CHEMISTRY 4460
Physical Chemistry II
Spring 2021

I. COURSE INFORMATION

INSTRUCTOR: Bill Taylor
OFFICE: Manion Annex 125
PHONE: 852-2529
EMAIL: billt@uca.edu
OFFICE HOURS: M,W 1:00 – 3:00, or by appointment. Note that unless otherwise specified, all office hours will be held via Zoom.

CLASSES: Lecture - Online: MWF, 9:00-9:50
Lab - MAN 305, Th, 8:00 – 10:40 (33028); 10:50 – 1:30 (33030); 2:40 – 5:20 (33031)

TEXTS: PHYSICAL CHEMISTRY, Atkins and de Paula, 10th Edition

DESCRIPTION: Equations of state, classical thermodynamics, equilibrium systems, solutions. Three hours of lecture and 3 hours of laboratory per week. Prerequisite: grade of C or better in CHEM 1451, PHYS 1442, and MATH 1497.

OBJECTIVES: Upon completion of this course, the student should have gained a basic understanding of the physical behavior of bulk chemical systems. This includes equations of state, the laws of classical thermodynamics, and relationships derived from these as applied to both reacting and nonreacting systems. Students completing this course should possess the knowledge base necessary for study of advanced physical chemical topics.

GRADING: Grades for the course will be based on the number of points accumulated out of a total of 860 points. Exams will constitute 600 possible points. In addition, there will be five 10 point problem sets assigned. Students can also earn up to a maximum 20 bonus points for in-class presentations of problems. Preference will be given to students who have not already earned these points.

4 hourly exams @ 100 points ea.	=	400
1 midterm exam	=	100
1 final exam	=	100
5 problem sets @ 10 point ea.	=	50
1 laboratory	=	210
TOTAL		860

Final grades will be assigned according to the following format:

A = 90+%
B = 80% - 89%
C = 65% - 79%
D = 55% - 64%
F = <55%

BLACKBOARD

The lecture component of this course will be delivered online via Blackboard. In addition, information such as this syllabus, lecture materials, laboratory handouts, and grades will be provided via this medium. Content will be delivered asynchronously where lectures will be pre-recorded and should be viewed prior to the scheduled lecture time. Scheduled lecture periods will be used to address questions regarding the lecture material.

COMMUNICATION VIA EMAIL

I will communicate assignments and other information from time to time using email. Emails will be sent exclusively via Blackboard email. It is the responsibility of the student to check his/her email regularly regarding class information.

II. EXAMINATION SCHEDULE

All exams will be taken face-to-face. Hourly exams will be given in Ida Waldran auditorium on the dates specified below during the scheduled lecture hour. These dates are fixed and will not be altered. Coverage for hourly exams will vary somewhat based on what has been covered prior to that date. Therefore, the chapter coverage listed below should be interpreted as approximate.

Exam #	Chapter Coverage	Exam Date:
1	1,2	February 10
2	3,4	March 5
Midterm	Comprehensive to date	March 11 (during lab period)
3	5	April 5
4	6	April 28
Final	Comprehensive since midterm	April 29 (during lab period)

III. LABORATORY SCHEDULE

Students are required to complete six labs during the semester from the list below. These labs are divided into two modules that will be available either in the first half of the semester (Module 1) or the second half of the semester (Module 2). Students may choose any three labs from Module 1 and any three from Module 2. Procedural writeups for most labs requiring experimental apparatus will be accessible to you via Blackboard. More detailed discussions of the labs can be found in laboratory texts available in the lab, and from supplemental materials posted on Blackboard. Everyone will do the Gas Constant/Propagation of Error lab together. Data for this lab will be provided to you. This will be the only lab where you will not physically come to the lab.

Lab	Dates
Determination of Gas Constant/Propagation of Error	1/21
Laboratory Module 1 Joule-Thomson Coefficient of Gases 2nd Virial Coefficient Bomb Calorimetry Solution Calorimetry Heat Capacities of Gases Thermodynamics of $N_2O_4 \leftrightarrow NO_2$	1/28 – 3/4
Laboratory Module 2 Three-Component Phase Diagram Solid-Liquid Phase Diagram pK_a of a Weak Acid $[Fe(SCN)]^{2+}$ Equilibrium Determination of Henry's Law Constant Boiling Point Elevation	3/4 – 4/22

LABORATORY REPORT FORMAT

There are seven total labs scheduled in the course. These labs will be completed in one or two lab periods and will be done in short form report format which must include the following components:

1. A clear statement of the objective
2. A detailed description of how you got the data. (Points will be taken off if this is copied from the provided lab materials.)
3. A tabulation of the raw data
4. A section containing results (includes graphs, calculations, and the final answer)
5. Analysis of error (if applicable)

Grading in these lab reports will focus largely on (1) the presence of all required components, (2) the quality of the data (3) the accuracy of the answer and (4) the clarity of the writing. The writing must be concise and accurate in the description of what was determined. An error analysis will be required for any lab in which the result is a quantifiable value resulting from measurable parameters. The lab reports will be worth 30 points each. Lab notebooks are not required, but are encouraged.

HOMEWORK

The five problem sets discussed above will be the only homework that will be graded. These problem sets will be graded for completion. Scores for incomplete problem sets will be adjusted to reflect work done. Additional questions and problems may be suggested from the text, but will not be graded. As a rule, the student should not wait for problems to be assigned, but should take it upon him/herself to do homework regularly. Problem sets will be discussed as a class on the due dates. A maximum of 20 bonus points (5 points per problem) will be awarded to students who go to the board and work out problems.

IV. POLICIES

ATTENDANCE

Students are expected to attend all scheduled classes. If a lecture is missed, the student should make every effort to obtain lecture notes for that day from a classmate. There is a definite correlation between lecture attendance and exam performance. If a student misses three (3) consecutive lectures without notifying the instructor or officially dropping the course, an automatic "F" or "W" will result.

NO MAKEUP EXAMS WILL BE GIVEN

NO MAKEUP LAB WILL BE GIVEN

*THERE ARE **NO** "EXTRA CREDIT" ASSIGNMENTS – **DON'T ASK***

Missing an exam is *rarely* excusable. It is the responsibility of the student to provide legitimate, documented proof as to the nature of the absence within 24 hours of the absence. Whether or not the absence is excusable is left to the discretion of the instructor. Be aware that excuses such as "I was sick", or "I had to find my roommate who stayed out all night" are not acceptable.

TARDINESS

Chronic tardiness is disrespectful of the instructor and other students. As such, it is unacceptable and will not be tolerated. Any student arriving late to lecture in excess of five minutes will be counted absent for the day. Any student arriving more than ten minutes late for a lab will receive no credit for that lab exercise.

GRADING DISPUTES

If the student believes that an error in grading has been made on an exam or assignment, it is the responsibility of the student to inform the instructor of the error within 24 hours of the time when the graded exam/assignment was passed back. Requests to re-evaluate graded papers outside this timeframe will not be accepted. Assignment of course grades

at the end of the semester lies *solely* within the purview of the instructor. Persistent attempts to argue for a better grade will only serve to irritate the instructor.

CELLPHONES

Cellphones must be put away and silent during class and lab. Cellphone usage of any type during lecture (or lab unless previously approved) is not allowed. Students ***MAY NOT*** use cellphones as readers for laboratory procedures during lab. Tablets and notebook computers are acceptable. This is a discourtesy to your fellow classmates and to me. Cellphones ***may not*** be used as calculators during exams.

ACADEMIC MISCONDUCT/PLAGIARISM

The university regards all acts of academic dishonesty as deserving severe punishment. Punishment for such acts may include receiving a failing grade for the work or course and/or being dismissed from the university.

SEXUAL HARASSMENT

Sexual harassment by any faculty member, staff member, or student is a violation of both law and university policy and will not be tolerated at the University of Central Arkansas. Sexual harassment of employees is prohibited under Section 703 of Title VII of the Civil Rights Act of 1964 and sexual harassment of students may constitute discrimination under Title IX of the Education Amendments of 1972.

These and other important policies are outlined in the *UCA Student Handbook*, which can be found at: http://uca.edu/student/student-handbook/ . The student is encouraged to familiarize him/herself with all of the policies contained within that document.

EMERGENCY PROCEDURES

An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at *http://uca.edu/mysafety/bep/.* Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

AMERICANS WITH DISABILITIES ACT STATEMENT

The University of Cental Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, contact the UCA Office of Disability Services at 450-3135.