

# COURSE SYLLABUS: CHEM 205 - GENERAL CHEMISTRY I

**IMPORTANT: ALL PARTS OF THIS COURSE WILL BE DONE IN PERSON, ON CAMPUS IN MONTREAL. SEE LEC. SECTION MOODLE SITE FOR DETAILS ON YOUR PROF'S LECTURE FORMAT & PARTICIPATION REQUIREMENTS. ALL LABS & TUTORIALS ARE MANDATORY. IF PUBLIC HEALTH REGULATIONS FORCE A CHANGE TO ONLINE LEARNING: LECTURE/LAB/TUTORIAL WILL REQUIRE SYNCHRONOUS PARTICIPATION VIA ZOOM, & EXAMS WILL BE DONE IN COLE WITH PROCTORIO PROCTORING. IF FOR ANY REASON THESE REQUIREMENTS DO NOT WORK FOR YOU, PLEASE DROP THE COURSE BY THE DEADLINE.**

## 1. GENERAL INFORMATION (see pages 7&8 of schedule)

- **Course:** General Chemistry I, CHEM 205 (3 credits), Winter 2024
- **Lectures:** 2.5h every week (synchronous classroom lectures +/- recorded videos, varies by professor), on campus
- **Tutorials:** MANDATORY; 2.5h biweekly (ALTERNATES WITH LAB), on LOY campus (see your own schedule for room)
- **Laboratories:** MANDATORY; 3.0h biweekly (ALTERNATES WITH TUTORIAL), on LOY campus in lab room SP-232

**IF REPEATING COURSE:** Lab exemptions must be requested before noon, **Fri. Jan. 19<sup>th</sup>** by submitting the application form (visit <https://www.concordia.ca/artsci/chemistry/programs/undergraduate/procedures-forms.html> & see Student Requests) to the Chemistry Department ([chemistry.reception@concordia.ca](mailto:chemistry.reception@concordia.ca)). **All repeating students must repeat all other parts of the course including the tutorials and Stemble.** Students are eligible for a lab exemption if they passed (>60%) the Chem 205 labs in the past 24 months; students who partially completed the lab component must repeat all labs.

### ▪ Instructor: for Office hours & Zoom IDs see Moodle Lecture site

- **Professor (Lec.04):** **Dr. Xavier Ottenwaelder**, Associate Professor, Dept. of Chemistry & Biochemistry  
Lectures: Synchronous = classroom lectures + problem-solving with participation quizzes  
Contact: [dr.x@concordia.ca](mailto:dr.x@concordia.ca) (for conceptual/lecture/exam issues; office hrs TBA – see Moodle)
- **Professor (Lec.05):** **Dr. Joanne Krupa**, Part-Time Faculty, Dept. of Chemistry & Biochemistry  
Lectures: Synchronous = classroom lectures + problem-solving with participation quizzes  
Contact: [joanne.krupa@concordia.ca](mailto:joanne.krupa@concordia.ca) (for conceptual/lecture/exam issues; office hrs TBA – see Moodle)
- **Professor (Lec.53):** **Dr. Marco Paladino**, Assistant Professor (LTA), Dept. of Chemistry & Biochemistry  
Lectures: Synchronous = classroom lectures + problem-solving with participation quizzes  
Contact: [marco.paladino@concordia.ca](mailto:marco.paladino@concordia.ca) (for conceptual/lecture/exam issues; office hrs TBA)
- **Professor (Lec.54):** **Dr. Georges Dénès**, Associate Professor, Dept. of Chemistry & Biochemistry  
Lectures: Synchronous = classroom lectures + asynchronous participation points via Moodle  
Contact: [Georges.Denes@concordia.ca](mailto:Georges.Denes@concordia.ca) (for conceptual/lecture/exam issues; office hrs TBA – see Moodle)
- **TAs (lab/tutorial):** TA contact information, office hours, & Zoom IDs provided on Core Materials Moodle site
- **Course Coordinator:** **Dr. Elham Ghobadi** ([e.ghobadi@concordia.ca](mailto:e.ghobadi@concordia.ca)) - course policies, Stemble homework/quizzes, tutorial absences/issues
- **Lab Coordinator:** **Dr. Jennifer Romero** ([Jennifer.Romero@concordia.ca](mailto:Jennifer.Romero@concordia.ca)) - lab rules/issues/absences, medical/employer's notes
- **Moodle sites:** Core Materials site: lab/tutorial/homework information, FAQs (course policies, labs, tutorials), sample finals  
Lecture section site: section-specific lecture slides, videos, sample midterm exams, other information

## 2. COURSE DESCRIPTION

- **Calendar description:** Stoichiometry, states of matter, atomic structure, electron structure of atoms, the periodic table, periodic properties, bonding, gases. Lectures & laboratory.
- **Required background knowledge/skills:** proficiency in high-school mathematics necessary (see Moodle for skills list)
- **Expanded course description:** To solve problems of a chemical nature, scientists assess factual information, apply concepts and perform mathematical calculations. In General Chemistry I, you will memorize language and facts and learn concepts and calculations used by scientists to describe matter and the things that different types of matter do. The hands-on laboratory experiments further demonstrate how textbook chemistry is used to solve real chemical problems. Together, the theory and lab work provide the introduction to chemical thinking needed for scientists and engineers.
- **To succeed in CHEM 205,** you must regularly work through problems from the textbooks and/or online homework system, in addition to doing the readings. Start with “general” end-of-chapter questions where different chapter topics are mixed together. If you start at question #1, you'll run out of time before you've ever tested yourself. Write out all problems/calculations in full to forge a strong - and fast - link between your brain and your pen. Work will be graded on both correctness and completeness.

### 3. OBJECTIVES

- **Students are expected to:**
  - Draw on background: routinely use high-school level physical science and mathematics (algebra) knowledge
  - Acquire knowledge: scientific method; factual information & laws; practical & abstract concepts; chemical calculations
  - Apply knowledge: look below surface to find causes; observe, interpret & predict; synthesize info. to solve problems
  - Develop skills: discipline; logic; analysis; explanation (what/how/why); problem-solving; hands-on lab techniques
  - Lay groundwork: for science/engineering: knowledge of matter & reaction types, & how to learn more about matter
  - Build independence: learn detailed lists of objectives by topic (see pages 5 & 6)

### 4. EXTRAORDINARY CIRCUMSTANCES

- In the event of extraordinary circumstances and pursuant to the [Academic Regulations](#), the University may modify the delivery, content, structure, forum, location and/or grading scheme. If this happens, students will be informed of the changes.

### 5. COURSE MATERIALS

- **Required: Textbook:** **free pdf textbook:** Openstax *Chemistry 2e* <https://openstax.org/details/books/chemistry-2e>  
**OR \$80-100 ebook** *Chemistry & Chemical Reactivity*, 10<sup>th</sup> Ed, Kotz, Treichel, Townsend & Treichel
- Homework:** Stemble system, ~\$25 (free trial for 1<sup>st</sup> month), sign-in details coming via email at start of term
- Lab manual:** ~\$20 at LOY book stop, *Chem 205 Gen.Chem.I* (Dept. Chem./Biochem.), or pdfs on Moodle (if on backorder)
- Equipment:** lab coat, safety glasses, and spatula (available at campus bookstore)
- **Readings:** Openstax 2e Ch.1-4, 6-9, 13.1, 14.2, 17.1 (see p.4) **OR** Kotz *et al* 10<sup>th</sup> Ed., Ch.1-4, 19.1, 6-8, 12.3, 9.1, 10 (see p.5).

### 6. GRADING

- **Breakdown:**

In-class participation:	2.5 %	(TBA by lecture prof, Moodle or in-class polling (iClicker); see Lec. Moodle site)
Tutorial participation:	2.5 %	(must attend $\geq$ 4 of 5 tutorials)
Homework (Stemble):	8 %	(4 assignments in Stemble, unlimited tries until due, worth 2% each)
Quizzes (Stemble):	12 %	(2 quizzes in Stemble, one try only until due, worth 6% each.)
Midterm exam:	20 %	(in class week of Mar. 4 <sup>th</sup> - 8 <sup>th</sup> , dropped if final exam grade is higher than midterm exam grade, in %. Ask your prof. for content and format.)
Final examination:	35 %	(cumulative, during Apr. 18 <sup>th</sup> - May 1 <sup>st</sup> exam period)
Laboratory reports:	20 %	(4 lab reports, each worth 5%; must attend $\geq$ 3 of 4 labs AND earn > 60%)

*Note: If a student who has written the midterm exam performs better on the cumulative final exam, their midterm will not count at all & their final exam will count for 55%.*

**Theory Pass Requirements: >45% average on final exam AND >50% average on all theory (exams + Stemble)**

**Lab Pass Requirement: >60% average on lab reports required to pass course**

- **Expectations:** application of pre-requisite knowledge (& common sense) to new concepts, situations and problems logical explanation of concepts/situations, supported by facts, drawings & calculations as appropriate objective, reasonable analysis and interpretation of laboratory observations and quantitative data

**Note:** Concordia's Short-Term Absence form (<https://www.concordia.ca/students/absence-form.html>) may be used to notify an instructor of a  $\leq$  5 day absence due to emergency/illness/acute mental health issues, without supporting documents (e.g. medical note). It **cannot** be used for final exams, work worth  $\geq$  30% of course, planned absences, or absences > 5 days. **IMPORTANT:** This form can be used a maximum of 2 times from Sept.-April and 1 time in any summer term. **Contact instructor within 2 days of the missed activity/deadline to see how missed work can be made up.** *NOTE: Depending on your situation and timing, it might be possible to get a lab or tutorial make-up without submitting a form, so talk to the Course Coordinator or Lab Coordinator ASAP.*

- **Attendance: Lecture participation:** professors may accommodate absence from synchronous-participation activities, when appropriately justified. Contact your professor ASAP if you have an issue.  
**Labs & Tutorials:** if miss > 1 lab or >1 tutorial (ANY REASON), a Repeat (R) grade is earned for course. Contact Lab Coordinator (for labs) or Course Coordinator (for tutorials) to plan for religious holidays or medical appointments or to ask if a make-up is possible. Missed labs or tutorial may be made-up during the period the same experiment/tutorial is being done. Un-excused missed labs earn zero grades. Absences without submission (max.1) might be excused if justified - see Lab Coordinator.
- **Submitted work:** must be submitted directly to Moodle before or on the due date; late penalties apply (10% per day) must be legible, organized & show full calculations and explanations (justification counts for grades) if uploaded, must be a pdf file made from a clear photo of handwritten work (unless ACSD says typed) will be graded by TAs (lab work), by Stemble (homework, quizzes) and by professors (participation, exams) must be in your own words; logic flow & proper terminology worth more here than perfection of writing may be submitted in French, according to Concordia policy (talk to your professor if you require this)
- **Grading scale:** A+ ( $\geq$  90.0%), A (85-89.9%), A- (80-84.9%); B+ (76.7-79.9%), B (73.4-76.6%), B- (70-73.3%);  
C and D grade ranges similar to Bs.
- **Failing grades:** Fail (F) grade: if earn < 50% on theory and/or <45% average grade on final exam  
Repeat (R) grade: if earn < 60% on labs, or miss >1 lab or >1 tutorial for any reason
- **Lab exemption:** If repeating course: can request lab exemption (see top of p.1) but must repeat all other coursework.

When a student receives a lab exemption for labs done at Concordia, the previous lab mark is reused. If a student did their labs at another institution, the previous lab grade is not used; their course grade is based solely on the theory grade from Concordia.

## 7. SCHEDULE (May be subject to change.)

- **Important dates:** Lectures: start week of Jan. 15<sup>th</sup>  
 Lab/Tut. check-in: mandatory, Jan.22-26, at scheduled lab start time in SP-232  
 Chem 101: mandatory seminar on Jan. 30<sup>th</sup> or Feb.1<sup>st</sup> via Zoom; Moodle quiz deadline Feb. 18<sup>th</sup> (11:55 PM)  
 Drop deadlines: DNE (tuition refund) deadline: Mon. Jan. 29<sup>th</sup>; DSC Wed. Apr.17<sup>th</sup>  
 Midterm exam: in person during class on campus week of Mar. 4<sup>th</sup> - 8<sup>th</sup> (on COLE if forced online by health regulations)  
 Final exam: Apr. 18<sup>th</sup> - May 1<sup>st</sup> exam period, in person on campus (on COLE if course forced online)

## 8. USE OF THIRD-PARTY SOFTWARE AND/OR WEBSITES

- **Stemble:** Students are advised that external software and/or websites will be used in this course. Students may be asked to submit or consent to the submission of personal information (e.g., name and email) to register for these online services. Students are responsible for reading and deciding whether or not to agree to any applicable terms of use. Use of this software and service is voluntary. Students who do not consent to the use the software or service should identify themselves to the course coordinator as soon as possible, and in all cases before the DNE deadline, to discuss alternate modes of participation.
- **Institution tools:** Moodle, Zoom, Yuja, Office365 (O365), COLE, and Proctorio are recognized as institutional tools by Concordia. Professors are not required to accommodate students who wish to opt-out of sharing data with these sites/tools.

## 9. BEHAVIOUR (RIGHTS AND RESPONSIBILITIES OF THE STUDENT)

- **Be professional:** All individuals participating in this course are expected to be professional and constructive throughout the course, including in ALL communications (verbal, written, face-to-face, on-line) with ALL faculty, staff and students. Concordia students are subject to the Code of Rights and Responsibilities (<https://www.concordia.ca/content/dam/common/docs/policies/official-policies/BD-3.pdf>) when engaged physically and/or virtually in any University activity, e.g., classes, seminars, meetings, labs, etc.
- **Contribute to a positive learning environment:** Disruptive or disrespectful behaviour will not be tolerated in any Concordia environments: classrooms, labs, tutorials or on-line. Students engaging in inappropriate behaviour will be asked to leave, without the opportunity to make up the missed work.
- **Read the Core Materials Moodle site during the first week of classes:** Full explanations of the course policies, activities, and helpful tips are provided as FAQs (frequently asked questions). Please read it before the end of the 1<sup>st</sup> week of class. By registering for the course, you are agreeing to follow these rules. The information will remain accessible all term for your reference. If you have questions, please ask the Course Coordinator, Lab Coordinator or Professor (depending on topic).
- **Be prepared for lectures, tutorials & labs: (for lab/tutorial check-in day: no preparation required)**

**Lectures:** Read/watch the provided lecture materials before class & answer any feedback questions required by your professor, and then be ready to (i) answer questions (including calculations) during the lecture and (ii) engage in discussion with classmates to clarify each others' understanding.

**Tutorials:** Attendance mandatory even if you have a lab exemption. Do recommended exercises beforehand & attend problem- solving session with tutorial TA.

**Labs:** Prelab quiz mandatory, + lab attendance mandatory. Read the experiment thoroughly & complete the pre-laboratory quiz in Moodle (individually), and then be ready to (i) perform the experiment in the lab with a lab partner, and (ii) write a lab report based on your data (individually).

- **Complete the MANDATORY "Chem 101" seminar + quiz on the Academic Code of Conduct & Ethical Use of Information Sources:**

As part of your CHEM course, you are **required** to i) attend a Chemistry and Biochemistry Departmental Seminar on the academic conduct code and the appropriate use of information sources and ii) pass the online quiz associated with this seminar (the passing grade for the quiz is 100%). (**Note:** this quiz is graded by the Department of Chemistry and Biochemistry, and you do not have access to it until after you have attended the seminar. Therefore, any other quiz you may have taken on the academic code of conduct does not count toward the CHEM 101 requirement.) The aim of this seminar and quiz is to clarify the academic conduct code in terms of which practices will be considered unacceptable with regards to work submitted for grading in your CHEM course. **You are only exempt from repeating the seminar and the quiz if you have done both in Winter 2019 or more recently\***, otherwise you are required to repeat both this term. This short seminar (1 hour) will be held at the following times (note that you will not be given credit if you join too late and/or leave too early):

Date (Winter 2024)	Time	Mode	Registration link
Jan.30 (Tuesday)	21:00- 22:00	Zoom	<a href="https://concordia-ca.zoom.us/meeting/register/tZEpduiqqj8rHNA4t_dWhFwnImOSHyjND38f">https://concordia-ca.zoom.us/meeting/register/tZEpduiqqj8rHNA4t_dWhFwnImOSHyjND38f</a>
Feb.1 (Thursday)	21:00- 22:00	Zoom	<a href="https://concordia-ca.zoom.us/meeting/register/tZlVf-ysrz8pGNFJEOnE8CqWvRYv_ADZ4arT">https://concordia-ca.zoom.us/meeting/register/tZlVf-ysrz8pGNFJEOnE8CqWvRYv_ADZ4arT</a>

As space for each of the Zoom seminars is limited, please **register early** for your preferred slot (copy the corresponding link above into your browser). **Look out** for the Zoom email with the link to the actual seminar. Then do not forget to **attend** that seminar slot on the date above. You will **not** receive a reminder on or before the date!

We will take attendance at the Zoom seminar; this means that you must log in with the code that was supplied for your registration. Do not “join a friend” in watching at their computer.

**If you do not complete Chem 101, your final CHEM 205 grade will be lowered by one letter grade and carry an incomplete notation (e.g., C+/INC if you earned a B-) until such time as this requirement is completed. Please refer to the undergraduate calendar (section 16.3.5) for details on removal of an incomplete notation.**

\* You are exempt if you can locate your ID in the pdf file located on the Departmental web site (<https://www.concordia.ca/content/dam/artsci/chemistry/docs/Compliance-list1.pdf>) and if there is no entry in the “quiz” column for you.

The Academic Code of Conduct can be found in section 17.10 of the academic calendar and on the Academic Integrity site (<https://www.concordia.ca/conduct/academic-integrity.html>). Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. The mandatory seminar is a clear and fair opportunity to learn what our faculty regards as academic misconduct. Failure to take part in this learning opportunity and thus ignorance of these regulations is no excuse and will not result in a reduced sanction in any case where academic misconduct is observed.

- **Demonstrate academic integrity:** (Source: [Academic Integrity Website](https://www.concordia.ca/conduct/academic-integrity/plagiarism.html), <https://www.concordia.ca/conduct/academic-integrity/plagiarism.html> ).

The most common offense under the [Academic Code of Conduct](https://www.concordia.ca/conduct/academic-integrity.html) is plagiarism: **“the presentation of the work of another person as one’s own or without proper acknowledgement”**. This could be material copied word for word from books, journals, internet sites, professor’s course notes, etc. It could be material that is paraphrased but closely resembles the original source. It could be the work of a fellow student (e.g., an answer on a quiz, data for a lab report, or an assignment completed by another student. It could be a paper purchased through one of the many available sources. “Presentation” is not limited to written work – it includes images, graphs, tables, ideas, oral presentations, computer assignments and artistic works. In addition, if you translate the work of another person into French or English and do not cite the source, this is also plagiarism. In simple words: DO NOT COPY, PARAPHRASE OR TRANSLATE ANYTHING FROM ANYWHERE WITHOUT SAYING FROM WHERE YOU OBTAINED IT!

## 10. INTELLECTUAL PROPERTY RIGHTS (IP)

- **No sharing/reposting:** Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Any unauthorized sharing of course content may constitute a breach of the [Academic Code of Conduct](https://www.concordia.ca/conduct/academic-integrity.html) and/or the [Code of Rights and Responsibilities](https://www.concordia.ca/conduct/academic-integrity.html).
- **Get permission to record:** Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor.
- **Your work is yours:** As specified in the [Policy on Intellectual Property](https://www.concordia.ca/conduct/academic-integrity.html), the University does not claim any ownership of or interest in any student intellectual property (IP). All university members retain copyright over their work.

## 11. CONCORDIA UNIVERSITY SERVICES FOR STUDENTS (partial list)

- Counselling & Psychological Services: <https://www.concordia.ca/health/mental-health/counselling.html>
- Student Success Centre: <https://www.concordia.ca/students/success.html>
- New Student Program: <https://www.concordia.ca/students/success/new.html>
- Concordia Library Citation & Style Guides: <http://library.concordia.ca/help/howto/citations.html>
- Academic Integrity Website: <https://www.concordia.ca/conduct/academic-integrity.html>
- Access Centre for Students with Disabilities: <https://www.concordia.ca/students/accessibility.html>
- Sexual Assault Resource Centre: <https://www.concordia.ca/conduct/sexual-assault.html>
- Academic advising: <https://www.concordia.ca/students/registration/advising.html>
- Advocacy & Support Services: <https://www.concordia.ca/students/success/advocacy.html>
- Health Services: [https://www.concordia.ca/health.html?utm\\_source=redirect&utm\\_campaign=health](https://www.concordia.ca/health.html?utm_source=redirect&utm_campaign=health)

**CHEM 205 – COURSE OUTLINE & READINGS (for Kotz 10<sup>th</sup> Chemistry & Chemical Reactivity)**

- **Slides and/or videos** will be posted on Moodle 3-4 days before class. Work through them BEFORE class time.
- **Read** upcoming textbook sections before each class. Lectures are intended to clarify your understanding of the topics covered in the text and to get you actively thinking about the material. Lectures do not replace readings, & vice versa.
- **Take notes** during class to recall the explanations & discussion. Don't waste time copying down what is on the slides!
- **Think actively** during class. Answer in-class questions and discuss material with your classmates – research shows that active participation improves both understanding and retention. Many problems will be solved during class time.

Chapter title	List of topics <i>(Note: prof may add supplementary material and/or cover topics in different order)</i>	Readings
Let's Review: the Tools of Quantitative Chemistry	Units of measurement; Making measurements – precision, accuracy, experimental error & standard deviation; Mathematics of chemistry; Problem solving by dimensional analysis; Graphs & graphing; Problem solving & chemical arithmetic	"Let's review" Sections 1 – 6 (after Ch.1)
Basic Concepts of Chemistry	Chemistry & its methods; Sustainability & green chemistry; Classifying matter; Elements; Compounds; Physical properties; Physical & chemical changes; Energy – basic principles	1.1 – 1.8
Atoms, Molecules & Ions	Atomic structure, atomic number & atomic mass; Isotopes & atomic weight; The periodic table; Molecules, compounds & formulas; Ionic compounds – formulas, names & properties; Atoms, molecules & the mole; Chemical analysis – determining compound formulas; Instrumental Analysis – determining compound formulas	2.1 – 2.8
Chemical Reactions	Introduction to chemical equations; Balancing chemical equations; Introduction to chemical equilibrium; Aqueous solutions; Precipitation reactions; Acids & bases; Gas-forming reactions; Oxidation-reduction reactions; <a href="#">Balancing redox equations in acidic/basic solution</a> ; Classifying reactions in aqueous solution	3.1 – 3.9, <a href="#">19.1</a>
Stoichiometry: Quantitative Information about Chemical Reactions	Mass relationships in chemical reactions – stoichiometry; Reactions in which one reactant is present in limited supply; Percent yield; Chemical equations & chemical analysis; Measuring concentration of compounds in solution; pH, a concentration scale for acids & bases; Stoichiometry of reactions in aqueous solution - fundamentals; Titrations; Spectrophotometry	4.1 – 4.9
Bonding & Molecular Structure	Chemical bond formation; Covalent bonding & Lewis structures; Atom formal charges in covalent molecules and ions; Resonance; Exceptions to the octet rule; Molecular shapes; Bond polarity & electronegativity; Bond and molecular polarity; Bond properties – order, length & energy; <a href="#">Bonding in ionic compounds – lattice energy</a>	8.1 – 8.9, <a href="#">12.3</a>
The Structure of Atoms	Electromagnetic radiation; Quantization – Planck, Einstein, energy & photons; Atomic line spectra & Niels Bohr; Particle-wave duality – prelude to quantum mechanics; The modern view of electronic structure – wave or quantum mechanics; The shapes of atomic orbitals; One more electron property – electron spin	6.1 – 6.7
The Structure of Atoms & Periodic Trends	The Pauli exclusion principle; Atomic subshell energies & electron assignments; Electron configurations of atoms; Electron configurations of ions; Atomic properties & periodic trends; Periodic trends & chemical properties	7.1 – 7.6
Valence Bond Theory	Valence bond theory <i>(note: 9.2-9.3 are not covered in Chem 205)</i>	9.1 only
Gases & Their Properties	Modeling a state of matter – gases & gas pressure; Gas Laws – the experimental basis; The ideal gas law; Gas laws & chemical reactions; Gas mixtures & partial pressures; The kinetic molecular theory of gases; Diffusion & effusion; Nonideal behaviour of gases	10.1 – 10.8

## CHEM 205 – COURSE OUTLINE & READINGS (for OPENSTAX, Chemistry 2e)

- **Slides and/or videos** will be posted on Moodle 3-4 days before class. Work through them BEFORE class time.
- **Read** upcoming textbook sections before each class. Lectures are intended to clarify your understanding of the topics covered in the text and to get you actively thinking about the material. Lectures do not replace readings, & vice versa.
- **Take notes** during class to recall the explanations & discussion. Don't waste time copying down what is on the slides!
- **Think actively** during class. Answer in-class questions and discuss material with your classmates – research shows that active participation improves both understanding and retention. Many problems will be solved during class time.

Chapter title	List of topics <i>(Note: professor may add supplementary material and/or cover topics in a different order)</i>	Text readings	Recommended questions <i>(for tutorials)</i>
Essential Ideas	Why study chemistry! Chemistry in context. Domains, Phases, Matter, classification, Physical and chemical properties, Measurements, Mathematical treatment	1.1 - 1.6	#17, 26, 46, 50, 51, 53, 56, 59, 76, 82, 83, 89, 90, 94
Atoms, Molecules, and Ions	Atomic structure, Symbolism, Chemical formulas; The periodic table; Molecules, compounds & formulas; Ionic compounds – formulas, names & properties	2.1 - 2.7	#8, 9, 12, 16, 22, 41, 43, 30, 48, 50, 52, 54, 58, 61
Composition of Substances and Solutions	Atoms, molecules & the mole Chemical analysis – determining compound formulas; Instrumental analysis – determining compound formulas, Empirical formula and molecular formula, Molarity and solutions	3.1 - 3.4	#18, 25, 28, 34, 38, 40, 48, 52, 57, 44, 60, 66, 73
Stoichiometry of Chemical Reactions	Introduction to writing and balancing chemical equations; Classifying chemical reactions; Precipitation reactions; Acids & bases; Gas-forming reactions; Oxidation-reduction reactions; Reaction stoichiometry; Limiting reactant; Percent yield; Chemical equations & chemical analysis; Titrations; <a href="#">Introduction to chemical equilibrium</a> ; <a href="#">Balancing redox equations in basic solution</a> ; <a href="#">pH</a>	4.1 – 4.5, <a href="#">13.1</a> , <a href="#">14.2</a> , <a href="#">17.1</a>	#6, 11, 12, 14, 20, 23, 25, 41 #52, 57, 60, 66, 78, 81, 83, 85, 86
Chemical Bonding & Molecular Geometry	Chemical bond formation; <i>ionic bonding</i> , Covalent bonding, electronegativity, Lewis structures; Exceptions to the octet rule; Atom formal charges in covalent molecules and ions; Resonance; Molecular shapes; Bond polarity & electronegativity; Bond properties – order, length & energy; <i>ionic bond strength – lattice energy</i> , Bond and molecular polarity, VSEPR	7.1 – 7.6	#8, 11, 13, 18, 22 #30, 31, 32, 44, 55, 57 #80, 82 #86, 94, 98, 109, 113
Electronic Structure and Periodic Properties of Elements	Electromagnetic radiation; Quantization – black-body radiation, Photoelectric effect; line spectra, Bohr's model; Particle-wave duality; Quantum mechanics; The shapes of atomic orbitals; One more electron property – electron spin, The Pauli exclusion principle; Atomic subshell energies & electron assignments; Electron configurations of atoms; Electron configurations of ions; Atomic properties & periodic trends; Periodic trends & chemical properties	6.1 – 6.5	#5, 7, 12, 15 #28, 34, 41, 53, 54, 57, 59, 62, 80 #67, 69, 76, 82, 84, 85
Advanced Theories of Covalent Bonding	Valence bond theory, hybridization, multiple bonds <i>(note: 8.4 is not covered in CHEM 205)</i>	8.1 – 8.3	#3, 4, 5, 6, 8, 12, 14, 29
Gases	Gas pressure; Gas laws – the experimental basis; The ideal gas law; Gas laws & chemical reactions; Gas mixtures & partial pressures; The kinetic-molecular theory of gases; Diffusion & effusion; Nonideal behaviour of gases	9.1 – 9.6	#5, 13, 27, 37, 41, 48, 61, 64, 68, 84, 88, 95, 101, 105

## CHEM 205 – LAB, TUTORIAL & HOMEWORK SCHEDULE – Winter 2024

**MANDATORY: Attendance at check-in, labs & tutorials is mandatory. If you miss >1 lab or >1 tutorial (ANY REASON), a Repeat (R) grade is earned in the course.**

**Stemble:** Set up Stemble online homework account first week of classes. Check email for invitation to register. Free for first 2-3 weeks of term.

**CHECK-IN:** **Week of Jan 22 to 26. Mandatory.** Meet at lab SP-232 a few minutes before start of your TL's lab time.

**Laboratories:** On campus in LOY SP-232; arrive 5 min early. Wear lab coat, safety glasses, fully covered legs/feet & closed shoes.

**Pre-lab prep.:** Complete pre-lab quiz on Moodle Core site **by 4pm day before your lab.** If pre-lab not done the lab report will not be accepted!

**Lab reports:** **Due at same time as next pre-lab** (must upload to Moodle). Late: -10%/day. Contact Dr. Romero if sick (no auto-extension).

**Tutorials:** On campus; arrive 5 min early. To prepare, do problems (not submitted/graded) from list on Moodle Core site.

**Homework:** **Assignments (4) in Stemble, each 2%. Open for ~3 weeks each. Deadline 11:55pm. See schedule for dates.**

**Quizzes:** **Quizzes (2) in Stemble, each 6%. Open 1 day (Thurs aft – Fri night). Deadline 11:55pm. See schedule for dates.**

Group A (follow this schedule if assigned to Gp.A at check-in)	Dates	Group B (follow this schedule if assigned to Gp.B at check-in)
<b>No labs/tutorials.</b> On own: set up Stemble, do "Math Module – essential review".	Jan 15 to 19	<b>No labs/tutorials.</b> On own: set up Stemble, do "Math Module – essential review".
<b>If register late: contact Dr. Ghobadi &amp; Dr. Romero ASAP</b> <b>Lab/Tutorial Check-in: MANDATORY</b> Meet in lab for introductory activities & division into Groups A/B On own: do Stemble ungraded modules, start Assignment 1.	Jan 22-26	<b>If register late: contact Dr. Ghobadi &amp; Dr. Romero ASAP</b> <b>Lab/Tutorial Check-in: MANDATORY</b> Meet in lab for introductory activities & division into Groups A/B On own: do Stemble ungraded modules, start Assignment 1.
<b>Tutorial 1A:</b> see topics & recommended problems list on Core Moodle site <b>Mandatory Health and Safety Quiz on Moodle Due Jan 28 at 11:59 pm</b>	(DNE Jan 29) Jan 29 to Feb 2	<b>Experiment 1:</b> Densities of Liquids <b>Due: Pre-lab for Expt.1 (in Moodle)</b> <b>Mandatory Health and Safety Quiz on Moodle Due Jan 28 at 11:59 pm</b>
<b>Experiment 1:</b> Densities of Liquids <b>Due: Pre-lab for Expt.1 (in Moodle)</b>	Feb 5 to 9	<b>Tutorial 1B:</b> see topics & recommended problems list on Core Moodle site.
<b>Due: Stemble Assignment 1</b> (covers OpenStax Chem.2e Ch.1 + 2.1-2.3; opens Jan. 22)	Fri. Feb. 9	<b>Due: Stemble Assignment 1</b> (covers OpenStax Chem.2e Ch.1 + 2.1-2.3; opens Jan. 22)
<b>Tutorial 2A:</b> see topics & recommended problems list on Core Moodle site	Feb 12 to 16	<b>Experiment 2:</b> Separation of a Mixture <b>Due: Pre-lab for Expt.2 + Report for Expt.1 (upload on Moodle)</b>
<b>Experiment 2:</b> Separation of a Mixture <b>Due: Pre-lab for Expt.2 + Report for Expt.1 (upload on Moodle)</b>	Feb 19 to 23	<b>Tutorial 2B:</b> see topics & recommended problems list on Core Moodle site
<b>Due: Stemble Assignment 2</b> (covers OpenStax Chem.2e Ch.2.3-2.7 + 3.1-3.2; opens Jan. 29) <b>+ Due: Stemble Quiz 1 (open for 1 day)</b> (covers all from Assignments 1 & 2; opens Thurs. Feb.22 at 4 PM)	Fri. Feb. 23	<b>Due: Stemble Assignment 2</b> (covers OpenStax Chem.2e Ch.2.3-2.7 + 3.1-3.2; opens Jan. 29) <b>+ Due: Stemble Quiz 1 (open for 1 day)</b> (covers all from Assignments 1 & 2; opens Thurs. Feb..22 at 4 PM)
<b>READING WEEK - No lect./lab/tut. all week.</b>	Feb 26 to Mar 1	<b>READING WEEK - No lect./lab/tut. all week.</b>
<b>Tutorial 3A:</b> see topics & recommended problems list on Core Moodle site	Mar 4 to 8 <b>Midterm Exam</b>	<b>Exp't 3:</b> Analysis, Observations & Concentrations <b>Due: Pre-lab for Expt.3 + Report for Expt.2</b>
<b>Exp't 3:</b> Analysis, Observations & Concentrations <b>Due: Pre-lab for Expt.3 + Report for Expt.2</b>	Mar 11 to 15	<b>Tutorial 3B:</b> see topics & recommended problems list on Core Moodle site
<b>Tutorial 4A:</b> see topics & recommended problems list on Core Moodle site	Mar 18 to 22	<b>Exp't 4:</b> Solubilities vs Reactions & Synthesis of Ca <sup>2+</sup> Acetate <b>Due: Pre-lab for Expt.4 + Report for Expt.3</b>
<b>Due: Stemble Assignment 3</b> (covers OpenStax Chem.2e Ch.3.3-3.4 + 4.1-4.5; opens Feb.12)	Fri. Mar. 22	<b>Due: Stemble Assignment 3</b> (covers OpenStax Chem.2e Ch.3.3-3.4 + 4.1-4.5; opens Feb.12)

Group A	Dates	Group B
<b>Exp't 4:</b> Solubilities vs Reactions & Synthesis of Ca <sup>2+</sup> Acetate <b>Due: Pre-lab for Expt.4 + Report for Expt.3</b>	<b>Mar 25 to 28; *Apr 5</b> <b>(*in lieu of Mar 29)</b>	<b>Tutorial 4B:</b> see topics & recommended problems list on Core Moodle site
<b>Tutorial 5AB:</b> see topics & recommended problems list on Core Moodle site	<b>Apr 8 to 12</b>	<b>Tutorial 5AB:</b> see topics & recommended problems list on Core Moodle site
<b>Due: Stemble Assignment 4</b> (covers OpenStax Chem.2e 7.1-7.6 + 6.1-6.4; opens Mar.18) <b>+ Due: Stemble Quiz 2 (open for 1 day)</b> (covers all from Assignments 3 & 4; opens Thurs. Apr. 11 at 4 PM)	<b>Fri. Apr. 12</b>	<b>Due: Stemble Assignment 4</b> (covers OpenStax Chem.2e 7.1-7.6 + 6.1-6.4; opens Mar. 18) <b>+ Due: Stemble Quiz 2 (open for 1 day)</b> (covers all from Assignments 3 & 4; opens Thurs. Apr. 11 at 4 PM)
<b>ABSOLUTE LAST DAY TO UPLOAD Expt.4 REPORT</b>	<b>Apr 15 by 4pm</b> <i>(DSC Apr 17)</i>	<b>ABSOLUTE LAST DAY TO UPLOAD Expt.4 REPORT</b>

- **Course Coordinator:** **Dr. Elham Ghobadi** – Contact re: course policies, Stemble, tutorial rules/issues/absences.
- **Lab Coordinator:** **Dr. Jennifer Romero** – Contact re: lab rules/issues/absences.
- **TAs:** see Moodle Core Materials site (please note: you can visit any TA's office hours for help)