. A general presentation of some measurement technology combined with a continuing emphasis on proper treatment of experimental error will round out the planned activities of the semester.

In addition to learning about the scientific substance of these chemical and physical measurements, we will also be interested in gaining experience in the handling and presentation of data and results. Further, it is imperative that we all become as adept as possible in our ability to communicate our science either orally or via the written word. The lab reports of this course and your interactions with the TAs and Professor Chaiken give opportunities for students to gain experience in these areas.

We need to become as proficient as possible in the searching of the scientific literature in general. We need to become disciplined at always working safely for our own sake and in consideration of others. This includes working in an environmentally responsible manner.

Locations and times

Lab lectures are held Mondays in CST 1-019 from 2:15 to 3:10 pm Labs are held in LSB 301 from 9:00 – 11:50 am Tuesdays, and from 2:15 – 5:05 pm Wednesdays, Thursdays, and Fridays.

Contact information

Dr. Chaiken has general office hours 1-2 pm most Mondays and by appt. (CST 2-010). Office hours for TAs are by appointment only. Email addresses for Dr. Chaiken and the TAs are:

Dr. Chaiken: jchaiken@syr.edu

Corey Kroptavich crkropta@syr.edu

Steven Ortiz: stortiz@syr.edu

Shawn Kowal: sfkowal@syr.edu

Minh Quan Hoang Dinh midinh@syr.edu

Rebecca Prendergast rfollmer@syr.edu (CST 1-044 A/B Office hours: 10:00-11:00 T/Th and by Appointment)

It is your responsibility to contact your TA with questions in a timely fashion.

Order of Experiments

Dates	Experiment		Instructor(s)
	Red Group	Blue Group	
Aug 29 - Sep 1	TA Intro and Safety	TA Intro and Safety	
Sep 4 - Sep 8	No Lab	No Lab	
Sep 11 - Sep 15	1. Calibration Curves I	2. Calibration Curves II	Minh/Shawn
Sep 18 - Sep 22	2. Calibration Curves II	1. Calibration Curves I	Shawn/Minh
Sep 25 - Sep 29	3. Phase Partitioning	4. Adsorption Isotherms	Minh/Shawn
Oct 2 - Oct 6	4. Adsorption Isotherms	3. Phase Partitioning	Shawn/Minh
Oct 9 - Oct 13	6. Phase Diagrams	5. Acid-Base Equilibrium	Steve/Corey
Oct 16 - Oct 20	5. Acid-Base Equilibrium	6. Phase Diagrams	Corey/Steve
Oct 23 - Oct 27	7. Heat of Combustion	7. Heat of Combustion	Shawn/Minh
Oct 30 - Nov 3	8. Heat Capacity	8. Heat Capacity	Steve
Nov 6 - Nov 10	9. Reaction Enthalpy	9. Reaction Enthalpy	Corey
Nov 13 - Nov 17	10. Final Project	10. Final Project	Corey/Steve
Nov 20 - Nov 24	No Lab (Thanksgiving)	No Lab (Thanksgiving)	
Nov 27 - Dec 1	Lab Final Office Hours	Lab Final Office Hours	
Dec 4 - Dec 8	No Lab	No Lab	

Note that the experiments have been divided into “Red Group” and “Blue Group”. You can look up which group you belong to on Blackboard (under “Information”). Pay attention, as the two groups follow a different order of experiments. Completing the pre-lab work for the wrong experiment will result in you not being allowed to attend that week’s lab, and you will receive a grade of 0% for the experiment you were meant to perform that week.

Due dates for pre-lab work

Pre-lab readings for each lab must be completed before that week’s lab lecture. A set of pre-lab questions for each experiment will be made available to students on Blackboard on the Monday before the week of the experiment (so for example, the questions for Experiment 9 (Reaction Enthalpy) will be available as of Monday, October 30). Answers to each question must be submitted on Blackboard no later than 2:00 p.m. on the day of the lab lecture for that week’s experiment. (This would mean submitting answers for the pre-lab questions for Experiment 9 by Monday, Nov. 6 by 2:00 p.m.). If you do not submit the answers on time you will not be allowed to attend that week’s lab, and will receive a grade of 0% for that experiment. If you receive a score of less than 50% on the pre-lab questions you must write the correct answers for **each** question in your lab book (even the questions you answered correctly online) and present it for inspection by your TA at the beginning of your lab. Failure to do this will result in your not being allowed to participate in that week’s lab and receiving a grade of 0% for that experiment.

You must come prepared to each lab. Students who are not prepared slow down the class and can pose safety risks to themselves and others.

You must prepare an experimental procedure for each experiment. This procedure must be written in

your lab notebook in ink (**not** pencil) or (if prepared on a computer) pasted or taped securely into your lab book.

For some labs you will be required to look up specific pieces of information (e.g. spectra, literature values). This will be made clear in the pre-lab instructions. These values must be written clearly in your lab book by the beginning of the lab.

You must have your lab book open to the procedure for the current experiment by 2:15 p.m. the day of the lab (by 9:00 a.m. for the Tuesday section). The TA will check each lab book to ensure that all pre-lab work has been properly performed (procedure, requested literature values, and, if necessary, answers to pre-lab questions). If you do not have the pre-lab work ready at the beginning of the lab, you will be dismissed and will receive a grade of zero for that experiment. If you arrive more than ten minutes late to the lab, the TA will not check your lab book and you will be dismissed from the lab (and will receive a grade of 0% for that experiment).

Due dates for post-lab work

All post-lab work is due one week after the lab. It must be handed in to the undergraduate office by 8:45 a.m. (for the Tuesday lab section), or by 2:00 p.m. (for Wednesday, Thursday, and Friday lab sections). (So if you perform Experiment 3 on Wednesday, September 27, the post-lab questions and lab report will be due by 2:00 p.m. Wednesday, October 4.) Post-lab work emailed to TAs or handed in to locations other than the undergraduate office will not be accepted.

Post-lab work that is handed in late will be penalized at a rate of 20% per day. Note: Work handed in at 2:01 p.m. on the due date **will be penalized 20%**. Weekends will count as one day. The full lab report (Heat of Combustion Lab) is due the week of October 31 in the undergraduate office 15 minutes before the start of that week's lab (8:45 a.m. or 2:00 p.m.). Penalization for late lab reports is the same as for regular post-lab work (described above). The final project (Experiment 10) post-lab work is due the week of Dec. 4. It must be handed in by 2:00 p.m. on the day of the lab section (including the Tuesday section).

List of Due Dates for Post-Lab Work

Dates	Red Group	Blue Group
Sep 19 - Sep 22	1. Calibration Curves I	2. Calibration Curves II
Sep 26 - Sep 29	2. Calibration Curves II	1. Calibration Curves I
Oct 3 - Oct 6	3. Phase Partitioning	4. Adsorption Isotherms
Oct 10 - Oct 13	4. Adsorption Isotherms	3. Phase Partitioning
Oct 17 - Oct 20	6. Phase Diagrams	5. Acid-Base Equilibrium
Oct 24 - Oct 27	5. Acid-Base Equilibrium	6. Phase Diagrams
Oct 31 - Nov 3	7. Heat of Combustion	7. Heat of Combustion
Nov 7 - Nov 10	8. Heat Capacity	8. Heat Capacity
Nov 14 - Nov 17	9. Reaction Enthalpy	9. Reaction Enthalpy
Nov 21 - Nov 24	---	---
Nov 28 - Dec 1	---	---
Dec 4	10. Final Project	10. Final Project

Grading

Grades will be assigned as follows:

Weekly post-lab work	64%
Full lab report	5%
Final project	15%
Pre-lab questions	6%
Lab lecture participation	4%
In-Lab Performance	6%

There will be no make-up labs. The experiment with the lowest total grade (pre-lab questions, performance, and post-lab work) will be dropped at the end of the semester. If you do not attend a lab for any reason, the grade of zero assigned for that experiment will count as your lowest grade and will be dropped. If you miss more than one lab, only one grade will be dropped, and the other lab(s) you missed will be assigned a grade of zero.

Attendance is not recorded during the lecture, and is not part of the student's grade. However, students must attend lectures in order to receive credit for the clicker questions that form part of the lecture ("lab lecture participation"). No credit will be awarded if clicker questions are not answered during class and recorded by Turning Technologies. It is the student's responsibility to ensure that they attend class, that they bring their clicker, and that their clicker is operating correctly. Credit is awarded for answering clicker questions, **not** for getting the correct answer. Answering at least 70% of in-class clicker questions during a lecture will give a student a point for that lecture. If points are obtained for at least 8 lectures (out of 9 total possible), the student will receive the full 4% of the total class grade devoted to lab lecture participation. If points are obtained for fewer than 8 lectures, the student will receive a grade of 0% for participation.

Tentative Grading Scheme

Letter grades correspond to the percent grade as follows:

Percentage (%)	Letter Grade
90 – 100	A
80 – 89	A-
77 – 79	B+
73 – 76	B
70 – 72	B-
67 – 69	C+
63 – 66	C
60 – 62	C-
50 – 59	D
0 – 49	F

Dr. Chaiken reserves the right to curve grades upward if he deems it necessary. Grades will never be curved downward.

Bonus Points

There *may* be some (very few, if any) opportunities to increase your overall grade by performing additional work. These opportunities for bonus points will be announced during the lab lecture. They may not be announced on Blackboard or via email: It is the individual student's responsibility to make themselves aware of these opportunities.

Dress code

Close-toed shoes must be worn in the laboratory, and long hair must be tied back. Safety glasses, lab coats, and gloves will be provided for some experiments. You must wear this protective gear if requested to do so by your professor or TA. Failure to adhere to these rules will result in dismissal from the laboratory and a grade of 0% assigned for that experiment.

Blackboard Site

Course information is available through the course Blackboard site: blackboard.syr.edu

Important course information can be accessed there. Tutorials and required readings for labs can also be accessed there. Pre-lab questions must be answered on Blackboard.

Religious Observances Policy (http://supolicies.syr.edu/emp_ben/religious_observance.htm)

SU recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class. The religious observances policy requires accommodation for the religious holiday itself, not for travel days if a student will be observing the holiday elsewhere.

Academic Integrity: The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see http://supolicies.syr.edu/ethics/acad_integrity.htm.

Special Accommodations: If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu>, located at 804 University Avenue, room 309, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities "Accommodation Authorization Letters." as appropriate. As accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.