# ASU Online CHM 343 – Spring 2024 Session-A

## *Elementary Physical Chemistry Laboratory*

*January 8, 2024*

**Overview:** This molecular sciences laboratory course will cover topics in modern experimental and computational physical chemistry and biophysical chemistry. Emphasis is placed on molecular thermodynamics, kinetics, and spectroscopy, which parallels the topics covered in Elementary Physical Chemistry (ASU CHM 341) and Physical Chemistry with a Biological Focus (ASU BCH 341).

**Virtual Recitations:** Online Meetings (Zoom) and Recorded Material (YouTube / Vimeo)
**'Cloud' Labs:** Experimental, Computational, and Data Science components will all be available through online/remote access.


**Instructors:** Professor: Jeffery L. Yarger, jeff.yarger@asu.edu
Phone/Text: (602) 492-7437 (Google Voice)
Pchem Email: biopchem@gmail.com
Zoom: https://asu.zoom.us/my/**yarger**

Teaching Assistants: Sthitadhi Maiti, Sthitadhi.Maiti@asu.edu
Pchem Email: biopchem@gmail.com


**Office hours:** Announced on ASU Canvas for TA's and Instructors or by appointment. All office hours are virtual and will use Zoom.

**Web Site:** ASU Canvas: https://canvas.asu.edu/ (2024SpringA-X-CHM343)
https://biopchem.education/ (Open Public Website)

### Prerequisites

Concurrent enrollment or completion of ASU CHM 341 (Elementary Physical Chemistry) or ASU BCH 341 (Physical Chemistry with a Biological Focus) or an equivalent physical chemistry college course. Basic algebra and calculus mathematics is required and a prerequisite for physical chemistry.

### Required Material

- Modern desktop or laptop computer with webcam, audio/mic and good high-speed (> 5 Mbps) internet connection. HTML5 Web Browser (Chrome, Firefox), pdf Reader (Adobe Acrobat), VNC/RDP (i.e., NoMachine, AnyDesk, noVNC), Zoom Video Conferencing, Office Suite (Microsoft, Libre) and scientific data/error analysis software (i.e., CoLab, Google Sheets, Matlab, Maple, Mathematica, Spectragryph). ASU students have access to several useful software applications via ASU myApps (https://myapps.asu.edu).
- All labs are designed to be performed remotely/online. However, if students are physically in a laboratory, or doing optional DIY projects at home, a lab coat, safety goggles and closed-toed shoes are required when handling any chemicals.

### Recitation

ASU CHM 343 is a remote and/or online course. All recitation material will be online. Recitations will be used for general announcements, laboratory exercise overviews and information, and the general discussion of experimental, computational, and data/error analysis physical chemistry concepts for each laboratory (project).

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**Lab**

Students will perform remote computational, experimental and data/error analysis laboratory lab projects. A remote accessibility laboratory experiment schedule will be provided on the official ASU-Online CHM343 Canvas website. Labs are designed to be asynchronous, remotely accessible, and able to be independently completed (or completed in online groups/teams).

**Safety**

All labs are online and/or remote. Hence, students will not have to worry about the typical safety concerns of a typical in-person chemical laboratory. However, if students perform any experiments in-person at a chemical laboratory or at their local residence, safety in chemistry labs is critical and lab coats, goggles, and close-toed shoes are recommended. If students do attend an in-person laboratory at ASU, no food or drink are allowed in the chemistry laboratory and all. ASU laboratories require that people wear a lab coat, goggles, and close-toed shoes.

**Learning Outcomes**

Upon successful completion of this course students will be able to collect, process, analyze, and disseminate experimental and computational chemical data. This course is meant to provide experimental and computational laboratory skills to complement fundamental molecular science concepts taught in physical chemistry (ASU CHM341 and/or Biophysical chemistry courses, e.g., BCH341).

**Course Evaluations & Grades**

*Student's progress and understanding in this online laboratory course will primarily be done through laboratory exercises, quizzes and active online laboratory participation.* This is a letter-graded course using the following scale: **(100% - 90%) A; (<90% - 80%) B; (<80% - 70%) C; (<70% - 60%) D; (<60% - 0%) E.**

To receive a grade in this class you must be registered on Canvas. All grades will be recorded on ASU Canvas LMS and each student can view his or her individual laboratory scores.

| | |
|---|---|
| **Laboratory Participation (YellowDig)** | **200 pts (40%)** |
| **Laboratory Exercises & Quizzes (1 quiz [20 pts] & 1 exercise [80 pts] per Lab)** | **300 pts (60%)** |
| **TOTAL** | **500 pts (100%)** |

| Dates | Lab Schedule |
|---|---|
| Jan 8-14 | Lab 1 – Properties of Gases – Molecular Thermodynamics (computational & remote experiment) |
| Jan 16-21 | Lab 1 – Properties of Gases – Molecular Thermodynamics (data/error analysis, lab exercise) |
| Jan 22-28 | Lab 2 – Thermochemical Processes (computational & simulated experiment) |
| Jan 29-Feb 4 | Lab 2 – Thermochemical Processes (data/error analysis, lab exercise) |
| Feb 5-11 | Lab 3 – Chemical Equilibrium & Kinetics (computational & remote experiment) |
| Feb 12-18 | Lab 3 – Chemical Equilibrium & Kinetics (data/error analysis, lab exercise) |
| Feb 19-27 | Lab X – Student (optional/makeup) Lab |

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## *Elementary Physical Chemistry Laboratory*

| Due Date | Lab Quiz (on Canvas) | Due Date | Lab Exercise (Submit on Canvas) |
|---|---|---|---|
| 01/14 | Lab 1 Quiz | 01/21 | Lab 1 Exercise |
| 01/28 | Lab 2 Quiz | 02/04 | Lab 2 Exercise |
| 02/11 | Lab 3 Quiz | 02/18 | Lab 3 Exercise |
| 02/26 | Lab X Quiz (Optional/Makeup) | 02/26 | Lab X Exercise (Optional/Makeup) |

- ⇒ Lab Exercises submitted before the due date will receive an addition 5 pts for each day it's submitted early.
- ⇒ Lab Exercises submitted after the due date will have a 5 pts reduction for each day it's submitted late.
- ⇒ All participation, lab quizzes and lab exercise must be submitted by 02/26/24 to be graded and count toward a student's final grade in this lab course.

**Lab X - Potential Alternative ASU 'Cloud' (Remote / Online) and/or Computational Physical Chemistry Labs**

Students can substitute one of the three labs with a proposed remote experimental physical chemistry laboratory and/or computational chemistry exercise. If a student wants to propose a project X, they need to submit a 1-page outline proposal by February 1st (and have it approved by February 5th). Examples of past proposed projects include:

- Project $X_1$ –Molecular Understanding of Analyte Diffusion in Water using Remote NMR Measurements and Molecular Dynamics Computational Resources.
- Project $X_2$ – Vibrational Spectroscopy (remote IR and Raman) of Fluorocarbons.
- Project $X_3$ – Molecular Structure and Dynamics of a cyclic peptide - Gramacidin-S.
- Project $X_4$ – Optical Diffraction using a Remote Laser Optical Setup.
- Project $X_5$ – DIY Acoustic Interferometer.

**Laboratory Quizzes**

Quizzes will be posted on the ASU CHM 343 Online Canvas website. It is important to have a secure and stable internet connection. Quizzes cover basic pre-laboratory, experimental, computational and data/error analysis components in molecular physical chemistry.

**Laboratory Exercises**

To evaluate student's ability to collect, process, analyze, and interpret experimental and computational physical chemistry data, as well as associate results into the context of fundamental concepts in molecular physical chemistry, students will be asked to complete a laboratory exercise primarily consisting of figures and tables which visualize and summarize the student performed lab. An exercise document will be provided for each lab which summarizes the figures, tables, calculations that should be completed by each student and submitted to the Canvas lab website. The due dates for each lab exercise are provided above. Lab exercise documents can be a presentation (ppt, slides), notebook (mathematica, jupyter, colab), web blog/dashboard, poster, screencast (video podcast), spreadsheet (excel or google sheets), or standard document (ms-word, google docs). Students are encouraged to collaborate and work in teams or groups for any aspects related to computational and/or experimental data collection. However, data/error analysis and reporting (figures, plots, tables) should be completed individually. If experimental and/or computational data is collaboratively collected, this needs to be properly acknowledged in a footnote of the laboratory exercise document/file.

Students will be expected to turn in a single electronic file of each lab exercise (pdf is the recommended file format). This can include additional supplemental sections showing detailed calculations for data and error analysis (e.g., propagation of error). Lab tables and figures should be in the style and format of a scientific publication (e.g., American Chemical Society (ACS) - *Journal of Physical Chemistry, Journal of Chemical Education*).

**Laboratory Participation**

A critical component to labs is peer-to-peer and peer-instructor interactions and communication. Labs are best when scientific interactions and collaborations are fostered. This online laboratory course will be using YellowDig for fostering questions, collaborations, polling and both peer-to-peer and student-instructor interactions. YellowDig is an active learning community platform designed for virtual classes to foster and reward student engagement. Participation points are provided in Yellowdig for student engagement and details can be found on the online CHM343 YellowDig site. To emphasize just how important group and peer-to-peer interactions and communication is in laboratory sciences, 40% of a student's grade will be based on active participation. Students are expected to actively participate in polling questions and discussions on YellowDig and requires students to participate a minimum of three days per week during the lab session. To further encourage engaging and participation in lab content, polling questions will regularly be posted on YellowDig that relate to lab quiz and exercise content.

## General ASU Policies

**Attendance and Participation**

Attendance and participation in class activities is an essential part of the learning process, and students are expected to attend class regularly. Some absences are, however, unavoidable. Excused absences for classes will be given without penalty to the grade in the case of (1) a university-sanctioned event [ACD 304-02]; (2) religious holidays [ACD 304-04; a list can be found here https://eoss.asu.edu/cora/holidays ]; (3) work performed in the line-of-duty according [SSM 201-18]; and (4) illness, quarantine or self-isolation related to illness as documented by a health professional.

Anticipated absences for university-sanctioned events, religious holidays, or line-of-duty activity should be communicated to the instructor by email at least 1 day before the expected absence.

Absences for illness, quarantine or self-isolation related to illness should be documented by a health professional and communicated to the instructor as soon as possible by email.

Excused absences do not relieve students from responsibility for any part of the course work required during the period of absence. Faculty will provide accommodations that may include participation in classes remotely, access to recordings of class activities, and make-up work.

If there is a disagreement as to whether an absence should be accommodated, the instructor and student should contact the academic unit chair immediately for resolution.

## Grade Appeals

Grade disputes must first be addressed by discussing the situation with the instructor. If the dispute is not resolved with the instructor, the student may appeal to the department chair per the University Policy for Student Appeal Procedures on Grades.

## Student Conduct and Academic Integrity

Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see http://provost.asu.edu/academicintegrity. Additionally, required behavior standards are listed in the Student Code of Conduct and Student Disciplinary Procedures, Computer, Internet, and Electronic Communications policy, and outlined by the Office of Student Rights & Responsibilities. Anyone in violation of these policies is subject to sanctions. Students are entitled to receive instruction free from interference by other members of the class. An instructor may withdraw a student from the course when the student's behavior disrupts the educational process per Instructor Withdrawal of a Student for Disruptive Classroom Behavior. The Office of Student Rights and Responsibilities accepts incident reports from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct.

## Prohibition of Commercial Note Taking Services

In accordance with ACD 304-06 Commercial Note Taking Services, written permission must be secured from the official instructor of the class in order to sell the instructor's oral communication in the form of notes. Notes must have the notetaker's name as well as the instructor's name, the course number, and the date.

## Accessibility Statement

In compliance with the Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act as amended (ADAAA) of 2008, professional disability specialists and support staff at the Student Accessibility and Inclusive Learning Services (SAILS) center facilitate a comprehensive range of academic support services and accommodations for qualified students with disabilities.

Qualified students with disabilities may be eligible to receive academic support services and accommodations. Eligibility is based on qualifying disability documentation and assessment of individual need. Students who believe they have a current and essential need for disability accommodations are responsible for requesting accommodations and providing qualifying documentation to the SAILS. Every effort is made to provide reasonable accommodations for qualified students with disabilities.

Qualified students who wish to request an accommodation for a disability should contact SAILS by going tohttps://eoss.asu.edu/accessibility, calling (480) 965-1234 or emailing Student.Accessibility@asu.edu. To speak with a specific office, please use the following information:

**ASU Online and Downtown Phoenix Campus**
University Center Building, Suite 160
602-496-4321 (Voice)

**Polytechnic Campus**
480-727-1165 (Voice)

**West Campus**
University Center Building (UCB), Room 130
602-543-8145 (Voice)

**Tempe Campus**
480-965-1234 (Voice)

## Disability Resources

As discussed above, students who feel they will need disability accommodations in this class but have not registered with the Student Accessibility and Inclusive Learning Services (SAILS) should contact them immediately. For additional information, contact SAILS by going to https://eoss.asu.edu/accessibility, calling (480) 965-1234 or emailing Student.Accessibility@asu.edu.

## Title IX

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As mandated reporters, course instructors (including TAs) are obligated to report any information they become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services, https://goto.asuonline.asu.edu/success/online-resources.html.

## Academic Integrity

Academic honesty is expected of all students in all examinations, papers, and laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see http://provost.asu.edu/academicintegrity

## Policy Against Threatening Behavior

All incidents and allegations of violent or threatening conduct by an ASU student (whether on-or off campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students. If either office determines that the behavior poses or has posed a serious threat to personal safety or to the welfare of the campus, the student will not be permitted to return to campus or reside in any ASU residence hall until an appropriate threat assessment has been completed and, if necessary, conditions for return are imposed. ASU PD, the Office of the Dean of Students, and other appropriate offices will coordinate the assessment in light of the relevant circumstances. For more information, please visit:
https://eoss.asu.edu/dos/safety/ThreateningBehavior.

## Policy on Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age,

disability, veteran status, sexual orientation, gender identity, and genetic information. As a mandated reporter, the instructor and TAs are obligated to report any information we become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish to discuss any concerns confidentially and privately.

## Copyrighted Materials

Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

## Syllabus Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule, but the possibility exists that unforeseen events will make syllabus changes necessary. Please remember to check your ASU email and the course site often.