Chemistry 4471A – Course Outline

1. Course Information

Chemistry 4471A – Transition Metals and Catalysis (Fall 2022)

Lectures: M-W-F 11:30 am - 12:30 pm; ChB 115

Prerequisite(s): Chemistry 3371F

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: M 1:30-2:30 pm, 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

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.

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

Important Dates:

Sept 9th – First Day of Class
Sept 23th – Assignment #1 Due
Sept 30th – In Class Activity
Oct 5th – Test #1 (in class)
Oct 21nd – Assignment #2 Due
Oct 28th – In Class Activity
Oct 31st - Nov 4th – Reading Week
Nov 9th – Test #2 (In class)
Nov 23th – In Class Activity
Nov 25th – Assignment #3 Due
Nov 28th & 30th – Presentations
Dec 7th – Last Day of Class
Dec 10-22 (Exact date TBA by Registrar) – Final Exam

Contingency plan for an in-person class pivoting to 100% online learning
In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, 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.

4. 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.

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.

5. Methods of Evaluation

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%

Term Test Dates
Term test will occur *during normal class time (11:30 am - 12:20 pm) in the normal lecture location (ChB 115)* on the specified dates below.

Oct 5th – Test #1
Nov 9th – Test #2

Course Conditions:
To be eligible to pass Chemistry 4471A it is necessary to:

- Obtain a passing grade on the combined marks from the term tests and final examination.

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. Assignments, Presentations):
No documentation is required if an assignment will be late. Please contact Prof. Blacquiere to discuss flexibility on due dates if a reasonable reason to miss the deadline arises.

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 accommodation is warranted. No make-up term tests will be offered, the weight of the excused term test will be redistributed among the other term test and the final exam.

Options for mark redistribution:

a) Full weight of the missed test will be added to the final (therefore, 65% final exam)
b) The weight of the missed test will be redistributed to the other test and the final, so that the weights are 30% completed test and 55% final exam.

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

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.

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.

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,

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.

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.

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.

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: @westernuchem, @WorkentinChem, @Lagugne, @GilroyGroup, @RagognaGroup, @jmblacquiere, 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.