1. Course Information
Course name: Chemistry 3372G - Instrumental Analytical Chemistry
Lecture: M/W/F, 8:30 am - 9:20 am (CHB-9)
Laboratory: Tu/W/Th, 1:30 - 5:20 pm (CHB 094)

*Please note that laboratories start on Tuesday January 10th. Be prepared!!!*

Mandatory Notice from the Registrar
Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites. The prerequisite for Chemistry 3372G is Chemistry 2272F. The website of the Office of the Registrar is [http://www.registrar.uwo.ca](http://www.registrar.uwo.ca).

2. Contact Information
Instructor:
Keith Griffiths
Office: CHB 25
E-mail: griff@uwo.ca

Teaching Assistants:
Goldman, Maxwell,
Henderson, Jeffrey
Turnbull, Joseph
Turnbull, Matthew
Zhu, Ziyan
Martino, Taylor
3. Methods of Evaluation

- **Laboratory**  - lab reports and lab notebook  24%
  - analysis of unknown samples  5%
  - driver’s test (wks of March 27 and/or April 3)  6%

- *Poster presentation*  (Tuesday April 4th 2017)  20%
- **Mid-term Test** (Wednesday, February 15th; in-class, 50 mins)  15%
- **Final Exam**  (TBA, set by Registrar)  30%

^Students must pass the combined laboratory component (reports, analyses of unknowns, the driver’s test, combined score ≥ 50%) in order to pass the course. You MUST perform the drivers test.

The laboratory component of this course is of particular importance, given the nature of the material covered in the lectures. This course is about analytical **instruments** and their usage, strengths and limitations. As such, performance in your lab work will be monitored closely by the teaching assistants and laboratory technical staff.

In mid-February, (well before the drop deadline for the course on March 7th 2017), 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:
**Satisfactory:**  you are performing your experiments in a safe and appropriate manner

**Caution:**  you have some serious defects in your lab performance and you are in danger of not performing to your best potential. Some of your actions may potentially damage equipment or impede the performance of your lab partner. Remedial action is required, and you should discuss this matter with your teaching assistant.

**Unsatisfactory:**  Your lab performance is very poor. You will be asked to meet with the instructor to discuss ways to improve the situation.

Students whose performance in the laboratory is consistently unsafe or destructive, in the opinion of the instructor, will be removed from the laboratory for the remainder of the lab session and reported to the Associate Chair of Chemistry. A zero mark will be assigned to the corresponding lab report. Continued unsafe or destructive performance will, on recommendation of the Department, and with the permission of the Dean of the Faculty, result in the student being excluded from further laboratory sessions in the course and the student will not be entitled to further evaluation in the course.

*Students must receive a passing grade for the poster presentation and defence.*

**Students must also receive a passing grade (>=50%) in at least one of the exams to pass the course.**

Students must attend all lectures and lab sessions. All important information for the course will be provided on OWL and during lectures. Absence from a laboratory session without a valid reason (as determined by the Dean’s office) will result in a grade of zero for the lab. **Electronic devices such as phones, ipods etc are not allowed during exams and tests.**
The Mid-term test will cover all material lectured upon, up to and including the Friday prior to the test (approximately only!! the actual break-point will be announce in class as we progress). The format of this test will be multiple choice and/or (very) short answer responses.

The final will cover all material covered post-mid-term only, (i.e, not cumulative), though it should be noted that some concepts covered in the early part of the course are foundational in nature and so may ‘carry forward’ into later topics.

The format of the final will be a mixture of multiple choice and short answer questions.

4. Course Materials

Official Text (Recommended): Principles of Instrumental Analysis, 6th Ed. (5th Ed. acceptable) Skoog/Holler/Crouch


I will provide my lecture notes in PowerPoint format only, on OWL.

5. Course Syllabus

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. Students are expected to perform weekly laboratory experiments and submit laboratory reports on the results. In addition, students are expected to deliver poster presentations on related topics. More details regarding the posters will be provided in a separate document.

I intend to cover parts of the following chapters from the text (in this order):
Chromatographic Separations
- Introduction to Analytical Separations (Chapter 26)
- Gas Chromatography (Chapter 27)
- Liquid Chromatography (Chapter 28)

Capillary Electrophoresis (Chapter 30)

High and ultra-high vacuum technology

Atomic Mass Spectrometry (Chapter 11)

Molecular Mass Spectrometry (Chapter 20)

Surface Spectroscopy and Microscopy (chapter 21)
- Electron Spectroscopies (XPS and Auger)
- Secondary ion Spectroscopies
- Atomic Force Microscopy
- Scanning electron microscopy
- Low energy electron diffraction

Tests and exams will be based upon any/all material that I present **in class only**.

Computer software: Microsoft Excel for data analysis (available in 3372G laboratory computers)
5. Course Policies

Only non-programmable scientific calculators are allowed in midterm and final examinations.

Plagiarism/and or cheating are major academic offences. Tests, exams, and lab reports may be checked with software that searches for unusual coincidences in answer patterns and/or copying that may indicate cheating.

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

Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. See -
https://studentservices.uwo.ca/secure/index.cfm

It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see:

A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: https://studentservices.uwo.ca/secure/medical_document.pdf

Students who are in emotional/mental distress should refer to Mental Health@Western
http://www.uwo.ca/uwocom/mentalhealth/ for a complete list of options about how to obtain help
Use of Email for Communication

For your own protection, students must use only their @uwo.ca email account for all inquiries related to this course. It is very easy for anyone to set up a web-mail account with anyone else's name in the email address. *(All emails coming from non-uwo servers will be ignored)*

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Laboratory Safety

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.

Due to limited resources, students are asked to work in pairs or groups of three in the lab. However, each student is expected to learn all aspects of the experiments. Likewise, each student is expected to contribute equally with their highest level of skills and effort. In the event of unequal contributions, the TAs will require the students to work individually for the remainder of the lab.

This course is supported by the Science Student Donation Fund.

If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students’ Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing paperwork in the Faculty of Science Dean’s Office. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the chair of your department or email the Science Students’ Council: ssc@uwo.ca.
Course Objectives and Learning Outcomes:

Overall: students will gain an in-depth knowledge of the functionality of modern instrumentation that is at the heart of chemical-analytical methods.

Students will understand the physical basis of several types of chromatography, and then understand how the instruments perform these tasks.

Students will understand the physical basis of mass spectrometry and then understand how the instruments perform these tasks.

Students will understand the importance and relevance of surface analysis and the difference between surface and bulk chemistry and structure. Students will understand the modern methods of chemical and microscopic analysis as they are applied to surfaces.