Chemistry 3550L
Physical Chemistry Laboratory
Fall 2018

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Office Hours: M 9:00 am - 12:00 pm
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and by appointment

Course Information

Class: Chem 3550L (CRN 80422 – 2.0 credit hours)
Meeting Time: Monday 12:30 pm – 4:30 pm
Room: TLC 3104

Course Description

In this course, students will demonstrate their understanding of the physical basis and general applications of experimental techniques in physical chemistry. In particular, they will demonstrate their ability in applying the theories from thermodynamics, kinetics, quantum mechanics and spectroscopy to interpret experimental data. They will also learn how to maintain a laboratory notebook – collect data in a professionally acceptable way. Finally, they will demonstrate their ability to communicate their data and results to others.

Required Materials:

No textbook is required for the course; relevant materials will be made available online.

A glue-bound (i.e. not spiral) composition notebook and non-erasable, blue or black ink pen will be required in each lab in order to record procedural and observational information.

A scientific calculator will be needed to perform calculations during the course of the lab.

Learning Outcomes

1. Students will synthesize concepts from thermodynamics, statistical mechanics, kinetics, and quantum mechanics to explain experimental observations in terms of their atomic and molecular behavior.
2. Students will work as a team to develop experimental strategies using literature references to accomplish laboratory goals.
3. Students will demonstrate professional record keeping skills and laboratory etiquette.
4. Students will communicate their findings using clear graphics and writing.
5. Students will write reports that develop their conclusions from theoretical foundations.

Course Assessment

Students' progress towards mastery of the learning outcomes will be tracked and assessed via:

Laboratory Conduct (10%)

Conducting yourself in a safe, conscientious, and professional manner should always be at the forefront of your mind when entering into an active lab space. The standard guidelines for student conduct are laid out in the Laboratory Safety Contract; failure to conduct yourself according to these guidelines will result in a deduction from your Laboratory Conduct grade. Repeated or gross violations of safety guidelines may result in expulsion from the lab.

Laboratory Notebook (10%)

Keeping an accurate, organized account of procedural details and observations is an essential skill to develop as a professional in science, engineering, and medicine. This course differs from 1000 and 2000-level labs where you are given a step-by-step procedure to follow. In this course, you are expected to develop an experimental strategy based on references provided by the instructor; keeping a laboratory notebook that includes experimental details, observations, and data will be critical to writing an acceptable lab report. Your notebook will be checked periodically throughout the course of the semester. To successfully keep up your notebook make sure that you do the following:

Before lab read through the provided reference materials for the experiment to be performed. Take notes on important theoretical concepts, equations, and experimental details in your lab notebook. Sketch any apparatus diagrams you feel might be helpful. This way, you will enter the lab ready to execute on an experimental strategy.

During lab perform the experiment in a timely manner, and make notes of experimental methods. Record useful data in an organized format. Keep in mind to record any relevant observations (e.g. color, smell, temperature, pressure, time).

After lab add to your lab notebook relevant handwritten calculations as well as copies of any plots or spectra you have acquired in the course of the experiment. This allows you to have a summary of all of your relevant data in one hard copy, which makes tracing the logic of your experiments easier for a reader of your notebook.

Always follow your instructor's guidelines for how to organize and write down data in your notebook.

Reports (60%)

Professional writing in chemistry requires one to clearly define the goals and conclusions of a set of experiments, provide the background to understand results and their importance, and lay out the experimental results and arguments in an organized, logical manner. One of the goals of this course is to train you to write papers that develop conclusions from experimental results using a physical, theoretical framework. To achieve this, each student will **individually prepare** and **electronically submit** a lab report using the CourseDen Dropbox following the completion of each experiment; reports will be due at 11:59 pm of the day prior to the next lab period. Reports

must be completed according to the provided Report Guidelines, which are based on standard guidelines for submission to ACS journals.

Peer review of lab reports will be performed following report submission. After your report is submitted, all identifying information will be removed and the paper will be handed to another student for evaluation. The evaluator will assess the paper according to the same rubric used by the course instructor and provide constructive feedback for improvement. Completing the evaluation in a thorough manner will constitute 10% of the reviewer's own report grade. Reviews will be due one week after the due date for the original lab report.

Presentation (20%)

Physical chemistry is a vast and rapidly developing field with a wide range of techniques and instruments used to investigate the interactions of energy and matter. To supplement your laboratory experience of physical chemistry techniques, you will individually research a technique used in physical chemistry that is not covered during the course. Each student will choose a topic from a list prepared by the instructors and find three research articles (i.e. not review articles) published in ACS journals within the past ten years that utilize this technique. These articles must be approved by the instructor. During the last day of class, each student will present a 15-minute, Powerpoint-based talk on their chosen technique to introduce the principles of the technique to the class and discuss specific examples of how it is employed in modern research.

Grading Scale

A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

Course Policies

Late Lab Report Policy

All lab reports are due at 11:59 pm of the day prior to the lab that follows the reported experiment. A 10% per day late penalty will be applied for each day the report is late. If the lab report is more than one week late, the lab report will be considered unsubmitted, will not be accepted, and will be awarded a grade of zero points.

Make-up Policy

Due to the time commitment of the experiments in this course, we are unable to offer make-up labs for this course. In the case that an emergency forces a student to miss a lab, the lab may be waived as long as **official documentation** is presented. A **maximum of one such exemption** will be allowed for every student. It is the **student's responsibility** to contact the instructor(s) with regards to any missed class time and discuss what arrangements need to be made. Missing multiple lab periods is grounds for being awarded a course grade of 'F'.

Student Conduct

Students are obligated to abide by the conduct guidelines as described in the university catalog. Respect and courtesy of all students while in the classroom is required. In addition to these standard policies, the guidelines laid out in the Laboratory Safety Contract must be adhered to at all times. Failure to adhere to any conduct guidelines, either written or verbal, may result in *dismissal from class, a deduction from your final course grade, as well as further disciplinary action.*

University Policies and Academic Support

Please review the Common Language for all university course syllabi at the address: https://www.westga.edu/administration/vpaa/assets/docs/faculty-resources/common_language_for_course_syllabi_v2.pdf
This document contains important information regarding Academic Support, Online Courses, Honor Code, Email Policy, Credit Hour Policy, and HB 280 (Campus Carry).

Academic Honesty

Any form of academic dishonesty—including but not limited to cheating or plagiarism—will result in a failing grade on the relevant assignment as well as possible additional action. Please be familiar with the definitions of academic dishonesty and plagiarism as laid out in the Student Handbook, which can be found at the link: http://www.westga.edu/handbook/

Disabilities Act / Accessibility for the Course

If you are a student with a disability as defined under the Americans with Disabilities Act and require assistance or support services, please notify your instructors and provide them with a copy of your packet from Student Services. The university will provide you with resources for any audio/visual needs that you may have with the learning management system or course content.

It is critical that you contact UWG Accessibility Services immediately to find out what accommodations are necessary so we can work together to facilitate your success in this class. Please consult the UWG Accessibility Services site http://www.westga.edu/accessibility or call (678) 839-6428 for more details regarding accessibility for this course.

Note on Syllabus Modifications

The instructors reserve the right to modify this syllabus at any time during the course of the term, particularly with regards to course schedule. Students will be notified of all syllabus modifications. In a case where a substantial modification is required, a revised syllabus will be reissued.

Tentative Schedule

Date	Experiment
Aug20	**Bomb Calorimetry**
Aug 27	**Solution Calorimetry**
Sep 3	**NO CLASS (LABOR DAY)**
Sep 10	**Viscosity of Polyvinyl Alcohol** ***Presentation Topic Due***
Sep 17	**Kinetics of Benzenediazonium Ion Decomposition**
Sep 24	**NMR Study of a Reversible Hydrolysis Reaction**
Oct 1	**Absorption Spectra of Conjugated Dyes - Experimental**
Oct 8	**Absorption Spectra of Conjugated Dyes - Computational** ***Presentation References Due***
Oct 15	**Vibrational-Rotational Spectrum of HCl/DCl - Experimental**
Oct 22	**Vibrational-Rotational Spectrum of HCl/DCl - Computational**
Oct 29	**Vibronic Spectrum of I_2**
Nov 5	**Quantum Dots: Absorption Spectra of QD Aliquots**
Nov 12	**Quantum Dots: Binding Isotherm of QD Ligands**
Nov19	**NO CLASS (THANKSGIVING)**
Nov 26	**Quantum Dots: Fluorescence Quenching**
Dec 3	***Presentation***