

Instructor: Yves Gélinas  
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Class time and room: Wed 18:00-20:30, room CC-111  
 Office hours: (to be discussed 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

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

<u>Date</u>	<u>Event</u>
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
TBA	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

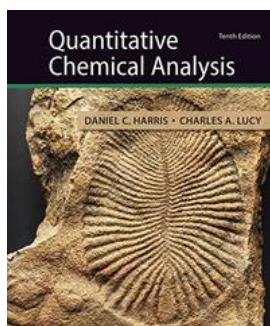
- Introduction to the Laboratory
- Review of Stoichiometry, Concentration Terms and Equilibrium Constants
- Statistical Treatment of Data
- Acid/Base Equilibria and Titrations
- Complexometric Equilibria and Titrations
- Solubility Products, Common-Ion Effect, Diverse Ion Effect and Activities
- Precipitation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

### Laboratory Experiments

- As described in the laboratory manual
- **All** experiments must be completed
- A passing grade for the lab (>60%) must be obtained to receive credits for CHEM217

### Textbook

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



- Chapter 0: The Analytical Process
- Chapter 1: Chemical Measurements (required reading)
- Chapter 2: Tools of the trade (required reading)
- 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)

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):

- Lab supervisor: Khalil Rahman (phone: 848-2424, ext. 3357)
- Labs start on: Monday September 13<sup>th</sup>, 2021
- Available in bookstore: Lab Manual & Book, Lab coat & glasses, Spatula & Bulb
- **If you are exempted from the lab, you must see me and Khalil ASAP**
- 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 10<sup>th</sup>, 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 summary (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 flowchart of the procedure (**NOTE: No pre-lab → no entry to lab**)

Grading of pre-labs (1 point): Good → 1.0 point; Reasonable → 0.5 point; Yuck → 0.0 point

Grading of the lab work (4 points) is based on the **ACCURACY** of the results

- Must fill a Lab Report Form (triplicate results, average and deviation)
- 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

