| Instructor: | Yves Gélinas | |
|---------------------------------------|---------------------------------|---|
| Office: | SP-275.25 | Phone: 848-2424 ext. 3337 |
| Lab: | SP-280.11 | Phone: 848-2424 ext. 7972 |
| E-mail: | yves.gelinas@ | concordia.ca (to schedule an appointment only!) |
| Class time and room: Office hours: | Wed 18:00-20 (to be discusse | :30, room CC-111 ed in class) |

Course Description

Chemistry 217 is an introduction to the theories and concepts of analytical chemistry. Based on your prerequisite knowledge on stoichiometry and acids/bases, the course material covers basic statistics, acid-base equilibria, volumetric analysis, complex formation, gravimetry, as well as introductory spectroscopy and chromatography. Following a theoretical introduction and background information, a wide range of applications are discussed, including problem sets to be solved mathematically & lab experiments. Examples have direct relevance for work in professional and academic labs (e.g., statistics, buffer preparation, pH calculations, EDTA titrations and chromatography).

Course Administration

The course will be given in person.

Course website: http://moodle.concordia.ca (automatic enrolment)

Assessment

During the term, weekly pre-readings will be required to prepare for class. Take-home assignments, weekly quizzes on the pre-assigned weekly reading, the midterm, the cumulative final exam and the lab grade will all be included in the calculation of the final mark.

Assignments

The development of and ability to perform quantitative calculations is an essential part of this course. To solve problems effectively, it is absolutely essential that you understand the theoretical principles of analytical chemistry. Solution of numerical problems will constitute the **major** part of the mid-term and final examination. Take home assignments have to be handed in (**on time!**). Assignments handed in after the posted deadline will receive a 20% deduction. If more than one week late, the grade will be zero.

Exam Schedule and Grading

| ightarrow Assignments and weekly quizzes | | 15% |
|--|-------------------------|----------------------|
| ightarrow Midterm Exam | midterm (to be decided) | 20% |
| ightarrow Final Exam | December | 40% (comprehensive!) |
| ightarrow Laboratory | | 25% |
| | | |

 \rightarrow Attendance to the Seminar on Academic Practices is mandatory!

IMPORTANT: A passing grade is required in both theory (>50%) and laboratory (>60%) components of the course to obtain credits for CHEM 217!

Important dates

Every week, pre-reading sections will be assigned (posted on Moodle).

| Date | Event |
|--------|---|
| Weekly | Pre-assigned reading |
| Weekly | Possible quiz on the pre-assigned reading of the week |

| 8 Sep 2021 | Classes start |
|-------------|--|
| 13 Sep 2021 | Labs start |
| 20 Sep 2021 | Deadline to add and withdraw (DNE) from fall courses |
| 20 Oct 2021 | Midterm 1 |
| ТВА | Deadline to complete CHEM 101 quiz (23h55) |
| 8 Nov 2021 | Deadline for withdrawal (DISC) from fall courses |
| TBD | Final exam |

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 evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the changes.

Attendance

Lecture: I strongly suggest to attend class regularly. To be excused from the midterm (no supplemental) or final examination (as per university regulations), you must present a doctor's note or other suitable official excuse. Marks for the missed midterm with an official excuse will be added to the final exam; without excuse a grade of zero will be given for the missed midterm. Missed quizzes will be marked zero (no supplemental).

Laboratory: Attendance at the laboratory sessions is mandatory. For any missed lab a doctor's note or other official note for the day of the lab is the only acceptable excuse and a make-up lab will be scheduled. You need to complete the introductory session and all experiments in order to receive a passing grade for the lab section. Lab sessions start on Mon, 13 Sep 2021.

Lecture Topics

- \rightarrow Introduction to the Laboratory
- \rightarrow Review of Stoichiometry, Concentration Terms and Equilibrium Constants
- \rightarrow Statistical Treatment of Data
- \rightarrow Acid/Base Equilibria and Titrations
- \rightarrow Complexometric Equilibria and Titrations
- ightarrow Solubility Products, Common-Ion Effect, Diverse Ion Effect and Activities
- \rightarrow Precipitation Separations and Gravimetric Factors
- \rightarrow Introduction to Spectroscopy and to Chromatography

Laboratory Experiments

- ightarrow As described in the laboratory manual
- \rightarrow <u>All</u> experiments must be completed
- \rightarrow A passing grade for the lab (>60%) must be obtained to receive credits for CHEM217

<u>Textbook</u>

- \rightarrow Chemistry 217/218 Laboratory Manual
- \rightarrow QUANTITATIVE CHEMICAL ANALYSIS, 10th edition, by Harris & Lucy (9th edition also ok)

| Quantitative Terre Editors Chemical Analysis | • | The Analytical Process Chemical Measurements (required reading) |
|--|------------|--|
| DANIEL C. HARRIS + CHARLES A. LUCY | Chapter 2: | Tools of the trade (required reading) |
| See 112 | Chapter 3: | Experimental Error |
| | Chapter 4: | Statistics |
| | Chapter 5: | Quality Assurance and Calibration Methods |
| | Chapter 6: | Chemical Equilibrium (excerpts) |
| | Chapter 7: | Let the Titrations Begin (excerpts) |
| and the second sec | | |

Chapter 8: Activity and Systematic Treatment of Equilibrium
Chapter 9: Monoprotic Acid-Base Equilibria
Chapter 10: Polyprotic Acid-Base Equilibria
Chapter 11: Acid-Base Titrations
Chapter 12: EDTA Titrations
Chapter 13: Advanced Topics in Equilibrium
Chapter 23: Introduction to Analytical Separations (excerpts)
Chapter 24: High-performance Liquid Chromatography (excerpts)
Chapter 21: Mass Spectrometry (excerpts)
Chapter 27: Gravimetric Analysis (excerpts)
Appendix F and Appendix G

Labs (room SP-210):

- \rightarrow Lab supervisor: Khalil Rahman (phone: 848-2424, ext. 3357)
- \rightarrow Labs start on: Monday September 13th, 2021
- \rightarrow Available in bookstore: Lab Manual & Book, Lab coat <u>&</u> glasses, Spatula & Bulb
- ightarrow If you are exempted from the lab, you must see <u>me and Khalil ASAP</u>
- → Missed experiments require a valid excuse (e.g. medical form) and still require to be performed

Lab Exemptions:

Students who are repeating the course and who have passed the lab component within the last two (2) years may be eligible for a lab exemption and may thus request a lab exemption. Applications for the exemption (forms available in SP201.01 and electronic version available on Moodle course site) must be submitted by Friday September 10th, 2021 (i.e. prior to the start of the laboratory); late applications will not be accepted. Signed and completed forms are to be returned to Lisa Montesano (SP 275.01). Students MUST register for the appropriate lab exemption lab/tutorial section (section 56); students registered in any other lab/tutorial sections will be required to complete the lab portion of the course (NO EXCEPTIONS).

Pre-Labs: Pre-labs include two parts:

- 1) A written <u>summary</u> (½ page max.) in your own words describing:
 - (a) the goal of the experiment (b) the experimental procedure
- 2) On a separate page(s), a <u>flowchart</u> of the procedure (**NOTE: No pre-lab** → no entry to lab)

Grading of pre-labs (1 point): Good \rightarrow 1.0 point; Reasonable \rightarrow 0.5 point; Yuck \rightarrow 0.0 point Grading of the lab work (4 points) is based on the **ACCURACY** of the results

- \rightarrow Must fill a Lab Report Form (triplicate results, average and deviation)
- \rightarrow Any rejected value must be explained (Grubbs test, see section 4-5 in Harris)

"CHEM 101": The Academic Code of Conduct: Ethical Use of Information Sources

MANDATORY QUIZ AND SEMINAR

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 Fall 2016 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 (Fall 2021) | Time | Mode | Registration link |
|---------------------|--------|------|--|
| Sept. 22 | 21:00- | Zoom | <u>https://concordia-</u> |
| (Wednesday) | 22:00 | | ca.zoom.us/meeting/register/tZlucumrqTouHdDujCve8eeyjRsM 6XiQUD |
| Sept. 23 | 21:00- | Zoom | <u>https://concordia-</u> |
| (Thursday) | 22:00 | | ca.zoom.us/meeting/register/tZEsdeyupjluGNdupvk7KE33YXJ6MyAak0An |
| Sept. 27 | 19:00- | Zoom | https://concordia-ca.zoom.us/meeting/register/tZlud- |
| (Monday) | 20:00 | | urqTMiH91iodapd5geAi05rQtcR_y6 |

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, and make sure you do not introduce a space: it is "concordia-ca"). Then do not forget to **attend** that seminar slot on the date above!

We will take attendance at the Zoom seminar.

If you do not complete this course requirement, your final grade for the course may be lowered by one full letter grade with an incomplete (INC) notation 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 (http://www.concordia.ca/content/dam/artsci/chemistry/docs/Compliance-list.pdf) and if there is no entry in the "quiz" column for you.

List of Student Services

- 1. Access Centre for Students with Disabilities (http://www.concordia.ca/students/accessibility)
- 2. Student Success Centre (http://www.concordia.ca/students/success)
- 3. Counselling and Psychological Services (http://www.concordia.ca/students/counselling-life-skills)
- 4. Concordia Library Citation and Style Guides (https://library.concordia.ca/help/citing)
- 5. Health Services (http://www.concordia.ca/students/health)
- 6. Financial Aid and Awards (http://www.concordia.ca/offices/faao)
- 7. Academic Integrity (http://www.concordia.ca/students/academicintegrity)
- 8. Dean of Students Office (http://www.concordia.ca/offices/deanstudents)
- 9. International Students Office (http://www.concordia.ca/students/international)
- 10. Student Hub (http://www.concordia.ca/students)
- 11. Sexual Assault Resource Centre (http://www.concordia.ca/students/sexual-assault)
- 12. As a Concordia student, you are a member of the Concordia Student Union and have many resources available to you including HOJO (Off Campus Housing and Job Bank: https://www.csu.qc.ca/services/