CHEMISTRY 414–SECTION 1 (weeks 1-6): Catalysis

People:

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*Note Dr. Crudden will be teaching the first 6 weeks, after which Dr. Evans will take over and teach the last 6 weeks concurrently with Chem 863.

Web Site: https://onq.queensu.ca/d2l/home/558122

Schedule: Three lectures per week, uploaded on line at the beginning of each week. The Tuesday slot will be used for office hours (optional) and the Thursday lecture slot will be used for guest lectures as noted below. Please plan to be there! For one guest lecture from the west coast, we will run this on October 8th from 3:30 to 4:30 pm.

Textbooks: Rather than have one required textbook, I will suggest several textbooks, reviews and scientific papers for reference material in the specific notes.

Marking (out of 50%):

Assignments	Total 25% each (due Sept. 17, Sept. 24, October 1st, and October 8)
Presentations	25% (October 18, 8:30–10:30 am and October 19, 9:30-11:30 am)

Note, participation marks will be added on top of the marks described above, to encourage students to participate in final presentations and with guest appearances. The value will be determined at the end of term but will not exceed 5%.

Assignments

Assignment 1: Case study of heterogenized catalyst (see information in week one lectures), provided in presentation form, up to 10 powerpoint or keynote slides. Can be done as an individual or groups of up to 3. Due September 17th (worth 5%).
Assignment 2: Case study of Jacobsen work on epoxide opening with water, provided in presentation form, 5 powerpoint or keynote slides. Details will be provided. Can be done as an individual or groups of up to 3. Due September 23rd (worth 5%).
Assignment 3: Individual assignment based on course material, due October 1st (worth 10%).
Assignment 4: Creation of Wikipedia page for a topic covered in class or something related due October 8th (worth 5%). Individual. Details will be provided.

Presentation

Time: 10 minutes long and 10 minutes for questions. Will be carried out in week 6.
Topic: Should be based on a publication within the last 5 years. Topics given out by Dr. Crudden or can be chosen independently (needs to be approved by Dr. Crudden). Topic submitted to Dr. Crudden by October 7th.
Format: Formal presentation in groups of 3. Presentations will be carried out in sequence first with volunteers and then presentation order will be chosen at random.

Marking (out of 100):

20% for participation – half for a critique of other student's presentations (these critiques will not be used to evaluate your colleagues but rather your ability to assess the presentations) and half for your own participation and asking questions.

40% content

20% knowledge of the subject/questions

20% delivery skills/presentation quality

Course Outline

Week One: Introduction, Catalysis/Catalytic terms, Assessing catalytic activity and heterogeneity, Intro to acid catalysis, Zeolites

Week Two: Lewis acid catalysis (Zimmerman–Traxler, Evans Aldol), Lewis base catalysis, Frustrated Lewis Pair catalysis

Week Three: Principles of Transition metals and basic reactions of TMs, Hydrogenation, biocatalysis

Week Four: Industrial Catalysis: Haber-Bosch process, Carbonylation (Oxo process, Cativa process), Polymerization.

Week Five: Cross–coupling reactions and Metathesis chemistry

Week Six: Group presentations

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Calculator Policy

No calculators are needed or allowed.

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