

CHEM 9674

Advanced Optical Spectroscopy and Microscopy(Fall 2020)

Department of Chemistry
Faculty of Science
The University of Western Ontario

1. Course Information

Course Name: Chemistry 9674- Advanced Optical Spectroscopy and Microscopy

Lectures: Fridays 1:30-3:30 (Starting September 18, 2020)

Location: Virtual Synchronous

2. Instructor

Name: Lagugne-Labarthet Francois

Title: Professor of Chemistry

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3. Course Description

Photons are commonly use as a source to probe different properties of materials. Beyond the traditional techniques such as UV-Vis or FTIR spectroscopies, light can also be used to determine orientation properties, birefringence, circular or linear dichroism in the Visible or infrared range trough a variety of experimental techniques to study surfaces or bulk properties of an oriented material. Such results can be modeled and compared to predicted structures which is of great interest in particular for complex signals obtained in circular dichroism measurements.

Furthermore, most of optical techniques can be coupled to optical microscopy opening a new window on micro and nanoscale characterization using photon source.

We will review here: the properties of light: energy, polarization phase its application to common characterization techniques: UV-Vis, FTIR, Raman, non linear optical processes, birefringence, circular dichroism, linear dichroism, surface and interface molecular characterization with polarization modulation spectroscopy its application to microscopy: limit of resolution of classical microscopy, confocal microscopy, near field microscopy...

4. Evaluation (tentative)

- Presentation: 40%
- In-class activities: 20%
- Home Assignments: 40%

5. Prerequisites: This course is open to all graduates students who have interest in spectroscopy and spectroscopy instrumentation

6. Course Materials: Powerpoints, in class demonstration of optical elements.

7. Learning outcome: Upon completion of this course, students will be able to: understand better how light can be used to characterize materials and thin films, refresh their knowledge, understand better what they are measuring, get acquainted with new characterization methods

8. Course attendance, expectations and missed tests/exams

Course attendance is highly recommended for **Chem 9674**, particularly considering the interdisciplinary nature of the course and points associated with in-class activities. You are responsible for all information disseminated in class. Information missed due to course absences will not be considered for the basis of a grade appeal.

Arrival on time is expected. Please turn off all cell phones upon entering class. Reading of newspapers, work on assignments for this or other classes, or other activities that are not part of the class are not allowed during lecture. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom.

If you are unable to meet a course requirement due to illness or other serious circumstances, you must contact your instructor within 48 hours after you are able to resume academic duties with valid medical or other supporting documentation.

Once your absences have been excused, an alternate date for presentation or exam will be arranged. 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.

No “make-up” evaluation will be provided for the *in-class activities* component of the course. If the absence is excused, missed *in-class activities* marks will be transferred to the exam.

9. The fine print - University guidelines on various other issues:

A. Medical/Compassionate Excuses: Students missing work for valid medical or other reasons are governed by the regulations <https://studentservices.uwo.ca/secure/index.cfm>

B. Student Accessibility Services (SAS): Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program. Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are encouraged to register with Student Accessibility Services, a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both SAS and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction. For more information, see <http://www.sdc.uwo.ca/ssd/>

C. Academic Offences: 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 Web site: http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

D. Support Services: Support is available from the Registrar: <http://www.registrar.uwo.ca>, via the university students council (<http://westernusc.ca/services/>) and at Student Development Services (<http://www.sdc.uwo.ca/>). In particular, learning-skills counsellors at the Student Development Centre are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

E. Mental or Emotional Health: 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.