

# Chemistry 2271A – Course Outline

## 1. Course Information

### Chemistry 2271A – Structure and Bonding in Inorganic Chemistry (Fall 2023)

**Lectures:** M-W-F 9:30-10:30; MC-105b

**Tutorials:** All tutorials will be held in the rooms identified below. Please attend the section for which you have registered. *The sections are listed as 3 h time slots, but these will be divided into two 1.5 h sessions (A and B). You will be informed which session (A or B) to which you are assigned.* Tutorial sections will be held during the following timeslots and locations:

041 - Th 9:30 am - 12:30 pm, SH-3317

043 - Th 2:30 - 5:30 pm; UCC-59

Tutorials will take place on a weekly basis for a total of **10 sessions**. The topics covered are designed to build upon the principles discussed in the lectures.

**Prerequisite(s):** Chemistry 1301A/B and Chemistry 1302A/B with a minimum mark of 60% in each, *or* Chemistry 1301A/B and Integrated Science 1001X with a minimum mark of 60% in each.

**Antirequisite(s):** Chemistry 2211A/B.

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:** Prof. Johanna Blacquiere (BLAA-key-air), she/her

**Office:** BGS 2022

**E-mail:** johanna.blacquiere@uwo.ca

E-mail correspondence can only be considered if it is sent from your @uwo.ca address. Please also include Chem 2271A 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:** T 10:30-11:30 am, BGS 2022. If you have a course that conflicts with this time, alternate arrangements can be made.

### 3. Course Syllabus, Schedule, Delivery Mode

#### Course Description

An overview of the Periodic Table, stressing trends in properties of the elements and their compounds; principles of ionic and covalent bonding; molecular orbital theory of simple molecules; solution and solid-state chemistry of Group 1 and 2 compounds, with examples relevant to biology and everyday life.

#### General Course Outline

Chemistry 2271A will be composed of three main components: (1) Understanding the Periodic Table; (2) Structure and bonding in main group compounds as well as molecular orbital theory of simple diatomics, and structures and bonding in common solids; and (3) Chemistry of selected main group elements.

#### Course-Based Learning Outcomes

*Upon completion of Chem 2271A, students will be able to....*

- Describe the underlying principles that led to the organization of the common periodic table and use the periodic table to rationalize trends in atomic properties based on its current form.
- Describe the scientific principles governing the structure and bonding of molecules derived from group 1, 2, and 13 elements.
- Have a solid understanding of the various models used to describe bonding in molecules and materials.
- Apply foundational knowledge to solve more complex structure and bonding questions relating to molecules derived from group 1, 2, and 13 elements.
- Work in small groups to evaluate and solve problems in a tutorial setting.

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

#### Important Dates:

Sept 8<sup>th</sup> – First Day of Class  
Week of Sept 18<sup>th</sup> – First week of Tutorials  
Oct 4<sup>th</sup> – Test #1  
Oct 30<sup>st</sup> - Nov 3<sup>rd</sup> – Fall Break  
Nov 8<sup>th</sup> – Test #2

Week of Nov 27<sup>th</sup> – Last Week of Tutorials  
Dec 8<sup>th</sup> – Last Day of Class  
Dec 10-22 (Exact date TBA by Registrar) – Final Exam

**Tutorial:** The names of the Tutorial TAs for Chem 2271A will be provided to you at the beginning of term. Specific questions regarding the tutorial 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 tutorials, please direct your queries to Prof. Blacquiere.

**Tutorial Topics** (subject to minor changes)

1. Lewis Structures/VSEPR (Weeks 1 and 2)
2. Periodic Trends and Valence Bond Theory (Weeks 2 and 3)
3. Valence Bond Theory (Week 4)
4. MO Theory of Homo- and Hetero-Diatomics (Weeks 5-7)
5. Donor-Acceptor Compounds (Week 8)
6. Solid-State Structures (Week 9)
7. Solid-State Structures and s-Block Chemistry (Week 10)

**Tutorial Quiz Dates**

1. Week 2, Sept 28<sup>th</sup>
2. Week 4, Oct 12<sup>th</sup>
3. Week 6, Oct 26<sup>th</sup>
4. Week 9, Nov 23<sup>rd</sup>
5. Week 10, Nov 30<sup>th</sup>

## 4. Course Materials

**Required Text**

*Inorganic Chemistry, 5<sup>th</sup> Ed.* Miessler, Fischer and Tarr

This book is available through the Bookstore as a physical book or as an eBook. Either are acceptable for this course.

[https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2021A&courses%5B0%5D=001\\_UW/CHE2271A](https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2021A&courses%5B0%5D=001_UW/CHE2271A)

**NOTE:** This text will also be required for Chem 2281G and Chem 3371F, thus you should expect to get substantial use out of it.

**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 4<sup>th</sup> 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 Site** 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.

All course material will be posted to OWL: <http://owl.uwo.ca>.

If students need assistance with the course OWL site, 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.

### **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**

<i>Term Tests</i> , two (highest 20%, lowest 15%)	35%
<i>Tutorial</i> , including participation and quizzes (5):	15%
<i>Final Exam</i> (Cumulative, date and time to be announced by Registrar)	50%

### Term Test Dates

Term test will occur *during normal class time (9:30 - 10:20 am) in the normal lecture location (MC-105B)* on the specified dates below.

Oct 4<sup>th</sup> – Test #1

Nov 8<sup>th</sup> – Test #2

### Course Conditions:

To be eligible to pass Chemistry 2271A it is necessary to:

- Obtain a passing grade on the combined marks from the term tests and final examination.
- Attend and complete the assignments of at least 80% of tutorial sessions (8/10). This includes completion of at least 3/5 of the tutorial quizzes.
- The tutorials and quizzes are essential components of this course. You must attend and complete at least 3 out of the 5 tutorial quizzes, write at least one of the two midterm tests, and write the final exam. 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

## 6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

### Assessments worth less than 10% of the overall course grade (i.e. Individual Tutorial Quizzes):

There are 5 tutorial quizzes in the course. No documentation is required if only one quiz is missed. Students who complete all 5 quizzes (and only those students) will receive a bonus: only the best 4 quiz marks will be counted toward the course grade. Students who complete only 3 quizzes and wish to be excused must provide medical documentation to the Faculty of Science Dean's office which will make the determination whether Academic Consideration is warranted. The weight of the excused tutorial will be redistributed among the tutorial quizzes. NOTE: completion of 2 or fewer quizzes means the student is not eligible to pass the course.

No make-up tutorial sessions will be offered.

### Assessments worth 10% or more of the overall course grade (i.e. Term Tests, Final Exam):

If you miss a term test for this course and wish to be excused, you must submit medical documentation to the Faculty of Science Dean's office which will make the determination whether consideration is warranted. No make-up term tests will be offered if academic

consideration is received for only one midterm test. The weight of the excused term test will be redistributed to the final exam such that the written test is worth 20% and the Final 65%. One makeup midterm test will be offered on November 15<sup>th</sup> *only* to those students who receive Academic Consideration for BOTH midterms. This makeup test will have the same length as a regular midterm but will be cumulative in coverage. For the purposes of evaluation, the makeup test will be treated as one regular midterm that is worth 20% and the Final will be worth 65%.

For further information, please consult the University's medical illness policy at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_medical.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf).

The Student Medical Certificate is available at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

### **Absences from Final Examinations**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

**Note:** missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

## **7. Accommodation and Accessibility**

### **Religious Accommodation**

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

### **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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

## 8. 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](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](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

## 9. 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](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](mailto: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](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.

## 10. Additional Information

### Social Media

#### *Twitter*

For those who are interested, I encourage you to get involved in the Western Chemistry community by joining us on Twitter: @westernchem, @WorkentinChem, @Lagugne, @GilroyGroup, @RagognaGroup, @jmlacquiére, etc.

#### *Facebook*

The department also has a Facebook page, please visit the page to keep up to date with things happening in and outside of the department: <https://www.facebook.com/ChemistryatWestern>

### Land Acknowledgement:

We acknowledge the Anishinaabek, Haudensaunee, Lūnaapéewak and Attawandaron peoples, whose land we will gather upon for the duration of this course.