

Syllabus for Instrumental Methods of Chemical Analysis

Course Number	SC/CHEM 3080 4.0; Section M
Term	Winter (W)
Session	2019-2020
Prerequisites	SC/CHEM 2080 4.0; SC/PHYS 1010 6.0 or SC/PHYS 1410 6.0 (or a strong skillset in linear algebra that can be applied to electronics and optics). Permission from the instructor is required if prerequisites are not met.
Course Director	Dr. Trevor VandenBoer Office: CB 344 Email: profvdb@yorku.ca
	NOTE: Emails will be responded to as quickly as possible, typically between 09:00-17:00 on weekdays. Do not expect an immediate response to an email on weekends, or even within the same day it is sent, as it may sometimes take up to 3 days to be addressed.
	Dr. VandenBoer will respond ONLY to emails which include: <ul style="list-style-type: none">• The Course Code (CHEM3080) in the <i>Subject Line</i>• A professional salutation (e.g. 'Dear Dr. VandenBoer')• Your full name and student number as the inquiring student
Lab Coordinator	Carolyn Hempstead Office: CB 360 Email: carolynh@yorku.ca
Lecture Times	T, R; 10:00 AM; 90 minutes; Room TBD
Office Hours	R; 11:30-13:30; CB 344
Laboratory	Room CB 343

Duration is a 3-hour session once per week with day and timing based on lab group. All laboratory concerns and conflicts must be addressed with Carolyn.

The labs will start on the third week of January 2020, with the lab manuals and schedules being available at least one week prior. Exact dates will be announced on Moodle.

Labs are performed with a partner. If you wish to request a partner you must do so in advance *via* Carolyn or one will be assigned. A list of students for each lab section is available outside CB 343 where requests may be written.

NOTE: The laboratory portion of the course represents a significant fraction of your final grade. To complete the experiments and reports to a satisfactory level, you must read and understand the experiment in the manual and the background information in the textbook **before** coming to the lab. It is probable that you will be performing an instrumental technique before it has been covered in the lectures. You must also be comfortable with proper analytical techniques and performing linear regressions manually, as learned in CHEM 2080. Expect a number of labs to be analyzed using TurnItIn to ensure that the Academic Honesty guidelines of York University are being respected. Any breaches of Academic Honesty will be fully enforced.

Course Texts Textbook: *Principles of Instrumental Analysis 7th Edition* by Skoog, Holler, and Crouch

This is a **RECOMMENDED** textbook for the course and is available in the York bookstore. Most analytical chemistry textbooks include sections on instrumentation and can be readily substituted. We will not be comprehensively covering the materials in Skoog, Holler, and Crouch. You will be responsible **ONLY** for materials covered in class.

Further supporting materials available at Steacie Science Library:
Principles of Instrumental Analysis 7th, 6th, and 5th Editions by Skoog, Holler, and Crouch

Evaluation Both the theory and laboratory components must be passed to pass this course. The grading structure for this course is as follows:

Midterm (20 %)	February 2020 (in class)
Quizzes (6 x 2.5 % = 15 %)	In Class
Final Exam (35 %)	Date set by registrar's office
Laboratory (30 %)	Throughout the term

Short quizzes (~15 minutes) will take place every other week and will consist of two questions selected from questions issued during the intervening week. Missed quizzes will have respective proportion of final grade transferred to final exam.

If the midterm grade is greater than any prior attempted quizzes, then the midterm grade will be applied to those quizzes that are lower. The same approach will be applied to the quizzes attempted between the midterm and exam, where the exam grade is higher.

NOTE: All students are expected to be available for the complete final exam period. Conflict with previously made travel arrangements is not an acceptable reason for missed exams.

**Missed
Midterm**

If you miss the midterm due to a legitimate illness, please provide an attending physician statement to Dr. VandenBoer **WITHIN 48 hours** (you do not need to fill out any other petition documents). For other extenuating circumstances, please contact Dr. VandenBoer by email.

The course evaluation scheme will change for those people who miss a midterm to the following:

Midterm (0 %)
Quizzes (6 x 3.3 %)
Laboratory (30 %)
Final Exam (50 %)

Final Grade

The Faculty of Science approved letter grades

NOTE: The numerical grades used throughout the course are only guides for assigning final approved letter grades. The course director retains the prerogative on how to use numerical grades to assign letter grades. Exam and laboratory marks are made available to students. However, a final numerical mark is not disclosed to the student.

**Course
Content**

The course will cover topics pertaining to instrumental chemical analysis. You will be provided the opportunity to learn about a wide variety of modern analytical instrumentation starting from their basic components, their theoretical principles of operation, the organization and workflow of instruments, and practical aspects of performing quantitative analysis with instrumentation.

The material covered will include the following topics and may vary slightly:

1. Introduction to Instruments
2. Calibrations and Method Selection
 - External Calibration
 - Standard Addition
 - Internal Standards

3. Electrical Components and Circuits

- Basic Components
- Operational Amplifiers
- Digital Electronics
- Signals and Noise

4. Analytical Spectroscopy

- Optical Components
- Atomic Absorption
- Atomic Emission
- Molecular Spectroscopy (UV-Vis)
- Luminescence Spectroscopy

5. Analytical Separations

- Separation Theory
- Gas Chromatography
- Ion Chromatography
- Liquid Chromatography

6. Electroanalytical Techniques (time permitting)

- Potentiometry
- Coulometry

Awareness

Students must make themselves aware of university policies on Academic Honesty/Integrity, Access/Disability, Student Conduct, Religious Observance and other matters. A periodically updated Information Sheet summarizing this information can be downloaded* and printed, and the Registrar's Office issues a list of Religious Observance Days.‡

* <http://secretariat.info.yorku.ca/files/CourseInformationForStudentsAugust20121.pdf>

‡ <http://registrar.yorku.ca/enrol/dates/religious-accommodation-guidelines-2018-2019>