

PHYSICAL CHEMISTRY LAB II

CHEM 3625

Spring 2021

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|--------------------|------------------------|----------------------|-------------------------|
| Instructor: | Matthew Rowley | Office Hours: | Daily 1:00 pm - 2:00 pm |
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Please include the course number in the subject line of all correspondence.

Course Description

This course is the laboratory to accompany CHEM 3620 – Physical Chemistry II. We will observe and explore chemical systems which clearly demonstrate principles of quantum mechanics.

Prerequisites: None

Concurrent requisite: CHEM 3620 – Physical Chemistry II

Course Materials:

No lab manual will be required. The instructions for each experiment will be posted on Canvas. You will be required to have and wear your own pair of OSHA-approved safety goggles whenever you are in the lab. Students without eye protection will be required to leave the lab and will receive a zero for the labwork that day.

Student Learning Outcomes:

Knowledge of the physical and natural world – Students will recall, interpret, compare, explain, and apply chemistry terminology and theory.

Quantitative Literacy – Students will use chemical equations, graphs and tables to interpret and communicate chemical information.

Inquiry and Analysis – Students will solve complex chemical problems.

Communication – Students will report laboratory results clearly and concisely.

Problem Solving – Students will design and implement experimental procedures.

Teamwork – Students will productively interact with each other to successfully conduct chemistry experiments.

Laboratory Work

Before lab, you are expected to have read the handout of your experiment as well as review your lecture notes from class. Come prepared to enter your data into the lab computers and have a USB drive with you. You may perform each laboratory with a lab partner and you may acquire your data together during your scheduled lab time. However, you must NOT work with your lab partner beyond this. All analysis of data and calculations as well as all laboratory reports must be done on an individual basis. Failure to do so will result in a zero for the lab in question. Please follow all safety procedures, especially by wearing safety glasses or goggles. When leaving the lab, please make sure it is in the same condition as it was when you arrived. Be respectful of others.

Laboratory Risk: Chemical exposure is a constant risk in a chemistry lab. To minimize the risk to yourself and those around you, the following rules must be followed:

- Never taste or smell a chemical or pipette by mouth.
- Wash your hands before leaving the lab and frequently during the lab to avoid accidental contamination of yourself and others.
- Dispose of chemicals only as directed. Nothing goes down the sink unless expressly directed.
- Keep your work area clean; wipe up any spills (liquid or solid) immediately.
- Replace caps on reagent bottles, and never return chemicals to the original container.
- No shorts, tank tops, or sandals allowed in lab, and long hair should be restrained.
- Wear safety glasses at all times when in the lab.

Students enrolling in this course should realize that they are voluntarily exposing themselves to a variety of chemicals, some of which could be irritating or hazardous with excessive exposure. For those persons with a sensitive medical condition such as allergies, precautions such as wearing additional protective garments, delaying enrolling, or even not enrolling in a class may be necessary. In particular, women who are their first trimester of pregnancy should avoid exposure to many chemicals unless approved by their physician.

Tentative Schedule

This class will meet on Thursdays from 3:30pm – 5:20pm in room 224 of the Science Center (SC)

Week 1: Jan. 11 – Jan 15

No Lab

Week 2: Jan. 18 – Jan 22

No Lab

Week 3: Jan. 25 – Jan 29

Exp 1: Quantum Dots and Particle in a Box – A Spectroscopic Study

Week 4: Feb. 1 – Feb. 5

No Lab – Analyze Quantum Dot Data

Week 5: Feb. 8 – Feb. 12

Exp. 2: Absorption Spectrum of Conjugated Dyes

Week 6: Feb. 15 – Feb. 19

No Lab – Analyze Conjugated Dyes Data

Week 7: Feb. 22 – Feb. 26

Exp. 3: Photophysics of Pyrene

Week 8: Mar. 1 – Mar. 5

No Classes this week (Spring Break!)

Week 9: Mar. 8 – Mar. 12

No Lab – Analyze Pyrene Data

Week 10: Mar. 15 – Mar. 19

Exp 4: Applications of Quantum Chemistry

Week 11: Mar. 22 – Mar. 26

No Lab – Analyze Computational Data

Week 12: Mar. 29 – Apr. 2

Exp. 5: Vibrational-Rotational Spectra of HCl/DCl

Week 13: Apr. 5 – Apr. 9

No Lab – Analyze HCl/DCl Data

Week 14: Apr. 12 – Apr. 16

Exp. 6: Calculation of π -type Delocalized Orbitals Using Hückle Theory

Week 15: Apr. 19 – Apr. 23

Final Exam (More details about the final will come)

Finals Week

No Final – You took it last week!

Course Requirements

Grades for this class will be determined based on the following items:

Pre-Lab Quizzes (10 points each) – Quizzes must be completed at the beginning of each lab.

You may take the better score out of two attempts at these quizzes.

Lab Reports (40 points each) – Reports must be turned in at the beginning of the following lab.

Lab Final (100 points) – The final will be given on the last scheduled day of class (Dec. 1).

Final Grades will be assigned according to the following scale:

| Percentage | Grade | Percentage | Grade |
|------------|-------|------------|-------|
| 100–93.0 | A | 77.0–73.0 | C |
| 93.0–90.0 | A- | 73.0–70.0 | C- |
| 90.0–87.0 | B+ | 70.0–67.0 | D+ |
| 87.0–83.0 | B | 67.0–63.0 | D |
| 83.0–80.0 | B- | 63.0–60.0 | D- |
| 80.0–77.0 | C+ | < 60.0 | F |

Note that you must complete *all* of the labs to pass this course! Regardless of your other scores, an incomplete lab will result in an incomplete grade for entire course.

Report Grading: Lab reports will be graded on the quality of both their *scientific content* and their *presentation* in the following way:

Presentation – Presentation includes writing quality, writing style, clarity, organization, formatting, grammar, etc.

Scientific Content – Your report should demonstrate a clear understanding of the basic principles at play in the lab. Data presentation should show an understanding of what the data mean and why they are important (e.g. mislabeled axes show a lack of understanding). Analysis of your data and any conclusions drawn should have a sound basis in the scientific theories you have been taught.

Different chemistry journals have different formats and requirements. To keep things simple, your reports should have four sections:

Introduction – Show background knowledge and general understanding of the experiment.

Method – Outline your specific procedure with enough detail that a competent chemist could reproduce your work.

Results – Results should include charts of any relevant data, as well as a description of any qualitative observations made in the course of the experiment.

Discussion – Interpret your results and draw conclusions. The lab manual will often prompt you with questions which must be answered in this section.

Late Work Policy: Laboratory reports must be turned in at or before the beginning of the following lab. There is a large window of time in which to analyze and write-up your results, so please plan to do the work early if you have any scheduling conflicts. Late work will not be accepted.

Make-up Work Policy: In general, there will be no opportunity to make up missed labs. This is particularly important because you must complete all of the labs to pass this course. If you must miss your assigned lab time, please arrange with your partner and me to do the lab some other time within the same week.

Miscellany

Important syllabus statements related to ATTENDANCE and COVID-19:

Q: If a student does NOT want to attend face-to-face this fall, is there another option?

A: All students who would normally attend face to face classes should plan to do so, unless they are ill or are concerned for their health. However, if a student is ill or concerned for their health, students will be able to complete classes this fall whether they stay home or are here in Cedar City. Digital recording equipment will be installed in each instructional space (classrooms, labs and other venues) so that students can log in and attend face-to-face classes remotely. This will allow any SUU community member to engage in classroom activities in the way they feel comfortable. Faculty will also be able to teach remotely in accordance with their personal health needs. Faculty will likely post the link for how to listen/watch live in the syllabus (and/or Canvas) or simply email it to their students. We recommend to students that they reach out to their faculty to notify them how they will be 'attending' class.

Q: Would it be possible to participate in courses remotely for the entire fall 2020 semester if desired?

A: Yes. The intent is that this semester is normal and that students attend face to face classes, however, if they are symptomatic or concerned for their health, they can participate remotely. All students will be able to complete the fall semester from another location. Students should notify their faculty if they are completing the course from a distance rather than attending class in-person. International students will need to be mindful of how this will impact their non-immigrant status and to contact International Affairs if there are any questions.

Q: Do students need special documentation to be allowed to attend classes remotely?

A: No, students do not need special documentation to attend classes remotely. However, students should notify their faculty if they are completing the course from a distance rather than attending class in-person so expectations can be clearly understood. Remote attendance should be for those who are ill or symptomatic.

ZOOM ETIQUETTE: Your class may utilize the Zoom online conference system. To participate in Zoom meetings, you will need to have a webcam/microphone or a smartphone with the Zoom app. We will adopt the same rules and norms as in a physical classroom (take notes; participate by asking and answering questions; wear classroom-ready clothing). For everyone's benefit:

- Join the course in a quiet, distraction free location
- Be aware of your background
- Turn on your video (you may close it after attendance is taken if your internet connection cannot handle having both audio and video going)
- Mute your microphone unless you are speaking
- Close browser tabs and software not required for participating in class
- Remember that our classes are in the Mountain Time zone

The success of this class will depend on the same commitment to learning we all typically bring to the physical classroom.

Scientific Calculator: There are many different ways to calculate figures during homework. It is tempting to rely on Online resources such as <http://www.wolframalpha.com>, or to simply use a calculator application on a smart phone. During exams, however, any devices capable of connecting to the Internet will *not* be allowed. You will instead need a scientific calculator capable of performing exponentiation and logarithms for the exams. Using this calculator exclusively while doing homework will ensure that you are familiar with it for use during exams.

Academic Integrity: Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the [Student Handbook](#) (published by Student Services) regarding student responsibilities and rights, and for the intellectual property policy, information about procedures, and what constitutes acceptable behavior. From University policy 6.33: “The University defines plagiarism as intentionally or carelessly presenting the work of another as one’s own. It includes submitting an assignment purporting to be the student’s original work which has wholly or in part been created by another person, or cutting and pasting of source material...”

ADA Policy: Students with medical, psychological, learning, or other disabilities desiring academic adjustments, accommodations, or auxiliary aids will need to contact the Southern Utah University Coordinator of Services for Students with Disabilities (SSD), in Room 206F of the Sharwan Smith Center or phone (435) 865-8022. SSD determines eligibility for and authorizes the provision of services.

Emergency Management Statement: In case of emergency, the university’s Emergency Notification System (ENS) will be activated. Students are encouraged to maintain updated contact information using the link on the homepage of the *mySUU* portal. In addition, students are encouraged to familiarize themselves with the Emergency Response Protocols posted in each classroom. Detailed information about the university’s emergency management plan can be found at: <http://www.suu.edu/emergency>

HEOA Compliance Statement: The sharing of copyrighted material through peer-to-peer (P2P) file sharing, except as provided under U.S. copyright law, is prohibited by law. Detailed information can be found at: <https://help.suu.edu/article/1097/p2p-and-copyright-infringement>

LINK Statement: SUU faculty and staff care about the success of our students. In addition to your professor, numerous services are available to assist you with the achievement of your educational goals. SUU’s LINK system may be used by faculty to notify you and/or your advisors of their concern for your progress and provide references to campus services as appropriate.

SUUSA Statement: As a student at SUU, you have representation from the SUU Student Association (SUUSA) which advocates for student interests and helps work as a liaison between the students and the university administration. You can submit My SUU Voice feedback by going here: <https://www.suu.edu/suusa/voice> Likewise, you can learn more about SUUSA’s Executive Council here (<https://www.suu.edu/suusa/executive-council/>) and about individual SUUSA’s Student Senators here (<https://www.suu.edu/suusa/senate/>)

Disclaimer: Information contained in this syllabus, other than the grading, late assignments, make up work and attendance policies, may be subject to change as deemed appropriate by the instructor.