

Chemistry 2211a Course Outline

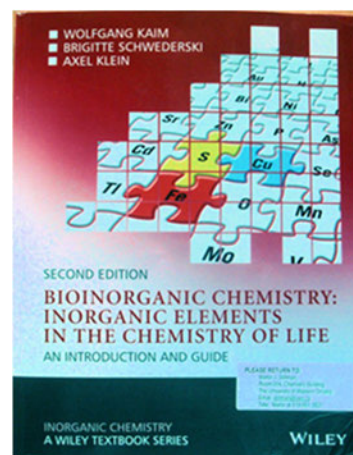
Sept – Dec 2025

“Inorganic Elements in Life”

Appointment by email or arrange at the end of each lecture. There is also usually time at the end of each lecture for a meeting.

Note: This Course Outline is subject to change.

This revision dated 2025 Aug 22-abcdeF



See the 1st INTRO unit on the web site for others that are in the library.

This is not a required text book it is a recommend text book –I will provide very detailed notes. However, to read another person’s words on our topics, I recommend you visit the library and read this and other books like this every week or so, or purchase the e-book version of this book through the bookstore (approximately \$80). The 2nd edition of Kaim, Schwederski & Klein (KS&K)- “Bioinorganic Chemistry: Inorganic elements in the chemistry of life” in the book store ISSN: 1939-5175

NOTE: Content for tests and exams will be solely taken from my marked up printed notes available on the course web site – IT IS NOT NECESSARY TO PURCHASE A TEXTBOOK. However, the Kaim, et al. book above is very useful.

Chemistry 2211a has four components: lectures, posters, a 90 minute, in-person multiple-choice-written-section midterm test and a 3 hour final exam.

The lecture component will introduce students to the fundamental concepts of bioinorganic chemistry, with an emphasis on the roles of metals in the biological world. **Lecture attendance at more than 85% of the lectures is mandatory and attendance may be taken.** Missing important announcements given at lectures cannot be used as the basis for an appeal. **This course is delivered in-person.** The midterm test, poster assessment and final exam will be in-person.

After taking this course you will be able to assess the importance of metal ions in Nature. You will be able to assess news reports and your own reading about the importance of metals in your own life and the lives of your family members and friends. You will be able to address the value of essential metals in your diet, toxic metals to avoid, and metals that play a role therapeutically in drugs you might take in your future.

Overall you will be able to begin to understand the role metals play in a healthy life of all organisms.

The poster component will allow students, in groups of two, to research and then present a scientific poster on a topic chosen from a list provided by the course instructor. Each group will be assessed through “interviews” during the last two weeks of the term. Students will also visit, and learn from, other students’ posters during those two weeks. Poster guidelines will be provided at a later date. You will learn to assess complex data and describe it in both writing on the poster and in person in your interview. These are aspects of your future career that will be very useful talents. **The poster assignment is a critical part of this course.**

The final exam will be cumulative except specific units that will be omitted - the exact syllabus will be provided via the web site page.

Topic	Description
A	Introduction to Bioinorganic Chemistry – this is a major review of the whole course and will provide an invaluable review resource before the final exam. <u>Note this is a lengthy unit and you will need to prepare by reading the text before each lecture.</u> You will find that the lecture style to be different in many aspects to other courses and you will want to become familiar with and adapt to this style.
B	Essential Inorganic Chemistry : orbitals, electronic configurations, HSAB theory, ligands, coordination complexes, equilibrium/stability constants
C	Essential Biochemistry : amino acids and their acid-base properties, protein structure, cells, common biological ligands. We especially focus on the amino acids in proteins that bind metals – there is a very select few. Projected end of lecture material for the midterm exam (subject to change –will be confirmed in the lectures before the midterm exam)
D	Catalysis : zinc, cobalt – for humans, the role of Zn in healing and breathing! The role of Co in vitamin B12 – a critically important compound for human health and only available in the diet from meat and fish. We will explore what these 2 metals actually do! Take a look at these sites – they are all reputable https://my.clevelandclinic.org/health/diseases/22831-vitamin-b12-deficiency https://scitechdaily.com/scientists-just-found-a-major-problem-with-vitamin-b12-guidelines-and-your-brain-might-be-at-risk/ We will touch on these aspects of this vital mineral:

Why is B12 important for brain health?

Nervous system function: Vitamin B12 is essential for the proper functioning of the nervous system, including the brain.

Red blood cell formation: B12 is needed to produce red blood cells, which carry oxygen throughout the body, including to the brain.

Cognitive function: B12 deficiency can lead to cognitive decline, including memory problems and impaired thinking.

Neurological disorders: Studies have linked B12 deficiency to an increased risk of neurological disorders like Alzheimer's disease and dementia.

Who might need more than the recommended 2.4 mcg?

Older adults: Absorption of B12 decreases with age, so older adults may need supplements.

Vegans and vegetarians: B12 is primarily found in animal products, so those with dietary restrictions may need supplements.

People with absorption issues: Certain conditions can impair B12 absorption, requiring higher doses or injections.

E **Photosynthesis: magnesium**

Toxicity of Selected Elements cadmium, mercury, arsenic and lead

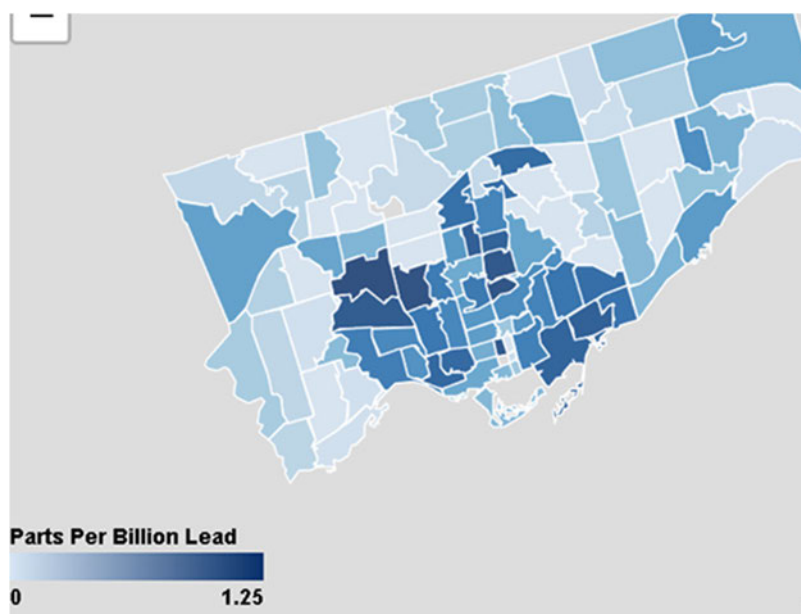
For example, if you live in Toronto do you know how much toxic lead is in your home's drinking water? Take a look for your home in this map

<https://www.toronto.ca/services-payments/water-environment/tap-water-in-toronto/lead-drinking-water/>

<https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/what-about-lead.html>

The map below shows results from Toronto's non-regulated lead testing program from January 2015 to April 2019. Darker areas represent a higher median lead value

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Introduction to Metals in Medicine

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

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

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.



Section	Day	Time and Room	Instructor	Office	Email

If you wish to meet with me, please send an email for an appointment using only your Western email address (@uwo.ca) and include *Chem 2211a* in the subject line (ESSENTIAL!) or arrange to meet with me after one of the classes. I have no specific office hours because course participants in Chemistry 2211a come from many different programs. I am available most days to suit your schedule by appointment.

Event	Time and Room	Building
1st class		You will need to have downloaded the "INTRO" lecture notes.
	TUESDAY 30 th September	
Lectures cancelled	TUESDAY AND THURSDAY 4 TH AND 6 TH NOVEMBER (reading week)	
Last lecture	Thursday, 4 th December	
Last day to tell about MidTerm exam conflicts or issues	Sept. 25 th	BUT NOTE THE MID-TERM IS IN CLASS TIME SO THERE CANNOT BE A CONFLICT WITH OTHER CLASSES
Midterm Exam		



	Note- there is no make-up because this is class time.	MAKE SURE YOU KNOW WHERE THIS ROOM IS – IT IS NOT [REDACTED]
Poster Topics posted for selection (teams of 2 work on each topic)	Tuesday 7TH October this is for you to consider and then make your selections via the Doodle Poll on Friday	ON A DOODLE PAGE – url to be sent to you via OWL on TUESDAY Oct 14th at 12 noon.
Poster topic and teams finalized	THURSDAY 16TH October – [REDACTED]	It is a requirement for this course that you select a poster topic and therefore a team member between 8 th and 11 th October Teams must plan and work together cooperatively by sharing schedule information and communication information. This is a team project.
Posters must be up	Before 5 pm Friday 14th November	[REDACTED]
Poster assessment	(Assessment time and day must be selected by TUESDAY 11 TH Nov. at noon. Failure to select an assessment time and day from the Doodle scheduler provided online will result in a time and day being assigned.) 17th Nov – 2nd Dec [REDACTED]	[REDACTED] outside class time assessment time to be selected from DOODLE timetable

The overall course grade, out of 100, will be calculated as listed below. Listed next to the respective components are their maximum contributions toward the course grade.

Component	Notes	Normal Value	Missed Midterm
Midterm Test		35	--
Poster	Weighted average of individual and group marks Following in-corridor oral assessment	25	25
Final Exam	Cumulative, scheduled by the Registrar, 3 hours	40	75

In order to obtain credit for the course, all of the following requirements must be met:

1. Obtain a minimum of 50% on the Poster component (12.5 out of 25).

The Poster is team project, with the Poster being put up on the designated day (with extenuating circumstances you do not need to request Academic Consideration to put the Poster up 24 hours

late without penalty) there is a 10%/day penalty for being late after this 24-hour delay. The assessment involves a 30 minute in-person assessment with all team members present, at a time selected from available meeting times outside Chem 2211a class time extending for about 2 weeks at the end of term. In the event of extenuating circumstances a 2nd assessment time may be possible depending on the circumstances and schedules of each team member and the TA assessor, if one team member is unable to attend then the other team member(s) will be assessed separately and the team member who missed that time and day would need to schedule and attend a mutually available time and day assessment either before the end of term or the next time the course is offered and the course mark will be reported as INC if each of the other components exceeds the passing grade.

2. Obtain a minimum *weighted average* of 50% on the Midterm Test and the Final Exam. That is, the Midterm Test mark out of 35, plus the Final Exam mark out of 40, must be greater than or equal to 37.5 out of 75. In the case of a missed Midterm Test, a minimum of 50% on the Final Exam must be obtained.
3. Students who fail to meet one or more of the above requirements, will receive a course grade no greater than 45 out of 100.

None of the components will be “dropped” and it is not possible to have the components reweighted except as specified above.

Only nonprogrammable calculators are allowed. Aside from the calculator, **no other electronics (phones, iPods, etc.) may be in your possession during tests and exams, even for timekeeping purposes.**

There is no Periodic Table provided for either mid-term or final exam.

You will be required to memorize the key metals and non-metals that impact bioinorganic chemistry.

██████████ will be very clear on what to memorize and will assist you in memorizing those elements in the Periodic Table.

There is no university-wide policy governing the use of generative AI tools in coursework or assessments. For this course please be careful in the use of ChatGPT for example, in preparing your Poster text, because you will have an in-person assessment where every word on your Poster will be checked and you will need to be able to both defend and explain all of your text in the context of your topic.

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/scholoff.pdf>. Computer-marked, multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

All required papers and poster content may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

There is no make-up midterm test. If you miss the midterm exam, and are granted Academic Consideration, the value of the midterm test will be shifted to the Final Exam as described in the table shown on the previous page.

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).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examinations).

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 this class is Chemistry 1301a and 1302b. Grade 12 or first-year university biology is also highly recommended. Antirequisites are Chemistry 2271a. The website of the Office of the Registrar is <http://www.registrar.uwo.ca>.

Accommodation and Accessibility

Academic Consideration for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences must be submitted to the Academic Counselling office of a student's Home Faculty.**

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf and for the Student Medical Certificate (SMC), see: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Academic Policies

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

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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 his/her official university address is attended to in a timely manner.

Support Services

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

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 Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being:
<https://www.uwo.ca/se/digital/>.

Learning-skills counsellors 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>.

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 (Defined by policy)

Midterm and Presentation-Group Project = Poster (Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration)

These always requiring documentation

Evaluation Scheme for Missed Assessments

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 (see above).

The Poster is an essential part of this course and must be presented by the end of term.

6. 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 in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. 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 writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the 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.

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:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Support Services

Please visit the Science & Basic Medical Sciences Academic Advising 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.

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.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.

END OF TEXT