This course deals with the principles and fundamentals of modern instrumentation in chemical analysis. The content involves quantitative analytical separation and spectroscopy, theoretical and practical aspects of instrumental techniques, and determination of metals and small molecules.

By the end of this course, students will be able to:

- gain an in-depth knowledge of the functionality of modern instrumentation that is at the heart of chemical-analytical methods.
- Understand the physical basis of chromatography-based separation techniques, such as gas chromatography and liquid chromatography, and understand how the instruments perform these tasks.
- understand the physical basis of mass spectrometry and then understand how the instruments perform these tasks.
- gain knowledge on several modern morphological characterization techniques for examining microscale object
- realize the important of surface analysis and the difference between surface and bulk chemistry structure
- provide preliminary assessment on the choice of analytical techniques upon given an analytical task
- become aware of the fundamental importance of integrity and ethics in analytical chemistry.

By a combination of classroom learning reinforced with hands-on experiential learning using modern instrumentation in the laboratory and preparation of professional analytical reports students will become well equipped for technical employment in a commercial or industrial analytical laboratory.

The following chapters are intended to be covered (subject to minor revision) in this course. The chapter numbers are based on the textbook by Skoog et al, 7th Edition (See Sec 4 for Course materials).

- Introduction to analytical separations
- Gas Chromatography
- Liquid chromatography
- Other separation techniques

- Introduction of mass spectrometry
- Mass spectrometry for element speciation (ICP-MS)
- Mass spectrometry for structure determination

Lecture notes, additional learning resources (where applicable) will be posted on the OWL (http://owl.uwo.ca) course website.

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Students are evaluated based on their performances both in lab and in lecture.

Summary of components and weights

Laboratory	Lab reports	24%
	Analysis of unknown	5%
	Driver's test	6%
Lecture	Poster presentation	11%
	Mid-term Test (1)	12%
	Mid-term Test (2)	12%
	Final exam	30%
Course Total		100%

Students must attend and complete at least FOUR laboratory sessions, complete the Driver's test, and obtain a combined mark of at least 50% on the laboratory component of the course.
Students who fail to meet any of these requirements will receive a course grade of not greater than 40%, even if the calculated grade is higher. For students with valid excuses, the only remedy against an F in such cases would be to apply for an INC grade through the Dean's Office and complete the missed work the next time the course is offered.

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You will need to submit all the required lab reports to earn your mark for the corresponding components.

Laboratory reports are to be submitted electronically via LAB SECTION OWL site using Turnitin.

Submit lab report as MS Word (.doc, .docx) or Portable Document Format (.pdf) file. You are also required to submit the files that were used when completing the lab report as supporting documents, i.e. the Excel (.xlsx) file and, if applicable, the raw chromatogram data (.pdf)."

The Driver's test: Students will be evaluated based on their knowledge on the instrumental analysis experiments they have performed in lab. The Failed to show up at the Driver's test will result a fail in the lab component.
Detailed instructions will appear as a separate document.

The laboratory component of this course is of particular importance. Performance in your lab work will be monitored closely by the teaching assistants, instructor, and laboratory coordinator. In mid-February, you will receive an interim progress notation on your laboratory competency (related only to your experimental techniques and the safe operation of equipment. Your lab reports are not considered as part of this evaluation). You will receive one of the following evaluations:

: you are performing your experiments in a safe and appropriate manner

: you have some serious defects in your lab performance and you are in danger of not performing to your best potential. SomQr4(t)10l( )-3(youe)8( )-3(sr)741. tcy (rel(n)-4( )6al. Somally n1(5(i)10ge ( )6a

There are two Mid-term Tests in this course, each is worth 12% of the total course mark. Both tests will be held in class, and the test questions are in a mixed format (i.e. multiple choices and short answers). Students with accommodated education will be given extra time.
Test 1: February 8, 9:30 am – 10:20 am
Test 2: March 7, 9:30 am – 10:20 am

Date/Time scheduled by Office of Registrar.
The Final Exam will be cumulative. The format of the final exam will be a mixture of multiple choice and short answer questions.

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf

Students who are unable to meet their academic responsibilities due to medical or compassionate reasons may submit a request for academic consideration. For each missed piece of work, *regardless of its weight in the total course grade*, you must apply for such consideration by providing valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration.

. Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. In cases where a student misses a piece of work for reasons related to the disability on file with Accessible Education, the student should request accommodation by contacting Accessible Education instead of the Academic Counselling Office.

Students are required to attend all the lab sessions. There are no make-up labs, and it is not possible to reschedule them. Absence from a lab session will result in a grade of zero for the missed lab. If the missed lab is due to a reason that is approved by Academic Counselling or Accessible Education, the weight of the lab will be shifted to other labs.

extension will be excused.

Since this is an activity performed by a team of two, at least one member in the team shall attend the Poster Day presentation. Both members shall receive the same grade. In the unlikely event that both members can't attend the presentation, and both members have obtained approval from Academic Counselling or Accessible Education, the students shall contact the course instructor as soon as possible to arrange alternative presentation method.

If you are unable to write a midterm test and are granted accommodation, the weight of the missed midterm will be shifted to the other midterm test. If you miss both midterm tests and are excused as well, the weight of the midterm tests will be transferred to the Final exam.
If you are unable to write the Final Exam, contact the Academic Counselling office of your Faculty of Registration as soon as possible. They will assess your eligibility to write the Special Examination. You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation". (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See Academic Calendar for details (under Special Examinations).

All lab reports will be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Students must seek approval from TAs whenever they leave the laboratory during experiments. They must return within a reasonably short period. Students leaving without approval will not be allowed to return to the lab, and will receive 0% on their lab mark.

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact