Chemistry 2281G – Course Outline

1. Course Information

Chemistry 2281G –Inorganic Chemistry of the Main Group Elements (Winter 2025)

Lectures: [redacted]

Labs: All labs will be held in ChB 080. Please attend the section for which you have registered.

[redacted]

Prerequisite(s): Chemistry 2271, *or* Chemistry 2211A/B with a minimum grade of 80%.

Unless you have either the requisites 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.

2. Instructor Information

Instructor: [redacted]

Office: [redacted]

E-mail: [redacted]

E-mail correspondence can only be considered if it is sent from your @uwo.ca address. Please also include Chem 2281G in your e-mail subject line. I would prefer to discuss chemistry face to face (see office hours below) and would ask that you contact me by e-mail only for administrative reasons.

Office Hours: [redacted] If you have a course that conflicts with this time, alternate arrangements can be made.

3. Course Syllabus, Schedule, Delivery Mode

Course Description

Comparison of the structure and solution chemistry of the main group elements and their oxides, halides and hydrides; examples of these compounds in the world around us, with a

discussion of the chemical principles involved; Molecular Orbital Theory of polyatomic molecules; metallic bonding and semiconductors.

General Course Outline

Chemistry 2281G will be composed of two main components; (1) Introduction to bonding in polyatomic molecules followed by (2) The chemistry of selected main group elements.

Part 1: Experimental methods in inorganic chemistry and an introduction to bonding in polyatomic molecules. This will include a brief review of Lewis, VSEPR and valence bond models followed by a study of molecular shape, symmetry and molecular orbital theory. We will also cover multi-nuclear NMR spectroscopy, IR spectroscopy and Mass spectrometry.

Part 2: We will then use what we learned in Part 1 to understand the structure bonding and reactivity of selected elements and their simple compounds. This will include a discussion of main group element hydrides, halides and oxides.

Course-Based Learning Outcomes

Upon completion of Chem 2281G, students will be able to....

- Predict and sketch expected heteronulear NMR, IR and mass spectra for various inorganic compounds
- Describe and identify the symmetry elements
- Use knowledge of symmetry to identify the point group of molecules
- Construct molecular orbital diagrams for molecules more complex than diatomics.
- Identify and describe common reactivity of Groups 14-17 of the periodic table
- Justify chemical reactivity based on knowledge of simplified molecular orbital diagrams.
- Differentiate the expected reactivity of different compounds based on periodic trends of the main group elements.
- Demonstrate proper inorganic synthetic techniques

Mode of Delivery: This course (lecture and tutorials) will be delivered in-person.

Important Dates:

Jan 6th – First Day of Class
Jan 21st/22nd – First day of Labs
Jan 22nd – Test #1
Feb 12th – Test #2
Feb 17th – 21st – Reading Week
Mar 12th – Test #3
Mar 25th/26th – Last Day of Labs
Apr 4th – Last Day of Class
Apr 7-30th (Exact date TBA by Registrar) – Final Exam

Labs: The names of the Lab TAs for Chem 2281G will be provided to you at the beginning of term. Specific questions regarding the lab content are to be directed to your specific TA

(contact details will be provided during first week). If you have general problems or issues with the labs, please direct your queries to Prof. Blacquiere.

Laboratory Schedule

Lab the Week of	Experiment	Due the Week of
Jan. 20	Library Lab	*Jan. 27*
Jan. 27	Symmetry Tutorial	*Feb. 3*
Feb. 3	Exp. 1: Synthesis of a Silicone Polymer - Bouncing Putty	*Feb. 10*
Feb. 10	Exp. 2: Positive Oxidation States of Iodine and the Interhalogens	*Feb. 24*
Feb. 17	*READING WEEK*	
Feb. 24	Exp. 3: Oxidation States of Tin	*Mar. 3*
Mar. 3	Exp. 4: Carbon Quantum Dots From Lemon Juice	*Mar. 10*
Mar. 10	Exp. 5: Ammonia-Borane	*Mar. 17*
Mar. 17	Exp. 6: Synthesis of Triphenylphosphine-Chalcogenides Week 1	
Mar. 24	Exp. 6: Synthesis of Triphenylphosphine-Chalcogenides Week 2	*Mar. 31*
April 8 – Last Day of Classes		

4. Course Materials

Strongly Recommended Text
Inorganic Chemistry, 5th Ed. Miessler, Fischer and Tarr
This book is available through the Bookstore as an eBook ($75). An older edition can be used.

NOTE: This text is the same text used for Chem 2271 and will be strongly recommended for Chem 3371F, thus you should expect to get substantial use out of it.

Required Laboratory Manual
This book is available through the Bookstore ($47), and will be a required resource for the laboratory component of this course.

Required Laboratory Notebook
This book is available through the Bookstore ($15.25), and will be a required resource for the laboratory component of this course.

Other Reading
There are texts available in the Taylor Library, which can supplement the required text and will help you with your tutorials, bonding theory, and other aspects of the class. I recommend you have a look at these resources.

Inorganic Chemistry 4th Edition, Catherine E. Housecroft and Alan G. Sharpe Pearson, Harlow, Pearson Education Limited, 2012.

Introduction to Coordination, Solid State, and Descriptive Inorganic Chemistry, Glen E. Rodgers, McGraw-Hill Inc.

In the library
Please make every effort to use the library as much as possible. ALL of the answers are there, you just have to find them! The reference section is excellent – some books that you may be interested to look at include:

1 – CRC Handbook of chemistry and physics (QD 65.C4)

2 – Lange's handbook of chemistry (QD 65.L36)

3 – Handbook of inorganic chemicals (QD 155.5.P37)

4 – Encyclopedia of inorganic chemistry (QD 148.E53 2005)

Course OWL Brightspace Site Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) 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.

All course material will be posted to OWL: https://westernu.brightspace.com/

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

Technical Requirements

In the event that this course must switch to remote delivery, the following technical requirements will be needed: a stable internet connection and a computer with working microphone and webcam. Affected course content will be delivered entirely online in a synchronous mode (i.e., at the times indicated in the timetable). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

5. Methods of Evaluation

Evaluation

Term Tests, three (highest 15%, two lowest 10%)	35%
Labs:	20%
Final Exam (Cumulative, date and time to be announced by Registrar)	45%

Term Test Dates

Term tests will occur *during normal class time (9:30 - 10:20 am) in a location to be announced* on the specified dates below.

Jan 22nd – Test #1
Feb 12th – Test #2
Mar 12th – Test #3

Course Conditions:

To be eligible to pass Chemistry 2281G it is necessary to:

- Obtain a passing grade on the combined marks from the term tests and final examination.
- Attend and complete (complete lab and report) at least 5 of the 6 labs (not counting library session and symmetry session) to be eligible to pass the course.
- Students who fail to meet any of these requirements, whether excused or not, will receive a final grade of not greater than 40%, even if the calculated grade is higher. Exception: Students who, for medical or compassionate reasons, have been granted Incomplete Standing (INC grade) by the Dean's Office will be required to complete the missed work the next time the course is offered

General Information about Missed Coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments

Midterm tests are essential assessments. At least one of the two midterm tests must be written. Students who write only one midterm and are granted academic consideration will have the weight of the missed test transferred to the final exam. A student who misses both midterms, whether excused or not, will have to apply for a grade of incomplete (INC) at the Dean's Office and write the missed tests the next time the course is offered. Students who miss both midterms and do not have an INC will receive a course grade of not greater than 40%, even if the calculated grade is higher.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

Essential Learning Requirements
Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade.

- at least 6 (of 8) attended and completed labs, and a minimum 50% grade on the laboratory component must be achieved to ensure that students demonstrate sufficient mastery of those technical skills to progress,
- Obtain a passing grade on the combined marks from the term tests and final examination.

Coursework with Assessment Flexibility
By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

Deadline with a No-Late-Penalty Period
Lab Reports. Students are expected to submit each of the 8 reports by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment up to 48 hours past the deadline without a late penalty. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 10% per day will be applied. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (48 hours).

7. Additional Statements

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence to the Academic Advising office in the Faculty of Science. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the test).

Please visit the Diversity Calendars posted on our university's EDID website for recognized religious holidays:

https://www.edi.uwo.ca

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Electronic Devices

As a courtesy to your fellow classmates, please switch mobile devices to silent mode before lectures/term tests/tutorials/exams begin. We will draw several diagrams and chemical structures so note taking on paper or tablet is recommended. But, if you use a laptop to take notes, please sit near the back of the classroom in order to minimize disruption to other students. The use of electronic devices (aside from a basic scientific calculator) is prohibited during quizzes, tests, and exams.

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/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services

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

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

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 Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (https://learning.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.