

COURSE SYLLABUS: CHEM 206 (GENERAL CHEMISTRY II) – Fall 2019

1. GENERAL INFORMATION

Lectures: Lec.51 Tues. night 18:00-20:30 in LOY HB-130
 Laboratories: MANDATORY; biweekly, alternate with tutorial; time (4.0 h): refer to your class schedule; room: SP-236
 Tutorials: MANDATORY; biweekly, alternate with laboratory; time (2.5 h) and room: refer to your class schedule

STARTING: 1st LECTURE = Sept.3rd + LAB/TUTORIAL = week of Sept.9th (see schedule - p.5)

- **IF REPEATING COURSE:** Lab exemptions must be requested *before 12 pm, Fri. Sept.6th* 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, on-line homework (OWL) and all examinations.** Students are eligible for a lab exemption if they passed (>60%) the labs of Chem 206 in the past 24 months; students who partially completed the lab component or discontinued the course must repeat all labs/tutorials/OWL.
- **Instructor:** Dr. Carrie Rogers (carrie.rogers@concordia.ca, (514) 848-2424 x 5838)
 Title: Senior Lecturer, Department of Chemistry & Biochemistry, Faculty of Arts & Science
 Office hours: **in LOY SP-201.17: drop-in Tues./Wed. 3:30-5:00pm & Thurs. 10:30-11:30am, other times by appointment**
 Preference: For conceptual questions, please see instructor (office hours & after class) rather than emailing.
- **Coordinator:** same as instructor (questions re: course policies, absences from labs/tutorials, medical/employment notes)
- **TAs (lab/tut):** contact information provided on course's Moodle website (Core Materials page)
- **Moodle sites:** Core Materials page: lab/tutorial schedule, FAQs (policies, labs, tutorials), past exams
 Lec.51 page: lecture slides, useful links, additional information...

2. COURSE DESCRIPTION

- **Calendar description:** Thermochemistry, solutions and their properties, equilibrium, ionic equilibrium, pH, buffers, kinetics, reaction mechanisms, other selected topics related to biochemistry, biology, and engineering. Lectures and laboratory. NOTE: Students in programs leading to the BSc degree may not take this course for credit to be applied to their program of concentration.
- **Prerequisites:** CHEM 205
- **Required background knowledge/skills:** proficiency in high-school mathematics necessary (see moodle for skills list)
- **Expanded course description:** General Chemistry II uses the chemical "language" learned in Chem 205 – atomic theory, properties of elements, molecular structures, chemical reactions and stoichiometry – and applies it to build an understanding of what drives chemical processes. In this course, theoretical understanding, critical thinking and mathematical approaches are combined to solve chemical problems; the course leans heavily on mathematical calculations. Chem 206 is a course about learning to think like a scientist, by digging through everything you know in order to determine what knowledge is relevant and how best to approach the problem at hand. The laboratory experiments further demonstrate how textbook chemistry is used to solve chemical problems. Together, the theory and lab work will give you a well-rounded introduction to some of the quantitative aspects of chemistry.
- **To succeed in Chem 206:** You must regularly work through problems from the 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 Questions" & "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 will run out of study time before you have ever tested your ability to apply your knowledge (which is the emphasis of this course). **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 previously studied chemistry knowledge (Chem 205) and mathematics (algebra)
 - Acquire knowledge: memorize factual information, assimilate scientific concepts, learn calculations to apply concepts
 - Build competencies: attention to detail, explanation of cause & effect, application of knowledge to real situations
 - Develop skills: discipline, logic, qualitative & quantitative problem-solving, data analysis, laboratory techniques
 - Lay groundwork: for science courses: critical thinking, understanding chemical driving forces & relevance to science

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

- **Required:**
 - Textbook:** *Chemistry and Chemical Reactivity*, 9th or 10th Ed, Kotz, Treichel, Townsend & Treichel. Packaged with OWLv2 at Bookstore (~\$180), **OR, as ebook with OWLv2 (~\$75) at bookstore or via THIS link (do not just search for OWLv2 on google):** www.nelsonbrain.com/webapp/wcs/stores/servlet/en/micrositesca/Concordia-CHEM205-206
 - Used book? Any General Chem. book is fine, AS LONG AS you buy the Kotz OWLv2-ebook.
 - 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-26R6YPHM6XMHZ>
If buy OWLv2-ebook, use course key: E-26R6YPHM6XMHZ
 - Lab manual:** *Chem 206, General Chemistry II*, by the Dept. of Chem. & Biochem. (Concordia)
 - Calculator:** non-programmable; recommended models: Sharp EL-531 or Casio FX-300MS
 - Equipment:** lab-coat, safety glasses or goggles, lab spatula or scoopula
- **Optional:**
 - Other GenChem texts: available on reserve at Vanier Library (e.g., Zumdahl, Gilbert & Kirss).
 - Library research tips: <http://library.concordia.ca/help/tutorial/>
- **Readings:** 9th or 10th Ed. Kotz, Treichel, Townsend & Treichel, Ch. 5, 8.9, 18, 11, 13, 14, 15, 16, 17.

5. GRADING

- **Breakdown:**
 - OWLv2 homework: 8 % (1% each: 1 Intro., 5 Tutorial-prep assignments; + 2% Last assignment)
 - Tutorial activities: 12 % (5 two-stage quizzes, 2.4% each: 1.2% group quiz, 1.2% individual)
 - Participation: 5 % (clicker questions in lectures, >85% participation earns full points)
 - Midterm exam: 15 % (dropped if final exam grade is higher than midterm exam grade)
 - Final examination: 40 % (55% if midterm exam grade is dropped)

Theory Pass Required: must earn >45% (>18/40) on the FINAL EXAM 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 55%.

- **Expectations:** application of pre-requisite knowledge (& common sense) to new concepts, situations and problems
logical explanation of concepts/situations, supported by facts and full calculations where appropriate
objective, reasonable analysis and interpretation of laboratory observations and quantitative data
- **Attendance:**
 - Labs/tutorials:** **if miss > 1 lab or >1 tutorial (any reason), an 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), & 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 Sept.9th (arrive at lab for check-in, complete OWL intro. assignment 1st!).
 - Chem 101: seminars Sept.16-20th; on-line quiz must be completed before 23:55 Sun.Oct.6th.
 - Drop deadlines: **DNE (tuition refund) deadline: Mon.Sept.16th; DSC deadline: Mon.Nov.4th.**
 - Midterm exam: in class, Tues.Oct.15th from 6:00-7:10pm (+ lecture afterwards)
- **Assignments:** mandatory homework assignments (1 intro. assignment, 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

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.

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 **Fall 2014** 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 several times during the week of Sept.16-20th: Mon.-Fri. at 4:45pm and two evenings at 8:45pm. Sign-up sheets (indicating the room locations) will be posted outside SP 201.01 (Departmental office). Please sign up EARLY for your preferred time, as seating is limited. **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)

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

Chem 206 – LECTURE SCHEDULE – Fall 2019
▪ Suggestions on how to approach lectures:

- **Read** the assigned textbook sections before each class. Lectures are intended to clarify your understanding of the topics covered in the textbook and to get you actively thinking about the material. Lectures do not replace the readings.
- **Print out** the lecture slides and bring them to class to write on. Slides will be posted on Moodle 3-4 days before class.
- **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: participation via answering in-class clicker questions & engaging in peer-instruction activities with classmates will comprise part (5%) of the course grade.

Week (notes)	Dates	Topic	Approximate schedule (subject to change)...	Readings (listed for Kotz 9 th Ed.; similar in 10 th)
1	Sept.3 rd	Thermo-dynamics	Energy, enthalpy, heat transfer, heat capacity, changes of state 1 st law of thermo., enthalpy changes in reactions, calorimetry	5.1 – 5.3 5.4 – 5.6
2	Sept.10 th		Bond energies, standard enthalpies, Hess's law calculations Driving forces of chemical rxns: 2 nd law of thermo., entropy	8.9, 5.7– 5.8 18.1 – 18.4
3	Sept.17 th	Liquids & Solutions	Entropy & Gibbs free energy changes in chemical reactions Spontaneity & equilibrium; ...Intermolecular forces	18.5 – 18.7 11.1 – 11.4
4	Sept.24 th		Intermolecular forces & properties of liquids Solution composition, dissolution, factors affecting solubility	11.5 – 11.6 13.1 – 13.3
5	Oct.1 st		Colligative properties: vapour pressure, boiling & freezing points Osmotic pressure, true solutions vs colloids	13.4 13.4 – 13.5
6	Oct.8 th	Kinetics	Reaction rates, experiments to find rate laws Integrated rate laws, half-life, concentration-time relationships	14.1 – 14.3 14.4
7	Oct.15 th	lecture + <i>*MT Exam*</i>	Activation E, effect of temperature on rate, Arrhenius equation <u><i>Thermodynamics & Liquids/Solutions (70 min.: 15%)</i></u>	14.5 <u><i>MT: 5.8.9.18.11.13</i></u>
8	Oct.22 nd	Equilibrium	Particulate view of reaction rates, reaction mechanisms, catalysis Equilibrium, reaction quotient vs eqm constant, direction of rxn	14.6 15.1 – 15.2
9	Oct.29 th		Disturbing a system at equilibrium (Le Châtelier's principle) Application of equilibrium concepts & calculations	15.6 15.3 – 15.5
10	Nov.5 th	Acids & Bases	Acid-base definitions, pH scale, role of water Acid-base conjugate pairs, ionization constants	16.1, 16.3 16.2, 16.4, 16.8
11	Nov.12 th		Lewis acid-base model, molecular structure & acidity/basicity Solutions of salts, calculating pH of weak acid/base solutions	16.10 – 16.11 16.5, 16.8
12	Nov.19 th		Acid-base rxns, acid-base titrations, pH indicators Polyprotic acids; common ion effect, buffers & controlling pH	16.6 – 16.7, 17.3 16.9, 17.1 – 17.2
13	Nov.26 th	Solubility Equilibria	Ionic solubility, solubility product, precipitation rxns, complex ions	17.4 – 17.7

CHEM 206 – LAB AND TUTORIAL SCHEDULE – Fall 2019 (all sections)

- **Check-in week:** Sept. 11 & 13th. Attendance is mandatory. Go to lab SP-236 at the start of **your** scheduled lab/tutorial time.
- **Tutorial prep.:** Complete OWLv2 tutorial-prep assignment for your Group (A or B), **before deadline 23:55 Mon. (see schedule).**
- **Quizzes:** Tutorial quizzes cover the *current* week's material! Study the tutorial topics & do the homework to prepare.
- **Prelabs:** To be allowed to enter the lab, give the TA your completed prelab summary and questions (found in lab manual).
- **Lab reports:** due 2 weeks after doing experiment (*i.e.*, at next lab session; if sick, submit report ASAP; -10%/day late).

Group A	Date	Group B
Check-in: Meet in lab SP-236 for introductory activities & division into schedule Groups A/B. On your own (all students): Complete OWL Intro. Assignment (due 23:55 Mon.Sept.16)	Sept.11 & 13 *see Course Coordinator, ASAP, if register late*	Check-in: Meet in lab SP-236 for introductory activities & division into schedule Groups A/B. On your own (all students): Complete OWL Intro. Assignment (due 23:55 Mon.Sept.16)
Tutorial 1A: see topics summary in OWL (Tut.1A) Homework: OWL Tut.1A-prep, due 23:55 Mon.Sept.16	Sept.18 & 20	Experiment 1: Gases
Experiment 1: Gases	Sept.25 & 27	Tutorial 1B: see topics summary in OWL (Tut.1B) Homework: OWL Tut.1B-prep, due 23:55 Mon.Sept.23
Tutorial 2A: see topics summary in OWL (Tut.2A) Homework: OWL Tut.2A-prep, due 23:55 Mon.Sept.30	Oct.2 & 4	Experiment 2: Calorimetry - Thermodynamics of Oxidation of Acetone by Hypochlorite
Experiment 2: Calorimetry - Thermodynamics of Oxidation of Acetone by Hypochlorite	Oct.9 & 11	Tutorial 2B: see topics summary in OWL (Tut.2B) Homework: OWL Tut.2B-prep, due 23:55 Mon.Oct.7
Tutorial 3A: see topics summary in OWL (Tut.3A) Homework: OWL Tut.3A-prep, due 23:55 Mon.Oct.14	Oct.16 & 18	Experiment 3: Determination of Molar Mass by Freezing-Point Depression Plus: prepare solutions for Expt.5 Part 2 (manual p.5-7)
Experiment 3: Determination of Molar Mass by Freezing-Point Depression Plus: prepare solutions for Expt.5 Part 2 (manual p.5-7)	Oct.23 & 25	Tutorial 3B: see topics summary in OWL (Tut.3B) Homework: OWL Tut.3B-prep, due 23:55 Mon.Oct.21
Tutorial 4A: see topics summary in OWL (Tut.4A) Homework: OWL Tut.4A-prep, due 23:55 Mon.Oct.28	Oct.30 & Nov.1	Experiment 4: A Kinetic Study - The Reaction of Crystal Violet with Sodium Hydroxide
Experiment 4: A Kinetic Study - The Reaction of Crystal Violet with Sodium Hydroxide	Nov.6 & 8	Tutorial 4B: see topics summary in OWL (Tut.4B) Homework: OWL Tut.4B-prep, due 23:55 Mon.Nov.4
Tutorial 5A: see topics summary in OWL (Tut.5A) Homework: OWL Tut.5A-prep, due 23:55 Mon.Nov.11	Nov.13 & 15	Experiment 5: Chemical Equilibrium – Parts 1 & 2
Experiment 5: Chemical Equilibrium – Parts 1 & 2	Nov.20 & 22	Tutorial 5B: see topics summary in OWL (Tut.5B) Homework: OWL Tut.5B-prep, due 23:55 Mon.Nov.18
ABSOLUTE LAST DAY TO HAND IN LAB REPORTS	Mon.Dec.2	ABSOLUTE LAST DAY TO HAND IN LAB REPORTS
Deadline to complete OWL Last assignment (2%) (note: accessible from Nov.18 to 23:55 Wed.Dec.4)	Mon.Dec.4	Deadline to complete OWL Last assignment (2%) (note: accessible from Nov.18 to 23:55 Wed.Dec.4)

Chem 206 – LAB REPORT RECEIPT RECORD**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 TA. lost my report*" will be investigated without this proof that your TA received the report(s).

Student Name		Term (e.g., Fall 2019):
ID #		

Experiment	Prelab Exercises		Lab Report	
	T.A. Signature	Date	T.A. Signature	Date
Experiment 1 Gases				
Experiment 2 Calorimetry				
Experiment 3 F.P. Depression				
Experiment 4 Kinetics				
Experiment 5 Equilibrium Part 1				
Experiment 5 Equilibrium Part 2				