UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
SPRING 2017

1. **Course:** Environmental Chemistry, CHEM 321.

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	EMAIL	OFFICE HOURS
L01	Tu/Th	12:00-14:45	ST 141	Dr. Izadifard	SA 246	izadifam@ucalgary.ca	Th 3:00-5:00 pm

Course website or Desire 2 Learn (D2L) course name: https://d2l.ucalgary.ca/d2l/home/184027

2. **Course Description:** A survey course of major aspects of environmental chemistry including the natural chemical cycles in the biosphere, geosphere, hydrosphere and atmosphere and the consequences of anthropogenic disturbances to these cycles. Topics discussed will include: Aquatic Chemistry and Water Pollution; Atmospheric Chemistry and Its Alteration; Soil Chemistry and the Fate of Pollutants; Toxicological Chemistry.

3. **Recommended Textbook(s):**

- "Fundamentals of Environmental and Toxicological Chemistry: Sustainable Science". Fourth Edition, by Stanley Manahan. CRC Press (2013)
- "Environmental Chemistry".4th or 5th Edition, by Colin Baird and Michael Cann, W. H. Freeman, NY.
- "Elements of Environmental Chemistry".2nd Edition, by Ronald Hites and Jonathan Raff. Wiley.
- "Environmental Chemistry: A global perspective". 3rd Edition, by G. W. vanLoon and S. J. Duffy. Oxford University Press

4. **Topics Covered:**

1. General Concepts:

A. Essential chemical concepts

- Fundamentals (atoms, elements, radicals; states of matter, elemental and chemical bonding, kinetics, gas law, chemical reactions, stoichiometry, units, mass balance)
- Organic chemistry

B. Biological and Ecological concepts

- Biological systems
- Ecological systems (Energy flow in ecosystem, food chain, bioconcentration, bioaccumulation, toxicology)
- Nutrient cycles (Global biogeochemical cycles)
- Limnological concepts and eutrophication

2. Toxicological Chemistry

- Fundamentals
- Survey of toxic compounds in the anthrosphere (metals, pesticides, dioxins, Furans and PCBs, Contaminants of Emerging Concern)

3. Aquatic Chemistry

- The chemistry of natural waters
- The pollution and purification of water (drinking water and municipal waste water)

4. Soil Chemistry

- Introduction to soil chemistry
- Environmental issues associated with soils

5. Atmospheric Chemistry

- Atmospheric & Stratospheric chemistry; Ozone layer hole
- Ground level air pollution; acid rain, aerosols, greenhouse gas effect

6. Energy

A. Energy and climate change

B. Energy and water pollution

C. Sustainable abundance or ecological crisis