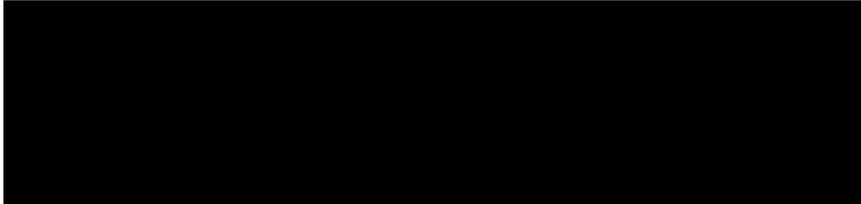


## Chemistry 3391b Bioinorganic Chemistry Winter 2026

  
**Prerequisite(s): Chemistry 3371F**

Unless you have either the prerequisites for this course or written special permission from the Department of Chemistry to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.  
Office Hours: by appointment via e-mail is most efficient. Dropping by my office is always possible.  
E-mail: Martin.Stillman@uwo.ca -- always with "Chem 3391b" in the Subject

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

**Course Description:** The role of the chemical elements and their compounds in biology. The emphasis will be on the functional and mechanistic aspects of the biological chemistry of the metallic elements. The toxicology and medicinal chemistry of metal ions will also be discussed.

**Course Topics**

A draft lecture sequence - the order of some topics may be changed and some topics may be omitted.

- A    BASICS OF BIOINORGANIC CHEMISTRY – An Extensive INTRODUCTION
  - 1     ELEMENTS IN BIOLOGICAL SYSTEMS
  - 2     SUMMARY OF THE COURSE - FROM BEGINNING TO END. THIS TAKES 2 WEEKS
  
- B    INORGANIC CHEMISTRY OF BIO-METALS - VERY SHORT - ASSUMES YOU HAVE REMEMBERED CHEM 2271a/2281b/3371f

- 1 PERIODIC PROPERTIES - SIZES - GROUPS- TRENDS - OX. STATES - very short – partly assigned reading
- 2 LEWIS ACID/BASE - HARD/SOFT METALS/LIGANDS - very short – partly assigned reading
- 3 IMPORTANT COORDINATION CHEMISTRY OF METALS & COMPLEXES – EQUILIBRIUM CONSTANTS - very short – partly assigned reading – a section that many have forgotten about!
- 4 BIO-IMPORTANT LIGANDS, INC. AMINO ACIDS - PORPHYRINS these have to be memorized
- 5 ESSENTIAL - TOXIC – MEDICINAL metals

C SOME ESSENTIAL BIOCHEMISTRY

- 1 BASIC BUILDING UNITS IN BIOCHEMISTRY; AMINO ACIDS – PROTEINS; emphasis on the typical donor atoms in amino acids that bind metal ions.

PLANNED END OF LECTURE MATERIAL FOR THE TERM TEST

- D ZINC - a fantastic yet really boring element - what can a d10 metal really do? Just wait. We will discuss Zn-enzyme chemistry in detail
- E COBALT - AN EXAMPLE OF ENZYMES IN ACTION: VIT B12 AND THE FOLATE CYCLE.
- F MAGNESIUM – AN EXAMPLE OF EVOLUTION - THE STORY OF CHLOROPHYLL – mixing spectroscopic properties with redox energy – photosynthesis does all that!
- G TOXIC METALS - this is a pretty challenging section - especially when we look at the effects on populations - studied in some detail
- H SUMMARY - CLOSING REMARKS

**Learning Outcomes**

**AIMS OF THE LECTURE PART OF THE COURSE**

Participants are expected, as a result of the lectures, case studies and associated required reading to be able:

1. To explain the key chemistry important for metal-based biological chemistry by assessing the inorganic chemistry common in biological molecules;
2. To identify the underlying principles of coordination chemistry as it applies to biological molecules by considering a series of cases that show the chemical properties of metalloprotein
3. To become familiar with the common properties of metals in biomolecular complexes - hard/soft metals/ligands, etc., by reviewing inorganic chemistry of the main and transition metal groups
4. To understand the differences between metal content; and metal requirements; metal-based function and connect nutritional-sources with function
5. To learn about a range of biological chemistries determined by the metal content by considering a series of case studies
6. To explain the choices to be made in analytical techniques to characterize metallo-biological complexes
7. To recognize the origins of the devastating effects of toxic metals from consideration of a series of case studies

## AIMS OF THE PRESENTATION PART OF THE COURSE

Participants are expected, as a result of the presentations:

1. To be able to describe in their own words chemistry important for metal-based biological chemistry;
2. To be able to read and, abstract and assemble published data, concepts and models.;
3. To work rapidly and efficiently in assembling a technical presentation;
4. To learn how to work with short timeframes to research, abstract, and construct a public presentation.
5. To deliver a succinct verbal report and then answer probing questions from the assessor.

Lecture notes are posted on OWL/Brightspace about 1 week before they are to be used. Please download.

Marked Up text will be posted at the end of each unit.

### 4. Course Materials

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

#### Textbook and Other Learning Materials

Recommended Text Book will help expand and explain the concepts given in the lectures – there is no requirement to purchase any of these text books. In fact, Prof Stillman is able to loan you some of them for use in the course and the library has most on heavy demand.

Paperback edition: 2<sup>nd</sup> Edition ONLY – Kaim/Schwederski/Klein Bioinorganic chemistry: Inorganic elements in the chemistry of life. Wiley.

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.

### Methods of Evaluation

#### Grading Scheme and Assessment Dates

##### DISTRIBUTION OF MARKS:

2 presentations (#1; Thur Jan 29 <sup>th</sup> ) 12% & (#2; Thur Feb 26 <sup>th</sup> ) 18%	= 30%
	= 30%
Final exam (3 hours in April)	= 40%

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

Attendance at lectures is mandatory and missing information given at lectures is not an acceptable excuse for missing important administrative details.

1. Obtain a minimum weighted average of 50% on the Midterm Test and the Final Exam. In the case of a missed Midterm Test, a minimum of 50% on the 70% Final Exam must be obtained.

2. Obtain 50% or greater on the aggregate grades of the two Presentations (note the condition that both presentations must be delivered to pass this course). The presentations are critical components of this course.
3. Students who fail to meet any of the above requirements will receive a course grade of not greater than 40%, even if the calculated grade is higher.

None of the components will be “dropped” and it is not possible to have the components reweighted. There is no Periodic Table provided for either the Mid-term or Final exam. You will be required to memorize the key metals and non-metals that impact bioinorganic chemistry (up to Kr plus key metals heavier than Kr). Prof Stillman will be very clear on what to memorize.

Students who fail to meet the essential course requirements may apply for Incomplete Standing (INC) through their home Faculty, and complete the missed items the next time the course is offered.

### **ADMINISTRATIVE INFORMATION ABOUT THE COURSE: SPECIAL DATES/OUTLINE**

The Topics for the 2 Presentations will be released about 10 days before and you will select your choice via a selection poll about 8 days before the Presentation Dates– it is imperative that you are able to receive MyMail@uwo.ca email messages as this is the only method of notifying you of the poll url.

There will be a Review session available before the Final exam in the April exam period.

#### **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://uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration\\_Sep24.pdf](https://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/](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.

**Missed tests.** Students who miss a test for any reason do not need to apply for academic consideration, submit documentation, or contact the instructor. The weight of the missed test will be automatically transferred to the final exam. There are no make-up tests in Chem 3391b.

However, the following assessments always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)

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.

## **Late Submissions.**

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.

Essential learning objectives that are required to pass the course: Two presentations; the Final exam.

### **Deadline with a No-Late-Penalty Period**

**Group Presentations.** Students are expected to submit each of the Presentation files and carry out the Presentations (#1, #2) on the dates listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment exactly 1 week past the deadline without a late penalty but by specific arrangement with Prof Stillman. Should students submit their assessment beyond this new date, a mark of zero will be recorded. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (1 week).

## **6. Additional Statements**

### **6.1 Religious Accommodation**

When a recognized religious holiday or observance conflicts with an examination, test, or other scheduled academic obligation, students must request accommodation via the University's Student Absence Portal (SAP). This request should identify the conflict and specify which course component(s) (e.g. test, midterm, exam) are affected.

Students are encouraged to submit the SAP request as early as possible, but no later than two weeks before any examination, or one week before any mid-term test or quiz, to allow sufficient time for adjustment.

The SAP request serves as official notification to both the course instructor and the Academic Advising Office, in accordance with University policy:

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

The Faculty of Science considers religious accommodations as scheduling conflicts. Instructors should provide either a make-up exam or an earlier sitting of the same exam to accommodate the student.

For more information on recognized religious holidays, please visit the Diversity Calendar posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca>

### **6.2 Academic 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).

### 6.3 General Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

**Use of @uwo.ca email:** 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 email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

#### Requests for Relief (formerly known as “appeals”)

Policy on Request for Relief from Academic Decision:

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/requests\\_for\\_relief\\_from\\_academic\\_decisions.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf)

Procedures on Request for Relief from Academic Decision (Undergraduate):

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/undergrad\\_requests\\_for\\_relief\\_procedure.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf)

### 6.4 Scholastic Offences

Policy on Scholastic Offences:

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_offences.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf)

Procedures on Scholastic Offences (Undergraduate):

[https://uwo.ca/univsec/pdf/academic\\_policies/appeals/undergrad\\_scholastic\\_offence\\_procedure.pdf](https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf)

#### Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones. **Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a *scholastic offence*, even if the device is not in use.** Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

#### Use of Generative AI Tools

The use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is only **permitted** in the completion of course assessments, that include presentations.

All required papers 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.

### 6.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, 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.

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. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

[http://academic-support.uwo.ca/accessible\\_education/index.html](http://academic-support.uwo.ca/accessible_education/index.html)

Learning-skills counsellors at Learning Development and Success (<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.

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