

Syllabus Ch118 Spring 2025



LABoratory Location: McLean **203**

Course Instructor/Coordinator: Dr. Faith Kim

Course Web Address: <https://sit.instructure.com/courses/78914>
(<https://sit.instructure.com/courses/78914>)

E-Contact: fkim@stevens.edu (<mailto:fkim@stevens.edu>)

In person Office (McLean 203 C) Hours:

- *15 minutes prior to lab sections below:*
- *During ongoing lab sections below:*
 - Section A, M 2:00pm-4:50pm in McLean 203
 - Section B, T 8:00am-10:50am in McLean 203
 - Section C, T 11:00am-1:50pm in McLean 203
 - Section E, R 8:00am-10:50am in McLean 203
 - Section F, R 11:00am-1:50pm in McLean 203
 - Section G, R 2:00pm-4:50pm in McLean 203
- **By appointment** (fkim@stevens.edu (<mailto:fkim@stevens.edu>))

Co-requisite: **CH116 General Chemistry II**

COURSE DESCRIPTION: This course provides a foundational introduction to laboratory safety, emphasizing the proper handling of chemicals, adherence to safety protocols, and the critical importance of responsible chemical waste disposal with the comprehensive overview of general chemical principles with a focus on their applications in research and industry. Students will develop the ability to critically analyze observations and evaluate experimental data with precision and rigor and gain a deeper understanding of chemical principles and enhance their skills in data collection,

observation, and interpretation. Key topics include qualitative and quantitative analysis in chemical kinetics, colligative properties of solutions, chemical equilibrium, thermodynamics, electrochemistry, and transition metal coordination chemistry. Students will also explore modern analytical methods and instrumentation. Enrollment in CH116 during the same semester is *strongly recommended* to maximize learning outcomes.

COURSE OBJECTIVES: Through hands-on experiments, students will

1. develop an essential understanding of laboratory safety precautions, including chemical handling, proper waste disposal, and adherence to safety guidelines.
2. investigate and evaluate chemical systems through quantitative interpretation and qualitative analysis of experimental data.

STUDENT LEARNING OUTCOMES: After successful completion of this course, students will

1. be familiar with the good laboratory practices including chemical safety guidelines and chemical waste disposal.
2. be able to interpret quantitative and qualitative scientific data.
3. recognize and implement the chemical theoretical principles to predict chemical and biological properties.

COURSE STRUCTURE AND LOGISTICS:

- **Attendance WET (IN PERSON) session is mandatory to receive credit for lab report/RDS/plots/graphs.** Failure to check-in may result in a grade of ZERO. Each session will begin with a brief introduction covering safety precautions, experimental procedures, and required techniques to ensure successful completion of the experiment. Make-up labs can only be arranged if there is an ongoing lab section that students can join. This opportunity will be offered as part of the intricate schedule, so please ensure you reach out promptly if you find yourself needing to make adjustments. The process is designed to be flexible, but it certainly requires careful planning to ensure the opportunity intertwines seamlessly with other students' lab times.
- **All students in WET (IN PERSON) sessions are required to wear a safety goggles, appropriate clothing, closed-toe shoes, and have hair to safely perform experiments.** Personal belongings must be stored in the bottom cabinet of the student bench area. **Eating, drinking, and chewing are strictly prohibited in the laboratory.** Detailed laboratory safety rules are provided in the attached document.
- **SDS Reading Assignment: Lab Safety** - All laboratory procedures involving potentially hazardous chemicals must begin by obtaining and reviewing the relevant Safety Data Sheet

(SDS), which can be accessed on the course Canvas page or directly at

<http://sigmaaldrich.com/safety-center.html>  <http://sigmaaldrich.com/safety-center.html>.

- **Pre-laboratory** questions for each lab must be completed prior to the lab session. Late submissions will incur a 10% penalty per day.
- **Each student** is required to complete the **raw data sheet (RDS), including a scanned or photographed copy of their own data generated during the lab session**. This must be submitted before the next lab period and will incur a 10% late penalty per day.
- **Post-laboratory** questions must be completed and submitted before the next lab session. Late submissions will incur a 10% penalty per day.

Instructor's Office Hours and Communication: Office hours will be held both in-person at McLean 203 C or virtually via Zoom as scheduled. Additionally, I can be reached via email at fkim@stevens.edu, with a usual response time of 48 hours. For Canvas postings, I will check at least three times per week. While it is not feasible to respond to every individual comment each week, I will address a variety of student contributions to ensure equitable engagement. For lab reports, RDS, plots, and graphs assignments on Canvas, a comment box is available for questions or to draw my attention to specific issues you would like reviewed. If you feel your concerns are not being addressed, please email me directly. When sending an email, please include the **course number/section and the topic** in the subject line (e.g., "CH118 Section A – PreLab 2 Question 3"). This will greatly assist me in locating your inquiry among the many emails I receive daily.

Laboratory Etiquette Guidelines

This course is committed to fostering a safe and inclusive learning environment for everyone. All opinions and experiences, regardless of how different or controversial they may seem, must be respected in the spirit of academic discourse. You are encouraged to comment, question, and critique ideas constructively, but personal attacks are strictly prohibited. Our differences, as highlighted in the University's inclusion statement below, enrich the learning experience. Please remember that sarcasm and humor can easily be misinterpreted in online interactions and may cause unintended disruptions. By working together as a respectful community of learners, we can create a positive and professional course environment. We can ensure a supportive and enriching learning environment for everyone by adhering to these guidelines:

- Allow space for all participants by not dominating discussions. Encourage others to share their perspectives.
- Use respectful and appropriate language; avoid offensive or inflammatory comments.
- Be mindful of how Internet communication may be perceived—for instance, using all capital letters may be interpreted as shouting.
- Avoid using slang or vernacular expressions, as they may lead to misunderstandings.

- Maintain an open mind and be willing to share and discuss minority opinions constructively.
- Review and edit your comments before submitting to ensure clarity and professionalism.
- Seek feedback when needed and don't hesitate to ask questions.

TENTATIVE COURSE SCHEDULE

- Before starting any laboratory procedures involving potentially hazardous chemicals, students must obtain and review the relevant Safety Data Sheet (SDS) available on Canvas.
- Any changes to the course schedule will be promptly communicated through Canvas under the weekly modules. Please check regularly for updates.

Tentative Course Schedule

Academic Week	Topic(s)	Required to read/watch	Canvas assignments
Week 1	Lab 1: Safety Student Contract & Course Policy Review (DRY Virtual ZOOM only)	<ul style="list-style-type: none"> • Review general chemistry laboratory safety rules, policies, techniques, and proper organization of experimental data collection and analysis. 	<ul style="list-style-type: none"> • SafetyContract • Safety/CoursePolicyReview
Week 2	Lab 2: Rate Law (Wet in-person Only)	<ul style="list-style-type: none"> • Learn how to determine rate law and the rate constant. 	<ul style="list-style-type: none"> • Pre_Lab 2 • Wet_Lab 2 • Post_Lab 2
Week 3	Lab 3: Activation Energy	<ul style="list-style-type: none"> • Determine the activation energy from the experimentally determined 	<ul style="list-style-type: none"> • Pre_Lab 3

	(Wet in-person Only)	equilibrium constants at different temperatures	<ul style="list-style-type: none"> • Wet_Lab 3 • Post_Lab 3
Week 4	Lab 4: Freezing Point Depression (Wet in-person Only)	<ul style="list-style-type: none"> • Estimate the molar mass of a solute from the depression of freezing point in solution. 	<ul style="list-style-type: none"> • Pre_Lab 4 • Wet_Lab 4/CoolingCurve • Post_Lab 4
Week 5	Lab 5: Chemical Equilibrium (Wet in-person Only)	<ul style="list-style-type: none"> • Study chemical equilibrium dynamics from the concentration changes of chemical species. • Calculate equilibrium constant from the concentrations determined using spectrophotometer. 	<ul style="list-style-type: none"> • Pre_Lab 5 • Wet_Lab 5/AbsorbSpectrum • Post_Lab 5
Week 6	Lab 6: Potentiometric Analysis (Wet in-person Only)	<ul style="list-style-type: none"> • Understand chemical equilibrium dynamics of monoprotic and polyprotic weak acids using potentiometer. • Determine the dissociation constant, K_a, of weak acids 	<ul style="list-style-type: none"> • Pre_Lab 6 • Wet_Lab 7/TitrationCurve • Post_Lab 6
Week 7	Lab7: Buffers & Indicators (Wet in-person Only)	<ul style="list-style-type: none"> • Understand various buffer systems. • Determine the effective pH range. 	<ul style="list-style-type: none"> • Pre_Lab 7 • Wet_Lab 7

			<ul style="list-style-type: none"> • <u>Post_Lab 7</u>
Week 8	Lab 8: Ksp & Molar Solubility (Wet in-person Only)	<ul style="list-style-type: none"> • Calculate the molar solubility and the equilibrium constant, Ksp 	<ul style="list-style-type: none"> • <u>Pre_Lab 8</u> • <u>Wet_Lab 8</u> • <u>Post_Lab 8</u>
Week 9	Lab 9: Common Ion Effect (Wet in-person Only)	<ul style="list-style-type: none"> • Understand the dynamics of molar solubility, common ion effect, and the relationship with solubility product, K_{sp}. 	<ul style="list-style-type: none"> • <u>Pre_Lab 9</u> • <u>Wet_Lab 9</u> • <u>Post_Lab 9</u>
Week 10	Lab 10: Thermodynamics, Free Energy, and Equilibrium of Borax (Wet in-person Only)	<ul style="list-style-type: none"> • Determine enthalpy, entropy, and free energy change of borax. 	<ul style="list-style-type: none"> • <u>Pre_Lab 10:</u> • <u>Wet_Lab 10</u> • <u>Post_Lab 10</u>
Week 11	Lab 11: Ag+ ion & LeChatelier's Principle (Wet in-person Only)	<ul style="list-style-type: none"> • Predict chemical equilibrium dynamics of silver ion and LeChatelier's principle. 	<ul style="list-style-type: none"> • <u>Pre_Lab 11</u> • <u>Wet_Lab 11</u> • <u>Post_Lab 11</u>

Week 12	Lab 12: Electrochemistry (Wet in-person Only)	<ul style="list-style-type: none"> Construct various electrochemical galvanic cells and measure the cell potentials. 	<ul style="list-style-type: none"> Pre_Lab 12 Wet_Lab 12 Post_Lab 12
Week 13	Lab 13: Transition Metal Complexes (Wet in-person Only)	<ul style="list-style-type: none"> Determine coordination bond strength and the stability of transition metal complexes. 	<ul style="list-style-type: none"> Pre_Lab 13 Wet_Lab 13 Post_Lab 13
Week 14	Lab 14: Lab Report in Scientific Journal Format (DRY Virtual ZOOM only)	<ul style="list-style-type: none"> Final Lab Report in Scientific Journal Format: Write a group report in a scientific journal format <ol style="list-style-type: none"> Students are allowed to use the words, images, schema, table, or any contents of the instructor written lab manual with the lab manual web address (http://,,,,,). IF ChatGPT or other generative AI tools are used, students must clarify the VALID source written in 	<ul style="list-style-type: none"> Formal Lab Group Report

		the reference section. For example, which generative AI tool they used and what exact portion of the texts are generated by the tool by distinguishing the AI generated contents using boldface, italics, or highlighting.	
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COURSE MATERIALS

Textbook(s): NONE (ALL course materials are freely available on canvas)

Personal Required Material: Chemical Splash Goggles for ALL WET LABS

GRADING PROCEDURES

Grades will be based on:

Lab 1-14	100.1% (7.15% each x 14)
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Grading Scale: The standard undergraduate grading scale will be applied to the entire class with no rounding and no exceptions. There will be no extra credit opportunities or additional ways to raise your grade beyond the assessments outlined in the course.

A(\geq 93.00%), A⁻(\geq 90.00%), B⁺(\geq 87.00%), B(\geq 83.00%), B⁻(\geq 80.00%) C⁺(\geq 77.00%), C(\geq 73.00%), C⁻(\geq 70.00%), D⁺(\geq 67.00%), D(\geq 60.00%), and F(<60.00%).

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Proficiency in navigating Canvas

Technology skills necessary for this specific course

- Ability to participate in live web conferencing using Zoom

Required Equipment/software

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Microphone: built-in laptop or tablet microphone or an external microphone

Academic Integrity

Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at

<http://web.stevens.edu/honor/> ➞ [\(http://web.stevens.edu/honor/\)](http://web.stevens.edu/honor/)

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

“I pledge my honor that I have abided by the Stevens Honor System.”


Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at www.stevens.edu/honor ➞ [_ \(http://www.stevens.edu/honor\)](http://www.stevens.edu/honor).

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable

accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>  (<https://www.stevens.edu/office-disability-services>). If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu (<mailto:pgehman@stevens.edu>) or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES





Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression) and who can visit the office in person. CAPS is open from 9:00 am – 5:00 pm Mondays, Wednesdays, Thursdays and Fridays and from 9:00 am – 7:00 pm on Tuesdays during the Fall and Spring semesters; appointments are highly encouraged. For those students who cannot visit the Stevens campus for an in-person appointment, you can contact a local mental health care provider for an in-person appointment, or if you are enrolled in the Stevens Student Health Insurance, you may call Care Connect for 24/7 mental health support at 1-888-857-5462.

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu (<mailto:care@stevens.edu>). A member of the CARE Team will respond to your concern as soon as possible.

Chemicals Commonly Encountered in the laboratory with Potential Hazards:

- **WHAT MAKES CHEMICALS HAZARDOUS?** A chemical is considered hazardous if it is cancer causing, toxic, corrosive, irritating, flammable or reactive (poses a threat to health/environment).

Exclamation Mark	Flame	Corrosion	Skull and Crossbones
			
<ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory) 	<ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides 	<ul style="list-style-type: none"> • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals 	<ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic)

• HOW DO CHEMICALS ENTER THE BODY AND CAUSE DAMAGE?

1. *Inhalation* - Gases and vapors can be inhaled through the nose and mouth, and once they reach the lungs, air contaminants can easily enter the bloodstream. Additionally, particulate matter, such as dust from powdered solids, can be inhaled and cause harm to the respiratory system and overall health. PREVENTION: WORK UNDER FUME HOOD. AVOID TOUCH NOSE AND MOUTH.
2. *Eye contact* - Exposure to chemicals through splashing, burns from heat, or injury from sharp instruments or shattered glass can occur. PREVENTION: ALWAYS WEAR SAFELY GOGGLES. AVOID TOUCHING YOUR EYES.
3. *Skin contact/absorption* - Chemical contact with the skin can cause irritation, sensitization, or allow substances to enter the bloodstream. PREVENTION: HANDLE CHEMICAL REAGENTS WITH CARE AND WASH SKIN CONTACT IMMEDIATELY WITH WATER.
4. *Ingestion* - Small amounts of chemicals may enter system through eating and drinking in lab, through nail biting, licking fingers to turn a page. PREVENTION: NEVER EAT OR DRINK IN LAB AND AVOID PUTTING YOUR HANDS IN YOUR MOUTH.

• FIRST AID In case of contact with a chemical reagent:

1. **DON'T PANIC!** Stay Calm
2. **CALL FOR HELP:** Notify your TA immediately!
3. **TAKE ACTION:**
 1. *Acid/Base on skin or in eyes:* Rinse immediately with water. Locate the safety showers and eyewash stations in the lab.
 2. *Solvent inhalation:* Move to fresh air immediately.
 3. *Ingestion of chemical:* Seek medical help immediately.

• LOCATE safety equipments

- Safety Shower: Use when large amount of substance spilled on
- Eye Sash Station: Use with your eye held open and rinse for at least 15 minutes if a chemical gets in the eye.
- First Aid Kit: For basic emergency medical supplies.
- Fire blanket: Use to smother small fires or wrap around a person if their clothing catches fire.

- Fire Extinguisher: For controlling small fires; familiarize yourself with the proper type for different fire classes.
- Acid/Base Neutralizer: For neutralizing acid or base spills on surfaces or skin.
- **Spill, Leak, and Disposal Procedures**
 - Be aware of the location of hazardous chemicals in the lab.
 - In case of a spill, inform your TA immediately and provide the identity of the chemical spilled.
 - Allow your TA to handle the containment and cleanup of the spill.
 - If you are exposed to the spilled chemical, clean yourself thoroughly to remove any traces.
- **SAFETY RULES must be followed at all times.**
 1. NO ONE allowed to perform lab WITHOUT the introduction given at the beginning.
 2. Conduct yourself in a responsible manner at all times in the lab. Horseplay, practical jokes, and pranks will not be tolerated.
 3. Follow all written and verbal instructions carefully. Ask your teacher questions if you do not understand the instructions.
 4. Do not touch any equipment, supplies, or other materials in the lab without permission from the teacher.
 5. Perform only authorized and approved experiments. Do not conduct any experiments when the teacher is out of the lab.
 6. Never eat, drink, chew gum, or taste anything in the lab.
 7. Keep hands away from face, eyes, and mouth while using equipments and materials, especially working with chemicals. Wash your hands with soap and water before leaving the lab.
 8. Wear chemical splash goggles at all times in the lab.
 9. Obtain and read the appropriate Safety Data Sheets (SDS) before entering the laboratory session. Read the lab manual carefully and understand the experiment that will be done safely and efficiently.
 10. Keep your work area and the lab neat and clean. Keep only your laboratory manual, raw data sheets, calculator, and writing instruments to the work area.
 11. Clean all work areas and equipment at the end of the experiment. Return all equipment clean and in working order to the proper storage area.
 12. Follow your teacher's instructions to dispose of any chemical waste generated in the experiment.
 13. Report any accident (fire, chemical spill, breakage, etc.), injury (cut, burn, etc.), or hazardous condition (broken equipments, etc.), to the teacher immediately.
 14. Consider all chemicals used in the lab to be dangerous. Do not touch or smell any chemicals unless specifically instructed to do so.
 15. Handle all chemicals with care.
 16. Do not remove chemicals, equipment, or supplies from the lab without permission from the teacher.
 17. Handle all glassware with care. Never pick up hot or broken glassware with your bare hands.

18. Use extreme caution when using Bunsen burner or hot plate. Only light Bunsen burners when instructed. Do not put anything into a flame unless specifically instructed to do so. Do not leave a lit burner unattended.
19. Dress properly-long hair must be tied back, no dangling jewelry, and no loose or baggy clothing.
20. Learn during the first WET LAB where the safety equipments are located and how to use it (emergency phone, eyewash fountain, fire blanket, safety shower, fire extinguisher, chemical waste tanks, acid/base neutralizer, and safety sorbent). Know where the exits are located and what to do in care of an emergency and fire drill.
21. Be familiar with the **NFPA 705** (Standard System for the Identification of the Hazards of Materials for Emergency Response, called "**Safety Square**" or "**Fire Diamond**") and **Occupational Safety Health Administration (OHSA) Hazard Communication Standard Pictogram**:

