SYLLABUS 2021 CHEM/ENCH 213:
Introduction to Chemical Analysis

Course instructor: Dr. Zhe She
CHE 307, Chernoff Hall
Phone: 613-533-2790
Email: zhe.she@queensu.ca

Lab instructor: Dr. Igor Kozin
CHE 124, Chernoff Hall
Phone: 613-533-6000 ext 74665
Email: igor.kozin@chem.queensu.ca

CHEM/ENCH 213 is a Hybrid course with parts taught in person and parts using OnQ

Lectures: Will be asynchronous recordings posted in OnQ each week. No synchronized lectures.
Tutorials: Weekly 1-hour tutorial will be held from week 1 to 12. Will be in-person or remote depending on the section. Some of the examples and past exam or test questions will be discussed during tutorial sections.
(No tutorial content is delivered in week 1. Students in in-person sections should find their tutorial room. Students in remote section will be testing connections during assigned tutorial time.)
Labs: Will be in person and offered at several different times
Office Hours: will be held on TEAM during class time. (Wednesday 11:30-12:30) The link will be posted on OnQ for easy access. (If you have any questions or would like to discuss topics from lecture notes and textbook further, you are encouraged to stop by virtual office hours with Dr. She.)

Each week a new module of the course will be released through OnQ, it will consist of a guided combination of lecture recordings, textbook readings, and supportive documents. There will be 5 labs during the course of the semester. (Detailed lab schedule and content will be provided in the lab manual.)

onQ: This electronic tool can only be accessed by students registered in CHEM/ENCH 213 by going to https://onq.queensu.ca/d2l/home. It contains:

- the course lecture-related material (i.e. syllabus, slides and practice problems)
- a week-by-week calendar of the topics/tests
- Laboratory Information Section, including lab report guidelines, report grading outlines, links to video material and lab-specific data files, which the students will have to use to process pre-recorded analytical data and to compile the corresponding lab reports.
- your grades
- tips to further help you
- a discussion board where questions can be asked about the course material.

Learning Goals: (1) Understanding the fundamentals of analytical chemistry in a down-to-earth, relevant way. (2) Review and deepen some of the knowledge acquired in first year chemistry. (3) Understanding analytical methods, tools and learning how to perform relevant calculations.

Learning Outcomes:
At the end of this course, students will be able to:
1. Demonstrate the proper use of the balance, pipets, buret and volumetric flask.
2. Assess the quality of a result and the validity of a method.
3. Accurately analyse samples by UV-visible spectrophotometry, fluorescence and atomic spectroscopies.
4. Calculate the concentrations of different species of a compound in solution.
5. Prepare buffers in various ways.
6. Perform titrations successfully and interpret the results correctly.

Assessment of Learning Outcomes:
Tutorials will assess outcomes 1-5
Tests will assess outcomes 1-4
Final Exam will assess outcomes 1-6
Labs will assess outcome 1-6

Assessment Timing and Weights:
- Lab reports (5): 30%
- **Open book**[#] on-line tests***** (5): 36%
- **Open book** final exam (In person, timing to be announced): 34%

 # Open book. Hard copy of "Quantitative Chemical Analysis" textbook and handwritten notes are permitted. Accessing notes and textbook through electronic devices is NOT permitted.

***There is no make-up test if you miss one.** Flexibility was built in to facilitate academic consideration:
- The best 3 out of 5 on-line tests will be used to calculate the overall test mark. (12% x 3 tests)
- Bi-weekly on-line tests will be hosted on OnQ quiz in week 3, 5, 7, 9 and 11. More details will be released in class.

Students must pass BOTH the lecture and the laboratory components to pass the course. If a student does not pass both the laboratory and lecture components of a course, they will fail the entire course and be allocated a mark of 47% or their actual mark, whichever is lower.

Grading Method:
All components of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen's Official Grade Conversion Scale:

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)

A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

Required textbook:
Quantitative Chemical Analysis, 10th Ed., *Daniel C. Harris,* Freeman & Company.

Note:
1. Quantitative Chemical Analysis, 9th Ed., *Daniel C. Harris,* Freeman & Company is also okay.
2. You are encouraged to have a paper copy of the required textbook. Reading electronic copy on electronic devices, such as computers, phones or tablets during open book tests and exam is NOT permitted. Using hard copy/printouts from e-book is permitted.
Readings will be posted in OnQ each week

Course Outline

Week 1	Preparation of solutions, technical and errors
Week 2	Statistical analysis and tests
Week 3	Least squares and weighting
Week 4	Standard addition, atomic spectroscopy and FAAS
Week 5	Spectroscopic techniques and internal standard
Week 6	Fundamentals of spectrophotometry
Week 7	Fundamentals of spectrophotometry and applications
Week 8	Spectrophotometry instrument and chemical equilibrium part 1
Week 9	Chemical equilibrium parts 2 and 3
Week 10	Monoprotic buffers and polyprotic equilibria
Week 11	Titration principles
Week 12	EDTA titration

Useful software:
- Data processing requires Microsoft Excel

Problem sets: Practice problems and solutions will be posted on the CHEM/ENCH 213 OnQ site.
These are not marked, but are recommended, as they will help you practice applying concepts from the course and will help you prepare for the tests and final exam.

Tutorials: Weekly 1-hour tutorial will be held from week 1 to 12. ***(No tutorial content is delivered in week 1. Students in in-person sections should find their tutorial room. Students in remote section will be testing connections during assigned tutorial time.)*** The tutorials in weeks 2 to 12 will be focusing on illustrating the applications of concepts and discussing example problems. This will be useful in preparation of tests and final exam. You are encouraged to interact with your TA and peers during tutorial sessions to gain good understanding of topics.

Tutorial 1: Week 1 September 7-10th
Tutorial 2: Week 2 September 13-17th
Tutorial 3: Week 3 September 20-24th
Tutorial 4: Week 4 September 27-October 1st
Tutorial 5: Week 5 October 4-8th
Tutorial 6: Week 6 Thursday October 18-22nd
Tutorial 7: Week 7 October 25-29th
Tutorial 8: Week 8 November 1st-5th
Tutorial 9: Week 9 November 8th-12th
Tutorial 10: Week 10 November 15-19th
Tutorial 11: Week 11 November 22nd-26th
Tutorial 12: Week 12 November 29th-December 3rd

Labs: All labs must be attended as scheduled
All students must attend the introductory lab (lab group assignment, lab safety, lab quiz) in week 2 (Sept. 13-16th) (~1 h)

Weeks 3-12 (Sept. 20th – Dec. 2nd), students rotate between the following five experiments:
Experiment 1: Direct Spectrophotometric Analysis of Energy Drinks (DSA)
Experiment 2: UV-VIS Spectrophotometry with Multi-wavelength Detection (VIS-MWD)
Experiment 3: Analytical Techniques based on Fluorescence Spectroscopy (FL)
Experiment 4: Microwave Plasma Emission and Flame Atomic Emission Spectroscopy (MP-AES/FAES)
Experiment 5: Elemental Analysis using Advanced Techniques of Atomic Spectroscopy

Calculator Policy
As noted in Academic Regulation 9.2, "Calculators acceptable for use during quizzes, tests and examinations are intended to support the basic calculating functions required by most Arts and Science courses. For this purpose, the use of the **Casio 991 series calculator** is permitted and is the only approved calculator for Arts and Science students."

Technology

Students are encouraged when possible to work with the most recent versions of software including web browsers, Java, Flash and Adobe Reader.

Web Browsers
onQ performs best when using the most recent version of the web browsers, Chrome or Firefox. Safari and Edge are strongly discouraged as these web browsers are known to cause issues with onQ.

Internet Speed
While wired internet connection is encouraged, we recognize that students may be relying on a wireless connection. A minimum download speed of 10 Mbps and up to 20 Mbps for multimedia is recommended. To test your internet speed, https://www.speedtest.net/

For technology support ranging from setting up your device, issues with onQ to installing software, contact ITS Support Centre https://www.queensu.ca/its/itsc

Notice of Recording

Synchronous (live) remote tutorial section will be delivered in this course through video conferencing platforms supported by the University [TEAM]. **(Note other tutorial sections will be in-person.)** Steps have been taken by the University to configure these platforms in a secure manner. Classes will be recorded with video and audio and will be made available to students in the course for the duration of the term. The recordings may capture your name, image or voice through the video and audio recordings. By attending these live classes, you are consenting to the collection of this information for the purposes of administering the class and associated coursework. If you are concerned about the collection of your name and other personal information in the class, please contact the course instructor to identify possible alternatives. To learn more about how your personal information is collected, used and disclosed by Queen's University, please see the general Notice of Collection, Use and Disclosure of Personal Information.

Academic Integrity

Queen's students, faculty, administrators and staff all have responsibilities for upholding the fundamental values of academic integrity; honesty, trust, fairness, respect, responsibility and courage (see www.academicintegrity.org). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities http://www.queensu.ca/secretariat/policies/senate/report-principles-and-priorities).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and their behaviour conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1 http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations/regulation-1), on the Arts and Science website (see https://www.queensu.ca/artsci/students-at-queens/academic-integrity), and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

- *In this course you are permitted to work with a partner or in groups of up to 4 to encourage collaboration, cooperation, and collective learning on lab/tutorial assignments that are designated as "group work". You are not permitted to share answers among large groups or as a tutorial group. You must work independently on all tests and exams as "individual work".*

Copyright of Course Materials

Course materials created by the course instructor, including all slides, presentations, handouts, tests, exams, and other similar course materials, are the intellectual property of the instructor. It is a departure from academic integrity to distribute, publicly post, sell or otherwise disseminate an instructor's course materials or to provide an instructor's course materials to anyone else for distribution, posting, sale or other means of dissemination, without the instructor's *express consent.* A student who engages in such conduct may be subject to penalty for a departure from academic integrity and may also face adverse legal consequences for infringement of intellectual property rights.

This course makes use of Turnitin for submitting lab reports. Be aware that by logging into the site, you will be leaving onQ, and accessing Turnitin's website. Your independent use of that site*, beyond what is required for the course (for example, purchasing the company's products),* is subject to Turnitin's terms of use and privacy policy. You are encouraged to review these documents, using the link below, before using the site.

- Turnitin - http://turnitin.com/en_us/about-us/privacy

Accommodations for Disabilities

Queen's University is committed to achieving full accessibility for people with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. The Senate Policy for Accommodations for Students with Disabilities was approved at Senate in November 2016 (see https://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslcwww/files/files/policies/sen

ateandtrustees/ACADACCOMMPOLICY2016.pdf). If you are a student with a disability and think you may need academic accommodations, you are strongly encouraged to contact the Queen's Student Accessibility Services (QSAS) and register as early as possible. For more information, including important deadlines, please visit the QSAS website at: http://www.queensu.ca/studentwellness/accessibility-services/

Academic Considerations for Students in Extenuating Circumstances

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time. The Senate Policy on Academic Consideration for Students in Extenuating Circumstances is available at http://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslcwww/files/files/policies/senateandtrustees/Academic%20Considerations%20for%20Extenuating%20Circumstances%20Policy%20Final.pdf

Each Faculty has developed a protocol to provide a consistent and equitable approach in dealing with requests for academic consideration for students facing extenuating circumstances. Arts and Science undergraduate students can find the Faculty of Arts and Science protocol and the portal where a request can be submitted at: http://www.queensu.ca/artsci/accommodations. Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

If you need to request academic consideration for this course, you will be required to provide the name and email address of the instructor/coordinator. Please use the following:
Instructor/Coordinator Name: Zhe She
Instructor/Coordinator email address: zhe.she@queensu.ca

Statement of the Location and Timing of Final Examinations

The exam dates for each Term are listed on the Faculty of Arts and Science webpage under "Important Dates." Student exam schedules for the Fall Term are posted via SOLUS immediately prior to the Thanksgiving holiday; for the Winter Term they are posted on the Friday before Reading Week, and for the Summer Term they are individually noted on the Arts and Science Online syllabi. **Students should delay finalizing any travel plans until after the examination schedule has been posted. Exams will not be moved or deferred to accommodate employment, travel/holiday plans or flight reservations.**

Discussion Guidelines

University is a place to share, question and challenge ideas. Each student brings a different lived experience from which to draw upon. To help one another learn the most we can from this experience please consider the following guidelines.

1. Make a personal commitment to learn about, understand, and support your peers.
2. Assume the best of others and expect the best of them.

3. Acknowledge the impact of oppression on the lives of other people and make sure your writing is respectful and inclusive.
4. Recognize and value the experiences, abilities, and knowledge each person brings.
5. Pay close attention to what your peers write before you respond. Think through and re-read your writings before you post or send them to others.
6. It's ok to disagree with ideas, but do not make personal attacks.
7. Be open to being challenged or confronted on your ideas and to challenging others with the intent of facilitating growth. Do not demean or embarrass others.
8. Encourage others to develop and share their ideas.