COURSE SYLLABUS: CHEM 205 - GENERAL CHEMISTRY I

1. GENERAL INFORMATION

- **Course:** General Chemistry I, Chem 205 (3 credits), Summer 2018
  Lectures: Lec.41 (Dr. Ghobadi): time: Tues. & Thurs.10:15-13:00; room: LOY HB-130
  Laboratories: MANDATORY; weekly; time (3.0 h): refer to your class schedule; room: SP-232
  Tutorials: MANDATORY; weekly; time (2.5 h): refer to your class schedule; room: CC-312

STARTING: 1st LECTURE = May 3rd & LAB/TUTORIAL = May 7-8th (see schedule on p.5)

IF REPEATING COURSE: *Lab exemptions must be requested before 5 pm, Fri. May 4th by submitting the application form (visit http://www.concordia.ca/artsci/chemistry/programs/undergraduate/procedures-forms.html & see Student Requests) during business hours at the Departmental office (SP-201.01, (514) 848-2424 x3366). Students still registered in a regular lab section after labs begin must repeat all labs (no exceptions).* ***All repeating students must repeat tutorials and on-line homework (OWL).*** *Students are eligible for a lab exemption if they passed (>60%) the labs of Chem 205 in the past 24 months; students who partially completed the lab component or discontinued the course must repeat all labs/tutorials/OWL.*

- **Instructors:**
  Professor: **Dr. Elham Ghobadi**, Part-time Professor, Dept. of Chemistry & Biochemistry
  Contact: e.ghobadi@concordia.ca (for conceptual questions, see in person)
  Office: SP-201.14; to be announced at lectures
  Coordinator: **Dr. Cerrie Rogers**, Senior Lecturer, Dept. of Chemistry & Biochemistry
  Contact: cerrie.rogers@concordia.ca (for questions re: lab/tutorial rules/absences)
  Office: SP-201.17; (514)848-2424 x5838; to be announced, also available by appointment
  TAs (lab/tut): contact information provided on course's Moodle website (Core Materials Metasite)
- **Moodle sites:** Core Materials Metasite: lab/tutorial schedule, FAQs (course policies, labs, tutorials, OWL), sample finals
  Lecture 41 section site: section-specific lecture slides, 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 and laboratory. NOTE: This course presumes a good grounding in secondary school mathematics. Students lacking such grounding or non-science students seeking only an awareness of chemistry are advised to enrol in CHEM 208. Students in programs leading to the BSc degree may not take this course for credit to be applied to their program of concentration.
- **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 OWL online homework system and textbook, in addition to doing the readings. Emphasize the end-of-chapter *"General Questions"* - these test your understanding and build your problem-solving skills by mixing topics together, as they are encountered in the real world and on exams (see samples on course website). Go back to the dozens of earlier *"Study & Practicing Skills"* questions when you've identified a particular topic with which you need extra practice. If you start at question #1 in each chapter, you'll run out of study time before you've ever tested yourself. Write out all problems/calculations in full to forge a strong link between your brain and your pen – your course work will be graded on both correctness and completeness. In OWL, take advantage of the optional "Adaptive Study Plan" quizzes for each chapter, to find out where your own strengths and weaknesses lie, and work on optional EOC problems and Mastery assignments (look for these in the "Assignments I Can Practice Now" area).

3. OBJECTIVES

- **Students are expected to:**
  - Draw on background: routinely use high-school level physical science and mathematics (algebra) knowledge
  - Acquire knowledge: memorize factual information & laws; assimilate scientific concepts; learn chemical calculations
  - Build competencies: look below surface to find causes; observe *&* interpret; apply knowledge to real situations
  - Develop skills: discipline; logic; 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

4. COURSE MATERIALS *(All materials are sold at the Loyola campus Bookstore.)*

- **Required:**
  - **Textbook:** *Chemistry and Chemical Reactivity,* 9th Ed, Kotz, Treichel, Townsend & Treichel. Packaged with OWLv2 at Bookstore (~$190), **OR, as ebook with OWLv2 (~$70) via:** *www.nelsonbrain.com/shop/micro/concordia/chem* (must use this link to get right price)
  - Used book? Any General Chem. book is fine, AS LONG AS you buy the Kotz 9th OWLv2-ebook too.
  - **OWLv2:** interactive homework system & personalized study planner, sold with text or e-book. If buy new text, go to: https://login.cengagebrain.com/course/E-26E6YKZAPMTYM If buy OWLv2-ebook, use course key: E-26E6YKZAPMTYM
  - **Lab manual:** *Chem 205, General Chemistry I*, by the Dept. of Chem. & Biochem. (Concordia) **OR, free:** download experiment pdfs from moodle Core Materials site & print yourself
  - **Calculator:** non-programmable; recommended models: Sharp EL-531 or Casio FX-300MS
  - **Equipment:** lab-coat, safety glasses or goggles, lab spatula or scoopula
- **Optional:** Tutor-like book: *General Chemistry I as a 2nd Language*, by D. Klein (also available as ebook)
- **Other:** Other GenChem texts: available on reserve at Vanier Library (*e.g.*, Zumdahl, Gilbert & Kirss). Library research tips: http://library.concordia.ca/help/tutorial/
- **Readings:** Kotz, Treichel, Townsend & Treichel, 9th Ed., Ch. 1-4, 19.1, 6-8, 12.3, 9.1-9.2, 10 (details/order in class).

5. GRADING

- **Breakdown:**

OWLv2 homework:	8 %	(1.33% each assignment: 5 Tutorial-preps + 1 Gases assignment)
Tutorial activities:	12 %	(5 two-stage quizzes, worth 2.4% each: 1/2 group quiz, 1/2 individual)
Midterm exam(s):	20 %	(dropped if final exam grade is higher than midterm exam grade, in %)
Final examination:	40 %	(60% if midterm exam grade is dropped)

Theory Pass Required: must earn >45% on final exam + >50% on combined theory to pass course

Laboratory reports:	20 %	(5 reports worth 4% each)

Lab Pass Required: must earn >60% (12/20) on lab reports to pass course

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 60%.

- **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
- **Attendance:** **Labs/tutorials: if miss > 1 lab or >1 tutorial (any reason), a Repeat (R) grade is earned for course**
  missed labs/tutorials earn zero grades, and cannot be made-up after the fact
  contact Course Coordinator to plan for religious holidays or medical appointments
  absences (max.1 each) excused if valid doctor/employer note - see Course Coordinator
- **Submitted work:** must be handed in directly to TAs before or on the due date; late penalties apply (10% per day)
  work must be organized, legible (handwritten is acceptable), & printed on double-sided paper if possible
- **Grading scale:** A+ (≥ 86.7%), A (83.4-86.6%), A- (80-83.3%); 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
  Repeat (R) grade: if earn < 60% on labs, or miss >1 lab or >1 /tutorial for any reason
  If repeating course: can register in lab-exempt section (see SP-201.01) but must repeat tutorials & OWL

  When a student receives a lab exemption for a lab taken at Concordia, the previous lab mark will be used again in determining the new grade. If a student receives a lab exemption based on a lab taken at another institution, the lab mark is not used again, and the course grade is based entirely on the "theory" marks obtained at Concordia.

6. SCHEDULE (May be subject to change.)

- **Important dates:**
  - Lab/tutorials: **start week of May 7th (arrive prepared for BOTH Tutorial 1 & Density experiment)**
  - Chem 101: Fri. May 11th mandatory seminar, 4:45-5:45pm SP-S110; quiz deadline 23:55 May 27th
  - Drop deadlines: **DNE (tuition refund) deadline: Wed. May 9th; DSC deadline: Wed. May 30th**
  - Midterm exam: Thurs. May 24th, during regular class time (details to be given at lectures)
  - Final exam: during June 19-26th exam period, date/time announced on MyConcordia portal
- **Assignments:** mandatory homework assignments (5 tutorial-prep assignments, 1 last assignment)
  must be completed on-line using OWLv2 before the deadlines posted in the Lab/Tutorial Schedule.
- **Lecture topics:** see course outline table on following pages for order of topics & readings list.
- **Labs/tutorials:** mandatory; see schedule on following pages.

7. RIGHTS AND RESPONSIBILITIES OF THE STUDENT

- **Read the Core Materials Moodle site during the first week of classes:**

  Full explanations of the course policies, activities, and helpful tips are provided there as FAQs (frequently asked questions). Please read it before the 2nd 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.

- **Be prepared for lectures, tutorials & labs: (for lab check-in only: no preparation required)**

  Lectures: Read the lecture materials before class, 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: Complete the OWLv2 tutorial-prep homework assignment, and then be ready to (i) participate in TA-led review exercise and (ii) write a two-stage quiz (complete a quiz in small groups, then write similar quiz individually).

  Labs: Read the experiment thoroughly & complete the prelaboratory exercises (individually), and then be ready to (i) perform the experiment together with a lab partner and (ii) write a lab report based on your data (individually).

- **Contribute to a positive learning environment:**

  Disruptive or disrespectful behaviour will not be tolerated in any Concordia environments: classrooms, labs, tutorials or on-line. Cell phones, laptops, tablets and other electronic devices are permitted in classrooms/labs **only** if being used for approved course-related activities. Students engaging in inappropriate behaviour will be asked to leave, without the opportunity to make up the missed work.

- **Complete the MANDATORY "Chem 101" seminar & quiz:**

  MANDATORY COURSE REQUIREMENT: As part of this course, you **are required to** (i) attend the "Chem 101" seminar on academic integrity, the academic code of conduct and the appropriate use of information sources **+** (ii) earn 100% on the "Chem 101" moodle on-line quiz. (**Note:** This is **not** the University's quiz you may have taken when you first registered and logged into the myConcordia portal; the Chem 101 quiz is graded by the Department of Chemistry and Biochemistry, and you cannot take it until after you have attended the seminar.) The aim of the seminar and quiz is to clarify the code of conduct in terms of what practices are considered unacceptable in work submitted for grading in Chemistry & Biochemistry courses. You are exempt from this requirement ONLY if you already did both (i) and (ii) in Summer 2013 or more recently;* otherwise, you must complete both this term. **You are exempt if you can locate your ID in the pdf file located on the Departmental web site (http://www.concordia.ca/content/dam/artsci/chemistry/docs/compliance-list.pdf).*

  The seminar (1 hour) will be held on Friday May 11th, 4:45-5:45pm, in SP-S110. Please sign up EARLY, as seating is limited. Sign-up sheet will be posted outside SP 201.01 (Departmental office). **IMPORTANT: Late-comers will not be admitted.**

  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-). Please refer to the Department website FAQs or the Undergraduate Calendar (section 16.3.6) for details on removing an INC notation (thus restoring your grade) via the "Late Completion" process.

  The Concordia University academic code of conduct can be found in section 17.10 of the current academic calendar *(http://www.concordia.ca/academics/undergraduate/calendar/current/17-10.html)*. Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. The Chem 101 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, www.concordia.ca/students/academic-integrity/plagiarism.html)*

  Plagiarism: The most common offense under the Academic Code of Conduct is plagiarism, which the Code defines as "***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, for example, an answer on a quiz, data for a lab report, or a paper or assignment completed by another student. It might be a paper purchased through one of the many available sources. "Presentation" is not limited to written work – it can also refer to copying images, graphs, tables, ideas, oral presentations, computer assignments and artistic works. Finally, 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!

8. CONCORDIA UNIVERSITY SERVICES FOR STUDENTS (partial list)

i. Counselling & Development: career, learning, psychological services *(etc.)*: *http://www.concordia.ca/offices/cdev.html/*
ii. Student Success Centre: *http://www.concordia.ca/offices/cdev.html/our-services/resources-and-drop-in-centres/*
iii. New Student Program: *http://www.concordia.ca/offices/cdev.html/our-services/services-for-new-students/*
iv. Concordia Library Citation & Style Guides: *http://library.concordia.ca/help/howto/citations.html*
v. Academic Integrity Website: *www.concordia.ca/students/academic-integrity/plagiarism.html*
vi. Access Centre for Students with Disabilities: *http://www.concordia.ca/offices/acsd.html/*
vii. Student Transition Centre: *http://www.concordia.ca/extended-learning/advising.html*
viii. Advocacy & Support Services: *http://www.concordia.ca/offices/advocacy.html/*
ix. Financial Aid & Awards: *http://www.concordia.ca/offices/faao.html*
x. Health Services: *http://www.concordia.ca/students/health.html*

CHEM 205 – COURSE OUTLINE & READINGS (Kotz 9th Ed. *Chemistry & Chemical Reactivity*)

- **Suggestions on how to approach lectures:**
  - **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.
  - **Print out** the lecture slides and bring them to class to write on. Check the moodle sites for updates.
  - **Take notes** during class to recall the explanations & discussion. Don't waste time copying down what is on the slides!
  - **Think actively** in the classroom. When given the opportunity, answer in-class questions and discuss material with your classmates – research shows that active participation improves both understanding and retention.

Chapter title	List of topics *(Note: professor may add supplementary material and/or cover topics in a different order)*	Text 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 in Kotz)
Basic Concepts of Chemistry	Chemistry & its methods; Sustainability & green chemistry; Classifying matter; Elements; Compounds; Physical properties; Physical & chemical changes; Energy – some basic principles	1.1 – 1.8
Atoms, Molecules & Ions	Atomic structure – protons, electrons & neutrons; Atomic number & atomic mass; isotopes; Atomic weight; The periodic table; Molecules, compounds & formulas; Ionic compounds – formulas, names & properties; Molecular compounds – formulas & names; Atoms, molecules & the mole; Chemical analysis – determining compound formulas	2.1 – 2.10
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; Spectrophotometry	4.1 – 4.8
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; *(from Ch.19)* Balancing redox equations in acidic/basic solution; Classifying reactions in aqueous solution	3.1 – 3.9, 19.1
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; *(from Ch.12)* Bonding in ionic compounds – lattice energy	8.1 – 8.9, 12.3
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
Orbital Hybridization & Valence Bond Theory	Orbitals & theories of chemical bonding; Valence bond theory *(note: section 9.3 - Molecular orbital theory – is not covered in Chem 205)*	9.1 – 9.2
Gases & Their Properties	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 ***NOTE: the gases chapter will be covered via a required on-line OWLv2 assignment (available after Ch.4 covered in lectures); might also be covered in lectures if time permits at the end of the term.***	10.1 – 10.8

CHEM 205 – LAB AND TUTORIAL SCHEDULE – Summer 2018

- **IMPORTANT:** **Labs AND tutorials are mandatory.** If you miss more than 1 of each, you automatically fail the course.
- **First lab/tutorial:** May 7-8th 1:30pm. Arrive at lab, SP-232, prepared for lab AND tutorial. Groups A/B will be assigned then.
- **Tutorial prep.:** Each week, complete OWLv2 tutorial-prep (worth 1.33%), before deadline Mon.11:55pm (see schedule). Do textbook problems + study (topics listed in OWL) to prepare for tutorial activities/quizzes (2.4%/week).
- **Prelab prep.:** To be allowed to enter lab, give the TA your completed prelab (lab summary + questions, found in lab manual).
- **Lab reports:** Reports (4% each) are due at the start of your next lab. A late penalty (10%/day) applies to late submissions.

Group A ***(you will be told your group at lab on May 7-8)***	**Date**	**Group B** ***(you will be told your group at lab on May 7-8)***
Prepare for: Density experiment AND Tutorial 1 **On your own (optional):** Do *ungraded* OWL Intro. Assignment, to be sure you have the required math skills for this course (before May 9 DNE deadline).	**May 2-4** *see Course Coordinator immediately if register late*	**Prepare for: Density experiment AND Tutorial 1** **On your own (optional):** Do *ungraded* OWL Intro. Assignment, to be sure you have the required math skills for this course (before May 9 DNE deadline).
First: Meet in lab SP-232 for division into Groups A/B. THEN go with TA to: **Tutorial 1: see topics summary in OWL** Homework: OWL Tut.1-prep, due 23:55 Mon. May 7	**01TL: May 7** **02TL: May 8**	**First:** Meet in lab SP-232 for division into Groups A/B. THEN stay in lab for: **Lab Check-in + Safety Activities +** **Experiment:** Densities of Organic Liquids
Lab Check-in + Safety Activities + **Experiment:** Densities of Organic Liquids	**01TL: May 9** **02TL: May 10**	**Tutorial 1: see topics summary in OWL** Homework: OWL Tut.1-prep, due 23:55 Mon. May 7
Tutorial 2: see topics summary in OWL Homework: OWL Tut.2-prep, due 23:55 Mon. May 14	**01TL: May 14** **02TL: May 15**	**Experiment:** Separation of a Mixture
Experiment: Separation of a Mixture	**01TL: May 16** **02TL: May 17**	**Tutorial 2: see topics summary in OWL** Homework: OWL Tut.2-prep, due 23:55 Mon. May 14
Lecture & midterm exam this week, but no labs/tutorials.	**May 21-25**	**Lecture & midterm exam this week, but no labs/tutorials.**
Tutorial 3: see topics summary in OWL Homework: OWL Tut.3-prep, due 23:55 Mon. May 28	**01TL: May 28** **02TL: May 29**	**Experiment:** Observations "A" – Observations *vs* Conclusions
Experiment: Observations "A" – Observations *vs* Conclusions	**01TL: May 30** **02TL: May 31**	**Tutorial 3: see topics summary in OWL** Homework: OWL Tut.3-prep, due 23:55 Mon. May 28
Tutorial 4: see topics summary in OWL Homework: OWL Tut.4-prep, due 23:55 Mon. June 4	**01TL: June 4** **02TL: June 5**	**Experiments (all students do both experiments):** Observations "B" – Solubility *vs* Reactivity Analysis "A" – Unknown Oxide of Copper
Experiments (all students do both experiments): Observations "B" – Solubility *vs* Reactivity Analysis "A" – Unknown Oxide of Copper	**01TL: June 6** **02TL: June 7**	**Tutorial 4: see topics summary in OWL** Homework: OWL Tut.4-prep, due 23:55 Mon. June 4
Tutorial 5: see topics summary in OWL Homework: OWL Tut.5-prep, due 23:55 Mon. June 11	**01TL: June 11** **02TL: June 12**	**Experiments (all students do both experiments):** Synthesis "A" – Lead(II) Iodide Synthesis "B" – Manganese(II) Chloride
Experiments (all students do both experiments): Synthesis "A" – Lead(II) Iodide Synthesis "B" – Manganese(II) Chloride	**01TL: June 13** **02TL: June 14**	**Tutorial 5: see topics summary in OWL** Homework: OWL Tut.5-prep, due 23:55 Mon. June 11
Deadline to complete OWL Gases assignment (note: opens Mon. May 21, due 23:55 Mon. June 18)	**Mon. June 18**	**Deadline to complete OWL Gases assignment** (note: opens Mon. May 21, due 23:55 Mon. June 18)
ABSOLUTE LAST DAY TO HAND IN LAB REPORTS	**Mon. June 18**	**ABSOLUTE LAST DAY TO HAND IN LAB REPORTS**
Optional: OWL Last assignment (*ungraded*, covers topics not done in tutorials)	**Tues. June 26**	**Optional: OWL Last assignment** (*ungraded*, covers topics not done in tutorials)

CHEM 205 – LAB REPORT RECEIPT RECORD – Summer 2018

Important:

- You must have your teaching assistant (TA) sign this sheet for each group of labs you hand in.
- No arguments of the type "*The T.A. lost my lab report*" will be investigated without this proof that your TA received the report(s).

Student Name		**ID #**

Experiment	**Prelab Exercises**		**Lab**	
	T.A. Signature	**Date**	**T.A. Signature**	**Date**
DENSITY				
SEPARATIONS				
OBSERVATIONS - A				
OBSERVATIONS - B				
ANALYSIS – A only				
SYNTHESIS - A				
SYNTHESIS - B				

NOTE: In the event of extraordinary circumstances beyond the University's control (*e.g.,* influenza pandemic), the content and/or grading scheme in this course is subject to change. Details will be outlined only if this happens.