COURSE SYLLABUS: Version P(ractical)

CHEM 372 – 001: Physical Chemistry Laboratory

Spring 2021: Mondays, 1:00 – 4:50 PM (Online via Zoom & In-Person in 587 Smith Hall)

Instructor: Dr. Tran-Ba

Student Hour: by appointment only (highly recommended!)

Contact: ktranba@towson.edu

Class Schedule: Mondays, 1:00 – 4:50 PM, Online & In-Person

January 25th, 2021 through May 3rd, 2021

No class on March 15th, 2021 (Spring Break)

Course Description. CHEM 372 is a 2-credit, one-semester laboratory course. It is aimed is to provide participating students a hands-on learning experience of the interesting field of experimental physical chemistry. Students will be conducting advanced-level laboratory experiments covering a variety of topics in thermodynamics, chemical kinetics, and molecular spectroscopy. The experiments involve the characterization of matter by determining their relevant physical properties using a variety of experimental techniques and instrumentation. Participants will also be trained to quantitatively analyze data and critically interpret the obtained experimental results and findings.

Course Objectives. This course is aimed to deepen the students' theoretical knowledge gained in CHM 345 by performing relevant experiments, analyzing collected data sets, and interpreting the obtained results in written short reports. Upon completion of this course, students will (1) have a deeper understanding of the relevant physical chemical concepts and their applications, (2) have gained numerous advanced data analysis skills, and (3) have improved their ability to interpret/discuss scientific data and (4) have learnt to write a concise scientific summary. Ultimately, participating students are well-prepared for their future independent career in the chemical industry or academia.

Course Format. Course participants choosing to follow this syllabus format (**Version P**) will (a) conduct a hands-on portion of the full lab and (b) work on weekly worksheets (see Grading Policy, Schedule for additional details). Additional experimental data needed for completion of the data analysis portion of each lab will be provided by the instructor. Each participant is expected to work individually and independently in the lab and on solving the weekly worksheet. Participating students are not allowed to switch to another course format during the semester.

Course Prerequisites. (a) CHEM 210: Analytical Chemistry & (b) CHEM 345: Principles of Physical Chemistry (can be taken concurrently – Note: It is NOT recommended to take CHEM 345 & CHEM 372 concurrently).

Required Materials (Note: Students must bring the following items to the weekly lab meeting)

1. Textbook: "*Experiments in Physical Chemistry*", Joseph W. Nibler, Carl W. Garland, David P. Shoemaker, 8th edition, 2009, McGraw-Hill.
2. A scientific calculator (that can be used for solving square roots, logarithms, and exponential functions).
3. A notebook for taking class notes, performing sample calculations, and other class activities.

Grading Policy

Assignment	*Description*	*% of total*
Error Analysis Worksheet	One worksheet worth 50 points (Week 1)	5
Data Fitting Worksheet	One worksheet worth 50 points (Week 2)	5
Experimental Worksheet	Six worksheets each worth 50 points (Lab 1 – 6, Week 3 – 15)	30
Data Analysis Worksheet	Six worksheets each worth 75 points (Lab 1 – 6, Week 3 – 15)	45
Final Exam	One final (150 points) on **May 14th, 2021** (10:15 – 12:15 pm)	15

Please note: All assignments must be turned in on Blackboard.

- Week 1 -2: Students must turn in their completed error analysis and data fitting worksheets for credit.
- Week 3 – 15: Student must turn in two completed worksheets (1x experimental and 1x data analysis) of each lab for credit. The practical and data analysis worksheets must be completed by the end of the first and second week of each lab, respectively. The practical worksheet is used to evaluate the student's laboratory success.
- Final Exam: Students must take the final exam (2 hours in length, open book) on Blackboard. The final exam cannot be missed. No make-up final exam will be offered. The exam date is fixed and cannot be alternated.
- Extra-Credit: Two extra-credit opportunities will be offered this semester:
  a) A syllabus-quiz worth 15 points (available on Jan. 25th for one week)
  b) A student evaluation worth 15 points (will be announced)

The students' final letter grades will be assigned based on TU's Grades and Grading Policies:

Total Points	Letter Grade	Total Score (%)
930 – 1000	A	93.0 – 100
900 – 929	A^-	90.0 – 92.9
870 – 899	B^+	87.0 – 89.9
830 – 869	B	83.0 – 86.9
800 – 829	B^-	80.0 – 82.9
770 – 799	C^+	77.0 – 79.9
700 – 769	C	70.0 – 76.9
670 – 699	D^+	67.0 – 69.9
600 – 669	D	60.0 – 66.9
≤ 599	F	≤ 59.9

Please note that your instructor reserves the right to adjust/curve the grades depending on the overall class performance.

Late Penalties. For full credit, each student must submit their completed worksheet by the due date. The due date of each worksheet is 24 hours after the end of the lab meeting. (For example, the first worksheet must be submitted on Jan. 26th by 4:50 PM). Turning in a worksheet after the due date will result in a 50% deduction of the received credit. (For example, 25 points will be deducted for a worksheet that received 50 points)

The instructor will strictly enforce this policy unless there is a documented reason such as (1) serious illness (with proper documentation from health provider) or (2) a serious personal/family emergency (with proper documentation from the Office of Dean of Studies). You must inform the instructor about any absence ASAP.

Attendance Policy. Attendance is mandatory and expected for each class meeting. All participants must turn on their webcam and leave it on while attending a Zoom/Blackboard class meeting. Students must inform the instructor at least two weeks in advance about their absence due to a university-sanctioned event, religious holidays or unavoidable career-related events (e.g. grad school visit). Leaving a class meeting early for work is not acceptable and will result in a penalty (50 points deduction). Documentation must be provided at all times.

Make-up Policy. In the event of an emergency or extreme illness, it is the student's responsibility to inform the instructor prior to the class meeting (or as soon as possible thereafter) that they are not able attend the session. Upon approval of the excused absence by the instructor, a make-up meeting can be arranged. Only one excused absence is permitted per semester. A zero-grade will be automatically assigned for any additional absences. Any unexcused absence will automatically result in a zero-grade for the missed assignment. Failure of providing a written notification two weeks in advance will result in the student's zero-grade for the missed class section.

Lab Fees. To partially cover the cost of the experiments performed in this course, a lab fee has been charged. It will be used to purchase chemicals, consumables, and/or repair/replace a faulty equipment.

Syllabus Subject to Change. Due to the ongoing uncertainty related to the COVID-19 pandemic and the shift to remote learning; the policies, number and type of assignments and grading practices in this syllabus are subject to change. Any changes will be communicated to the students in writing, including posting a revised syllabus on Blackboard.

Additional Resources

Student Hour: Student hours are available per appointment. Please email your instructor for setting up a student hour via a Zoom meeting. Course participant are strongly encouraged to reach out to the instructor for assistance on a regular basis. At the student hour, student may ask any questions related to the experiments, data analysis procedure and/or worksheet expectation.

Tutoring Center: Additional help is available at the Tutoring Center (SM 538). This service is open to any student enrolling in this course, free of charge and operates on a walk-in basis. Please contact Prof. Ladon (lladon@towson.edu) for further information.

Departmental Statements

Statement on Copyright. Your instructor retains all copyrights to all original materials distributed in this course including, but not limited to, lab reports, notes, worksheets, lab materials, and exams. Reposting, selling, or otherwise distributing these materials in any fashion at any time is prohibited.

Statement on Academic Dishonesty. Academic dishonesty is described in Towson University's Student Academic Integrity Policy and is to be followed by all students, faculty, and staff. Any student who is found to be responsible for academic dishonesty will be assigned a penalty up to and including a grade of zero for the involved academic work. Any suspected academic dishonesty will be reported to the department chairperson and to the Office of Student Conduct & Civility Education for further investigation.

Statement on Accommodations for Students with Disabilities. Students with approved accommodations must submit their DSS memos to the instructor *the first week of class*. It is the student's responsibility to present this paperwork and to follow up regarding accommodations that require instructor participation (e.g. testing accommodations). Please contact Disability Support Services with any further questions.

Statement on Classroom Diversity and Inclusion. The students, faculty, and staff at Towson University represent a diverse and vibrant community of learners and scholars. As a community, we value the unique contributions of each individual and promote active participation in all aspects of the learning process by each community member. Your instructor supports Towson University's goal of fostering a diverse and inclusive educational setting. Your instructor strives to create a classroom environment built upon the principles of mutual respect and support. Toward this end, all members participating in this course are expected to demonstrate respect for all other members of the class. If you feel these expectations have not been met, please speak with your instructor or the designated diversity liaison, Dr. Zeller (czeller@towson.edu). For further information regarding the diversity and inclusion policies of Towson Univ, please see Towson University's "Strategy 1:Exposure to Diversity", the Fisher College of Science and Mathematics Diversity Action Plan, and the Chemistry Department Diversity Action Plan.

Laboratory Policy for Pregnant Students. Pregnant students should consult their physicians for advice on whether or not to perform experiments in the laboratory. Students are encouraged to provide their physician with a list of the chemicals that they might be exposed to while in lab. They should also check the MSDS sheets (available in the Department) to be aware of the hazards of the chemicals. If a student is advised against performing laboratory work, then faculty must make accommodations for the student. Any accommodations should comprise a workload that is approximately equivalent to the regularly scheduled laboratory work. These accommodations may include:

- performing "dry" experiments only, in a place free from exposure to ongoing experiments.
- performing the wet chemistry at a later date.
- receiving an incomplete grade in the course pending completion of experimental work

Course Schedule

Week	Date	Activity/Topic
1	01/25	Syllabus, Error Analysis Worksheet
2	02/01	Lab Safety, Data Fitting Worksheet
3	02/08	Lab 1: Experimental Worksheet
4	02/15	Lab 1: Data Analysis Worksheet
5	02/22	Lab 2: Experimental Worksheet
6	03/01	Lab 2: Data Analysis Worksheet
7	03/08	Lab 3: Experimental Worksheet
8	03/15	Spring Break: No Class
9	03/22	Lab 3: Data Analysis Worksheet
10	03/29	Lab 4: Experimental Worksheet
11	04/05	Lab 4: Data Analysis Worksheet
12	04/12	Lab 5: Experimental Worksheet
13	04/19	Lab 5: Data Analysis Worksheet
14	04/26	Lab 6: Experimental Worksheet
15	05/03	Lab 6: Data Analysis Worksheet
16	05/14	Final Exam: 10:15 – 12:15 pm, Blackboard