Syllabus for CHEN 1203 Fall 2025

CHEN 1203: General Chemistry for Engineers Part 2: Fall 2025

Instructor: Michael Shirts, michael.shirts@colorado.edu (mailto:michael.shirts@colorado.edu) , Office: JSCBB C123

Lectures: JSCBB A115, MW 8:30-9:20 am

Instructor Office Hours: JSCBB C123, Wed 9:30-10:30 am

TA: Anet Sanchez, Anet.sanchez@colorado.edu (mailto:Anet.sanchez@colorado.edu)

TA office hours: Thurs, 1-2:30, ECCE 1B16

CA: Jibreel Zeinab, Jibreel.Zeinab@colorado.edu (mailto:Jibreel.Zeinab@colorado.edu)

CA office hours: Thurs 4:30-5:30, ECNW 148

Course Description:

CHEN 1203: General Chemistry for Engineers is the second semester of a two-semester sequence course designed to meet the general chemistry requirements for students in Chemical and Biological Engineering. Designed for students whose academic plans require advanced work in chemistry. Topics include kinetics, solubility/solubility equilibria, acid-bases, buffers and titrations, thermodynamics, and electrochemistry. Examples and problems illustrate the application of chemistry to engineering sub-disciplines. AP Chemistry credit not accepted in lieu of any of these prerequisite classes.

Registration Restrictions:

Requires prerequisite courses of CHEN 1201 or CHEM 1113 or MCEN 1024 (all minimum grade C-). Restricted to College of Engineering undergraduates (ENGRU) and IUT On Track applicants only

Student Learning Outcomes

In this course, students will:

- Understand the connection between macroscopic observations, molecular views, and abstract or symbolic representations in chemistry.
- Apply college-level mathematical skills to fundamental chemical concepts to make predictions of chemical changes.
- Recognize the relationship between molecular structure and chemical and physical properties, including the effects of temperature and pressure.
- Analyze complex chemical problems, develop critical thinking skills, and iteratively integrate foundational knowledge with logical approaches to problem solving.
- Be able to explain what makes chemicals react, and why reactions go in a particular direction.
- Quantify changes in chemical mixtures upon reaction.
- Draw and interpret graphs and analyze data in class, in individual work and on exams.
- Recognize and explain how chemistry concepts apply to everyday phenomena.
- Take personal responsibility for learning and enhance self-regulated learning skills.
- Articulate an understanding of science and demonstrate communication skills.
- Better appreciate of the richness of chemistry and its influence on your life.
- Develop an understanding of the following subsets of chemistry:
  - Chemical kinetics
  - Chemical equilibrium
  - Acids and bases
  - Ionic equilibrium
  - Free energy and thermodynamics

- Electrochemistry
- Organic chemistry
- Biochemistry
- Transition metals and coordination compounds

A detailed course outline (https://canvas.colorado.edu/courses/127044/pages/schedule-of-course-topics) is posted to Canvas separately, including readings assigned for each class period.

Textbook and Other Required Materials

- **Textbook:** *Chemistry: A Molecular Approach, 6th Edition,* by Nivaldo Tro which comes along with Pearson's *Mastering Chemistry* online resources. Textbook and electronic resources are available through the web site.

In-Person Meeting Times and Location: MW 8:30-9:20 am, JSCBB A115. During this time, I will work examples, we will do clicker questions (in-class student responses) as well as group work. I will also both take questions from students during that time address questions asked online before the discussion time. This session will be recorded.

Course Communication

Canvas will be used to communicate class information. You are responsible for all the information that is posted here! Most administrative questions should go to my email. Please add **CHEN1203 to the subject line** to make sure the email doesn't get lost. Email is **not** a good way to clarify questions on the material; those questions should be answered in office hours or in class.

Class Format

1. Reading assignments will be assigned for every class. Any-in person discussions **will be conducted with the assumption that you have read them.**
2. There will be shorter reading quizzes due on M/W and homework problems due Thursday. Quizzes will be due 8:30 am, and HW will be due on Thursday at 11:59 p.m.

Preliminary Grading Scale

90/93/100	A-/A
80/83/87	B-/B/B+
70/73/77	C-/C/C+
60/63/67	D-/D/D+
< 60	F

The cutoffs for a given grade may be lowered, but will not be raised, so I'm happy to give as many people A's as can demonstrate mastery of the material. Even if curved, the grade distribution will reflect that fact that students in CHEN 1211 are in the top half of the general chemistry class population.

The weights of the assessment components are:

Assessment Component	Points
Homework	100
Reading Quizzes	100
Clicker Questions	100
Midterm 1	175

Midterm 2	175
Final Exam	350
Total	1000

Note the points are spread across various categories, so that your final grade is not dependent on any one aspect of the class.

Exams (700 points):

All exams are closed books – any necessary information or equations to solve problems will be provided. Exams will in person, during class. Any student who misses an exam will be dropped from the class unless he/she has a health emergency or similar unavoidable conflict.

You will need a NON-PROGRAMMABLE calculator for each of the exams. These are the simple, $15-20 calculators that just do addition, subtraction, multiplication, division, etc.; logarithms and exponentials are the most complex math that will be used. A TI-87 or similar is a PROGRAMMABLE calculator and you will not be able to use these on the exams.

Exam	Date	Time	Location
Midterm 1	Wednesday, Sep. 24th	In class	JSCBB A115
Midterm 2	Wednesday, Oct. 29th	In class	JSCBB A115
Final (cumulative)	Monday, Dec 8th	7:30-10:00 p.m.	JSCBB A115

Homework (100 points):

All homework will turned in with Gradescope via Canvas. The only make-up homework that will be offered is for documented medical or emergency reasons. The lowest homework score will be dropped. Once you have registered and enrolled in the course, you can log in at any time to complete or review your homework assignments. Homework will be posted by class time on Wednesday, and due the following Thursday at 11:59 pm. It will cover material up through the Monday before the homework is due. The amount of knowledge gained from assigned homework will be significant – make sure you completely understand the problems and concepts from both class and homework. Do not rely on your classmates, or AI, for the knowledge you need to complete assignments – you will be the one taking the exam! An high standard of professional quality and clarity is expected on assignments. Understanding content and its applicability is elevated when you are also able to communicate this knowledge effectively.

Reading Quizzes (100 points):

There are two reading quizzes per week, accessed through *Mastering Chemistry*. These are based on both previous material **and** assigned reading for the upcoming day. The lowest three quizzes will be dropped; no other quizzes will be dropped for anything other than documented medical or emergency reasons. For each question in the reading quiz assignment, you will get up to 4 chances to answer each question, losing 20% each time (fewer answers if multiple choice). During sign up or throughout the term, if you have any technical problems or grading issues with *Mastering Chemistry,* visit the **support page (https://support.pearson.com/getsupport/s/contactsupport)** to resolve the issue. The Pearson support team for *Mastering Chemistry* is almost always faster and better able to resolve computer issues than the team at CU.

Clicker questions (100 points)

Almost all classes will include multiple clicker questions. These are conceptual or simple calculation questions related to technical ideas and reiterating practical connections to course content. You will receive 2/3 of the credit for answering each question, and the other 1/3 for a correct answer. We will drop the lowest three clicker days (by point total) to account for unavoidable absences; no other clickers will be dropped for anything other than documented medical or emergency reasons, or official school events. I am planning on using the IClicker Remote app the course.

Extra Credit:

- Meet with the professor before the first exam (5 points). Available times will be posted.
- Participation in weekly surveys on how the week went (2 points each)

Attendance Policy

Attendance at the MW session of class is required, and will be enforced by the participation points from required clocker questions. Recordings will be posted from these sessions to enable review.

Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy. For more information, see the **Student Classroom and Course-Related Behavior Policy** (https://www.colorado.edu/compliance/policies/student-classroom-course-related-behavior) , the (https://www.colorado.edu/sccr/student-conduct) **Student Code of Conduct** (https://www.colorado.edu/sccr/student-conduct) , and the (https://www.colorado.edu/oiec/) **Office of Institutional Equity and Compliance** (https://www.colorado.edu/oiec/) .

Policies for Infectious Diseases

Members of the campus community should **follow CDC guidelines for physical distancing, masking, and/or staying home if they are sick or test positive for all respiratory illnesses** (https://www.cdc.gov/respiratory-viruses/prevention/precautions-when-sick.html) . Stay home and away from others (including people you live with who are not sick) if you have respiratory virus symptoms that aren't better explained by another cause. These symptoms can include fever, chills, fatigue, cough, runny nose, and headache, among others. You can go back to your normal activities when, for at least 24 hours, both are true 1) Your symptoms are getting better overall, **and** 2) You have not had a fever (and are not using fever-reducing medication). When you go back to your normal activities, take added precaution over the next 5 days, such as masking and avoiding crowded spaces.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. If you wish to have your preferred name (rather than your legal name) and/or your preferred pronouns appear on your instructors' class rosters and in Canvas, visit the **Registrar's website** (https://www.colorado.edu/registrar/students/records/info/preferred) for instructions on how to change your personal information in university systems.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the **Honor Code** (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct) . Violations of the Honor Code may include, but are not limited to: plagiarism (including use of paper writing services or technology such as essay bots), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty of others. Understanding the course's syllabus and what the requirements are for course work is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to the Student Conduct & Conflict Resolution office (**StudentConduct@colorado.edu** (mailto:StudentConduct@colorado.edu)). Students found responsible for violating the Honor code will be assigned resolution outcomes from Student Conduct & Conflict Resolution as well as academic sanctions from the faculty member. Visit the **Honor Code website** (https://www.colorado.edu/sccr/students/honor-code-and-student-code-conduct) for more information on the academic integrity policy.

Any discovered incidents of academic dishonesty will be reported to the departmental disciplinary committee who will recommend an academic sanction. Sanctions can range from an F for the particular assignment and a lowering of your grade at least a full letter grade to an F for the course. In addition, all confirmed incidents will be reported to the University Honor Code

Schedule of Course Topics

Date	Lecture number	Topic	Chapters
Aug 25	1	Introduction, key points of last semester and class success strategies	
Aug 27	2	Chemical Kinetics: Intro, Rate Laws	15.intro-15.3 (642-649)
Sept 1		No Class: Labor Day	
Sep 3	3	Chemical Kinetics: Integrated Rate Laws, Reaction Rate	15.4-15.5 (655-661)
Sep 8	4	Chemical Kinetics: Reaction Mechanisms, Catalysis	15.6-15.7 (662-678)
Sep 10	5	Chemical Equilibrium	16.intro-16.3 (696-709)
Sep 15	6	Chemical Equilibrium	16.4-16.6 (707-712)
Sep 17	7	Chemical Equilibrium	16.7-16.9 (713-732)
Sep 22	8	Review and Problems	
Sep 24		Exam 1	
Sep 29	9	Acids and Bases	17.intro-17.4 (749-756)
Oct 1	10	Acids and Bases	17.5-17.7 (757-774)
Oct 6	12	Acids and Bases	17.8-17.11 (775-789)

Oct 8	13	Aqueous Solution Equilibrium	18.intro-4 (802-819)
Oct 13	14	Aqueous Solution Equilibrium	18.5-6,18.8 (833-841,845-849)
Oct 15	15	Free Energy and Thermodynamics	19.intro-19.4 (864-877)
Oct 20	16	Free Energy and Thermodynamics	19.5-19.6 (878-885)
Oct 22	17	Free Energy and Thermodynamics	19.7-19.10 (886-901)
Oct 27	18	Review	
Oct 29		Exam 2	
Nov 3	19	Electrochemistry	20.intro-20.5 (914-935)
Nov 5	20	Electrochemistry	20.6-20.9 (936-951)
Nov 10	21	Organic Chemistry	22.Intro-22.6 (1008-1032)
Nov 12	22	Organic Chemistry	20.6-20.10 (1033-1042)
Nov 17	23	Biochemistry	23.Intro-23.3 (1058-1068)
Nov 19	24	Biochemistry	23.4-23.7 (1069-1082)
Nov 24-28		Thanksgiving (no classes)	
Dec 1	25	Nonmetals	24 (1092-1129)
Dec 3	26	Metals	25 (1130-1155)

Dec 8	27	Final Exam (Cumulative): 7:30-10:00 pm

where further nonacademic disciplinary action can be taken. The following list includes some of the examples of dishonest acts (not all of them) for which a hearing will result:

1. Talking to each other during a class individual exam or bringing any information into the exam.
2. Any alteration, forgery, or falsification of official records (such as modification of graded homework problems or exams for which you are seeking additional credit).
3. Allowing another person to take an exam for you (false identification).
4. Knowingly providing material of your own or of others to a fellow student.
5. Possession of or observation of examinations or solutions to examinations prior to the date and time of the exam.
6. Allowing another person to answer clicker questions for you, or answering clicker questions for someone else.

Mental Health and Wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact **Counseling and Psychiatric Services (CAPS)** (https://www.colorado.edu/counseling/) located in C4C or call (303) 492-2277, 24 hours /7 days a week.

Accommodation for Religious Obligations

Campus policy requires that faculty provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please notify me well before any conflict so we can arrange proper accommodation. See the **campus policy regarding religious observances** (http://www.colorado.edu/policies/observance-religious-holidays-and-absences-classes-andor-exams) for full details.

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the **Disability Services website.** (https://www.colorado.edu/disabilityservices/) You can reach out Disability Services at 303-492-8671 or **dsinfo@colorado.edu** (mailto:dsinfo@colorado.edu) for further assistance.

If you have a temporary medical condition or required medical isolation for which you require accommodation, please notify me before any missed class, so we can arrange the proper accommodations. Also see **Temporary Medical Conditions** (http://www.colorado.edu/disabilityservices/students/temporary-medical-conditions) on the Disability Services website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits **protected-class** (https://www.colorado.edu/oiec/policies/protected-class-nondiscrimination-policy/protected-class-definitions) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email **cureport@colorado.edu** (mailto:cureport@colorado.edu). Information about university policies, **reporting options** (https://www.colorado.edu/oiec/reporting-resolutions/making-report), and **OIEC support resources** (https://www.colorado.edu/oiec/support-resources) can be found on the **OIEC website** (https://www.colorado.edu/oiec/).

Please know that faculty and graduate instructors are required to inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure the person impacted receives outreach from OIEC about resolution options and support resources. To learn more about reporting and support resources for a variety of issues, visit the **Don't Ignore It** (https://www.colorado.edu/dontignoreit/) page.