EFFECTIVE: SEPTEMBER 2004

CURRICULUM GUIDELINES

A.	Division:	**Education**	Effective Date:		**September 2004**	
B.	Department / Program Area:	**Science and Technology Chemistry**	Revision	**X**	New Course	
			If Revisio			
			Date of Previous Revision:		**June 07, 2000**	
			Date of Current Revision:		**September 2004**	

C: CHEM 2303 **D: Environmental Chemistry** **E: 5**

Subject & Course No.	Descriptive Title	Semester Credits

F: Calendar Description:

This course begins with a brief introduction and overview of chemistry in the environment then covers a selection of the following topics: the chemistry of the stratosphere and troposphere and related environmental issues; the chemical and energetic basis for global warming and its impact on the environment; the chemical composition and behaviour of natural waters and the impact of acidic d

owed by an examination of toxic organic chem

M:

Course Objectives/Learning Outcomes

The student will be able to:

1. Describe the structure of the Earth's atmosphere and name its various regions.
2. Describe the general chemical composition and the trends in temperature of the various regions of the atmosphere..
3. Outline the composition and chemistry of the stratospheric ozone layer.
4. Outline the various non-catalytic and catalytic mechanisms for ozone destruction in the stratosphere.
5. Describe the physical chemistry that leads to "holes" in the stratospheric ozone layer.
6. Discuss the role of CFCs in ozone destruction and current issues/potential solutions surrounding this topic.
7. State the common units used to describe the concentration of atmospheric components and convert gas concentrations between these units.
8. Use appropriate terminology to qualitatively describe the origin, occurrence and environmental effects of photochemical smog and some common techniques to reduce ground-level photochemical smog.
9. With the aid of appropriate chemical equations, qualitatively describe the origin, occurrence and environmental effects of acid deposition.
10. Qualitatively describe the origin, occurrence and environmental effects of ground-level, atmospheric particle matter.
11. Use appropriate chemical equations and principles to describe the free radical chemistry which naturally takes place in the troposphere.
12. Use appropriate chemical equations and principles to describe the specific tropospheric chemistry associated with photochemical smog.
13. Use appropriate chemical equations and principles to describe the specific tropospheric chemistry associated with acidic deposition.
14. Qualitatively describe the various technologies currently being used or developed as solutions to ground-level air pollution.
15. Qualitatively describe the origin, occurrence and environmental effects of the major pollutants associated with indoor air pollution.
16. Qualitatively explain how the components of sunlight effect the rotation and vibration of molecules and how this leads to the "natural" greenhouse effect.
17.

34. Sketch a block diagram of a tertiary effluent treatment plant for a pulp and paper mill and describe the purification/separation process which occurs in each step.
35. Define the terms pesticide, insecticide and herbicide.
36. Draw the chemical structures and the corresponding names of some common organochlorine insecticides (and related compounds) such as DDT, DDE, HCB, chlorinated cyclopentadienes, etc.
37. Draw the chemical structures and the corresponding names of some other common insecticides

6. Drinking Water: Quality, Contaminants and Purification
   Specifications for drinking water, typical contaminants in drinking water, various strategies for purification of drinking water: chemistry and environmental impact.

7. Wastewater: Sources, Chemistry and Treatment
   Important sources and associated contaminants of wastewater, various strategies for treatment of wastewater: chemistry and environmental impact, sludges: composition and treatment.

8. Organic Chemistry Review
   A brief review of organic chemistry with emphasis on organic compounds with significant environmental impact.

9. Toxic Organic Chemicals in the Environment
   Pesticides and insecticides, organochlorine insecticides: chemistry and environmental impact, other important insecticides, herbicides and wood preservatives: chemistry and the dioxin/difuran, problem, polychlorinated biphenyls (PCBs): chemistry and environmental impact, toxicology of PCBs and

Q: Means of Assessment

The student's performance in the course will be based on the following evaluations:

1. Lecture Component (maximum 70%)
   - 1.1. Two or three classroom tests will be given during the semester (30%)
   - 1.2. A final exam covering the entire semester's work will be given during the final examination period (30%)
   - 1.3. Problem and research assignments will be graded and class participation, particularly during semester discussions and student presentations, will be assessed (10%)
2. Laboratory (minimum 20%)
   - 2.1. Written reports for each experiment will be graded. These reports will be either complete reports, prepared in a laboratory notebook, or shorter submissions on report sheets. In addition, some written quizzes based on the laboratory material will be evaluated (17%)
   - 2.2. Quantitative results of experiments performed on unknown samples will be graded (3%)
3. Term Project and Field Trips (10%)
   In consultation with the instructor, each student will choose a term project involving a chemistry related environmental issue. The project will involve literature research, collection and analysis of appropriate samples and preparation (and presentation) of a term paper. Guidelines and requirements for the term project will be distributed by the instructor.

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR

Course Designer(s)	Education Council / Curriculum Committee Representative
Dean / Director	Registrar