Chemistry 4481B – Solid State Inorganic Chemistry and Materials 2021/2022

Description A discussion of the structures and bonding in inorganic solids as well as of their physical and chemical properties. Links to practically important inorganic materials and solid-state devices will also be discussed.

Instructor: Prof. John Corrigan 
Chemistry Building 16, ext. 86387 
corrigan@uwo.ca (email messages must be from your @uwo.ca account. Please put Chem 4481B in the subject line.) 
Office hours: Every Mon. 2:30-3:20 pm or we can set up an appt if there are course conflicts

Course Webpage: Students should check OWL (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. The missing of critical information due to your failure to check OWL cannot be used as a basis for appeal. 
NOTE: You will need to be registered in the course and have a UWO computer account to access this site as well as lectures via Zoom and (possibly) test submission via Gradescope.

Course prerequisite: Chemistry 3371F

A Notice from the Registrar: “Students are responsible for ensuring that their selection of courses is appropriate and accurately recorded and that all course prerequisites have been successfully completed. If the student does not have the requisites for a course, and does not have written special permission from his or her Dean to enroll in the course, the student will be removed from the course and it will be deleted from the student's record. This decision may not be appealed. A student will receive no adjustment to his or her fees in the event that he or she is dropped from a course for failing to have the necessary prerequisites.”

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/scholoff.pdf

Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Office Policy in the Western Academic Calendar).
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 Accessible Education (AE) at Western for any specific question regarding an accommodation.

Support Services  Learning-skill counselors at the Student Development Centre (http://www.sdc.uwo.ca) 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. Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help. Additional student-run support services are offered by the USC, http://westernusc.ca/services. The website for Registrarial Services is http://www.registrar.uwo.ca.

Course Introduction

General: Chemistry 4481B builds on many of the concepts introduced in Chem. 2271/2281 and 3371. The subject matter presented in 4481B is done primarily in a "bottom up" approach, whereby concepts introduced at the beginning of the lecture series are used throughout the course. It is thus important that students keep up with the material. Problem sets will be assigned and are a general guide as to the format of both the term tests and the final examination.

Reading and Reference List: There is no required textbook for this course however you will find Chapters 7 & 11 in Inorganic Chemistry (5th Ed) by Miessler, Fischer & Tarr useful as a general reference. Lecture notes will be supplemented with handouts.

The following e-text is also available via the Taylor library:

Solid State Chemistry: An Introduction (5th Ed) by Smart and Moore, 2012

Evaluations:

Participation 6 % (problem sets discussion; Zoom polls)
In class Test 15 % Monday February 7, 2022, in class
Mid-term Test 34 % Friday March 11, 2022 (6-8 pm; location TBD)
Final Examination (cumulative) 45 % April Examination Period, date TBD (3 hours)

* If test is carried out via Zoom, access to a printer will be required.

Course Schedule - 3 hours per week - Mon., Wed. and Fri. 8:30 am-9:20 am. A combination of on-line synchronous via OWL (Zoom) and in person (CHB 115**)

** The current plan is to begin in-person lectures as soon as safety protocols permit (as of 31.01.2022). Dates may be pushed back depending on university/provincial guidelines or restrictions in which case
synchronous delivery via OWL/Zoom will continue. Some lecture periods will be reserved for discussing assignments.

There are no make-up test dates. If the test or midterm is missed for valid reasons (you must use the self-reporting or arrange an appointment with an Academic Counselor in the Faculty of Science office and provide appropriate documentation – see below) the weighting will be transferred to the final examination.

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. In the event of a missed final exam, the Faculty of Science will assess your eligibility to write the Special Exam and a "Recommendation of Special Examination" form must be obtained from the Dean's Office.

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:

http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

Problem Sets will be handed out throughout the term. These will be taken up ~ one week after they are distributed. Participation by registrants is required (see Evaluation scheme).

Learning Outcomes

Recognize and describe the packing and crystal structures, bonding and electronic properties of inorganic solids.

Recognize the common synthetic methods of inorganic solids, and describe the characterization methods of these inorganic materials.

Be able to discuss the relationship between the chemical characteristics and physical properties of various inorganic solids

Tentative Course Outline

Course introduction

Packing & simple crystal structures

Characterization methods

Preparation of solid state materials

Bonding in solids; electronic properties

Optical properties
Nanomaterials

Defects and non-stoichiometry

Porous materials (time permitting)

**Tech. Requirements**  Completion of this course will require you to:
- have a reliable/stable Internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link: [https://support.zoom.us/hc/en-us](https://support.zoom.us/hc/en-us)
- A computer with a working speaker/microphone/webcam
- Participants in this course are not permitted to record the sessions
- In the event that in-person activities cannot take place, access to a printer and the capability of uploading your tests/exam electronically (scanning or taking pictures).
- Tests and examinations in this course *may* have to be conducted using Zoom. You will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the proctor if asked to do so at any time during the exam. The test/exam sessions will **not** be recorded.
- More information about the use of Zoom for exam invigilation is available in the Online Proctoring Guidelines at the following link: [https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf](https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf)
- *Note* -Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination

**Statements concerning Online Etiquette**

This course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- **“arrive” to class on time**
- to minimize background noise, mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- in order to give us optimum bandwidth and web quality, turn off your video camera for the entire class unless you are invited to speak
- unless invited by your instructor, do not share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:
• If you wish to speak, use the “raise hand” function in Zoom and wait for the instructor to acknowledge you before beginning your comment or question.

• Please remember to unmute your microphone and turn on your video camera (if you choose) before speaking.

• Self-identify when speaking.

• Please remember to mute your microphone and turn off your video camera after speaking (unless directed otherwise).

General considerations of “netiquette”:

• Keep in mind the different cultural and linguistic backgrounds of students in the course.

• Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.

• Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.

• Be professional and scholarly in all online postings. Use proper grammar and spelling. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.