

UNIVERSITY OF
CALGARY FACULTY OF
SCIENCE DEPARTMENT
OF CHEMISTRY COURSE
SYLLABUS
Winter 2021**1. COURSE: CHEMISTRY 425, Industrial Chemistry**

LEC	DAYS	TIME	ROOM	INSTRUCTOR	EMAIL	OFFICE HOURS
L01	TR	13:00-14:15	WEB-BASED	Dr. Maryam Izadifard	maryam.izadifard@ucalgary.ca	Fridays: 3:00-4:00 pm

To avoid IT problems, it is recommended that the students use their U of C account for all course correspondence.

Please use "CHEM 425" in the Subject of your e-mail.

Desire2Learn (D2L) Site: <https://d2l.ucalgary.ca/d2l/home/358279>

Departmental Office: Room SA 229, Tel: (403) 220-5341, e-mail: chem.undergrad@ucalgary.ca

- 2. Course Description:** A cross section of industrially relevant chemicals and processes will be presented. These will be discussed from the perspective of precursors (availability, cost), their products and uses, efficiency (catalysis, scalability) and sustainability (environmental impact, geopolitical factors).

Analysis of industrial chemical processes based on reaction pathways to infer system performance including co-product formation and the role of catalysts. Examples from oil, gas, coal and petrochemical processing.

3. Recommended Textbook:

Jacob A. Moulijn, Michiel Makkee, Annelies E. van Diepen, Chemical Process Technology, 2nd Edition: Wiley.

Harold A. Wittcoff, Bryan G. Reuben, Jeffrey S. Plotkin. Industrial Organic Chemicals, third Edition: Wiley.

4. Topics Covered:

- 1) Introduction to the Chemical Industry (Inorganic & Organic chemicals)
- 2) General Considerations in the Design of an Industrial Chemical Process
- 3) Green Chemistry
- 4) Chemicals from natural gas and petroleum (Organic bulk chemicals)
 - o Processes in the Oil Refinery
 - o Products from Ethylene; Propylene; C4 & C5; benzene; xylenes; methane/alkanes; coal
 - o Production of Synthesis Gas & Synthetic Fuels Derived from Synthesis Gas
- 5) Inorganic Bulk Chemicals
 - o Production of sulfuric acid
 - o Production of ammonia
 - o Production of nitric acid
 - o Ammonium Nitrate and Ammonium Sulfate
 - o Production of Cl₂, NaOH (and H₂) from NaCl- Electrochemistry

6) Catalysis (homogeneous, heterogeneous)

- General Introduction – Activity / Selectivity / Stability

7) Polymer Chemistry:

- Production of Polyurethane; Epoxy resins, nylon

8) Selected Topics

- Reactor types and their industrial applications
- Corrosion and Corrosion Control
- Fouling and fouling control
- Biotechnology
- Photocatalysis
- Process chemistry

Department Approval: