

Chemistry 4471A – Transition Metals and Catalysis (Fall 2021)
Western University
Department of Chemistry

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

Office: BGS 2022

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E-mail correspondence can only be considered if it is sent from your @uwo.ca address. Please also include Chem 4471 in your e-mail subject line. I would prefer to discuss chemistry face to face (Zoom or in-person; see office hours below) and would ask that you contact me by e-mail only for administrative reasons.

Lectures: M-W-F 12:30-1:20 pm; ChB-09

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

Course Webpage: Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news and updates or have notifications set to notify of an update. This is the primary method by which information will be disseminated to all students in the class. Missing critical information due to 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 account to access this site.

Office Hours: M 1:30-2:30 pm, BGS 2022. If you have a course that conflicts with this time, alternate arrangements can be made.

Important Dates:

Sept 8th – First Day of Class
Sept 24th – Assignment #1 Due
Sept 27th – In Class Activity
Oct 4th – Test #1 (in class)
Oct 22nd – Assignment #2 Due
Oct 29th – In Class Activity
Nov 1st-5th – Reading Week

Nov 10th – Test #2 (In class)
Nov 24th – In Class Activity
Nov 26th – Assignment #3 Due
Nov 26th & 29th – Presentations
Dec 8th – Last Day of Class
Dec 10th-21st (Exact date TBA by Registrar) – Final Exam

Details on Student Accessibility

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 Services for Students with Disabilities (SSD) at 519-661-2111 (ext 82147) for any specific question regarding an accommodation.

Electronic Devices

As a courtesy to your fellow classmates, please switch mobile devices to silent mode before lectures begin. 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 tests, and exams.

Course Attendance

Course attendance is mandatory for Chem 4471. Information missed during unexcused absences will not be the grounds for academic appeal.

Course Description

This course will introduce mechanisms and applications of transition-metal catalysts. Fundamental background in structure and bonding of transition metals will lead into the properties of different ligand classes. Common reaction pathways will be covered, including their relationships to structural properties of the metal complex. Knowledge of individual reaction steps will provide the basis to understand and postulate catalytic cycles. Common catalytic transformations and applications will be discussed.

General Course Outline

Chemistry 4471 is composed of three main components, that are all related to transition metals: (1) Structure and Bonding; (2) Reactivity; and (3) Catalysis.

Course-Based Learning Outcomes

Upon completion of Chem 4471, students will be able to...

- Identify and explain different ligands and bonding types found in organometallic complexes that are relevant to catalysis.
- Sketch and label individual reaction steps that comprise well-known catalytic cycles.
- Justify observed catalytic performance based on known structure and bonding properties of the catalyst intermediates.

Prerequisite(s): Chemistry 3371

A Mandatory Notice from the Registrar: Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you will 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.

Course Materials:

- An incomplete version of the notes will be posted on OWL prior to class, attendance in class is required to fill in additional information.
- There is no required text for this course.
- Many general inorganic textbooks cover aspects of transition-metal chemistry, including:
 - *Inorganic Chemistry: Principles of Structure and Reactivity*, Huheey, Keiter, Keiter, Harper Collins.
 - *Inorganic Chemistry, 4th Ed.* Housecroft and Sharpe
 - *Inorganic Chemistry* Shriver and Atkins, Freeman.
- The notes will rely heavily on books specific to transition metals and catalysis, including
 - *The Organometallic Chemistry of the Transition Metals*, Crabtree, Wiley.
 - *Organotransition Metal Chemistry: From Bonding to Catalysis*, Hartwig, University Science Books.
 - These two are on reserve at Taylor Library.

Evaluation

Term Tests: (two at 15% each)	30%
Assignments: (three at 7% each)	21%
Presentation	7%
Participation	7%
Final Exam (Cumulative, date and time to be announced by Registrar)	35%

**Message from the Dean of Science and the Chair of Chemistry
Cheating and Plagiarism**

Students must write their essays and assignments in their own words! Whenever a student (or any scientist) takes an idea or 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.

For all tests and exams, it is the policy of the Department of Chemistry that any electronic devices, i.e., cell phones, tablets, cameras, or Apple Watch are strictly prohibited. These devices MUST be left either at home or with the student's bag/jacket at the front of the room and MUST NOT be at the test/exam desk or in the individual's pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam. The Department of Chemistry is not responsible for stolen/lost or broken devices.

Plagiarism and cheating is a serious academic offence and will not be tolerated. Any incidents in this regard will be reported immediately to the Department Chair for consideration of disciplinary action as noted in the Western Academic Calendar under "Scholastic Offences".

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

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 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.

Illness and Missing Course Requirements

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counseling Office of your home faculty as soon as possible. If you are a science student, the Academic Counseling Office of the Faculty of Science is located in NCB 280.

http://www.uwo.ca/sci/undergrad/academic_counselling/index.html

Students seeking academic accommodations based on medical (physical or mental) illness should begin by contacting the Academic Counsellors of their home faculty. Please visit the following link for policy on Accommodation for Illness:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf

If you miss the Final Exam, contact your faculty's Academic Counselling Office as soon as possible. They will assess your eligibility to write the Special Exam (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", see:

http://www.registrar.uwo.ca/examinations/exam_schedule.html

How this applies to Chem 4471A

It is the policy in Chem 4471A that if you have missed an assignment/test due date, it is your responsibility to contact Professor Blacquiere and the science counsellors' office within 48 hours AFTER the missed date or before the next lecture period where you are in attendance.

...and about the Chem 4471A late policy

Due dates/times for assignments will always be at the beginning of a lecture session. Late assignments will be deducted 10% per day.

Support Services

Learning-skills 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>.

Social Media

Twitter

For those who are interested, I encourage you to get involved in the Western Chemistry community by joining us on Twitter: @westernuchem, @WorkentinChem, @Lagugne, @GilroyGroup, @RagognaGroup, @CorriganLab, @jmbiacquiere, 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>