THE UNIVERSITY OF TEXAS AT DALLAS
Course Syllabus Spring 2016

Course Information

Course Number/Section	CHEM 4V01 (3 credits)
Course Title	Topics in Chemistry: Environmental Chemical Reactions
Days & Times	Tues & Thurs: 11:30 am – 12:45 pm, FN 2.104

Instructor Contact Information

Instructor:	Dr. Bernine Khan, Assistant Dean, NSM
Office Phone	972-883-6472 or 972-883-2416
Email Address	bik140030@utdallas.edu
Office Location	FN 3.308C
Office Hours	By appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions
One undergraduate course in general chemistry, organic chemistry, and physics, with a comfort of doing mathematical calculations.

Guest Speaker: *Sustainability*, U.S. Environmental Protection Agency.

Course Description
This course is a study of the sources, reactions, transport, and fate of chemical entities in the air, water, and soil environment, as well as, their effects on human health and the natural environment. The course is divided into 5 major parts that is relevant to today's most important Environmental issues: (I) Atmospheric Chemistry and Air Pollution; (II) Energy and Climate Change; (III) Water Chemistry and Water Pollution; (IV) Toxic Organic Compounds; and (V) Soils and Sediments, and Solid and Hazardous Waste Management. Students will be required to integrate information, solve problems, and engage in authentic inquiry through homework, in-class discussions, a group project, and examinations.

Student Learning Objectives/Outcomes
The goals of this course are:

- To provide an introduction to the chemistry of the environment—developing an understanding of the nature, reactivity, and chemical processes (in air and water) that influence our environment.
- To understand the issues related to energy demand and its impact on the environment.
- To predict ways to manage environmental pollution in the context of developing sustainable and technological solutions.
- Learn about societal implications of some environmental issues.
- To learn how business and government policies toward chemicals in the environment impact the Earth.
- To design and carry out field research.

Required Textbooks and Materials
Environmental Chemistry, 5th Edition, by Colin Baird and Michael Cann.

Suggested Reading Materials

- John H. Seinfeld and Spyros Pandis, Atmospheric Chemistry and Physics: From Air pollution to Climate Change, 2nd Edition, 2006, Wiley.
- Barbara J. Finlayson-Pitts and James N. Pitts, Jr., Chemistry of the Upper and Lower Atmosphere, 1999, Academic Press.
- Stanley E. Manahan, Env. Chemistry, 9th Ed, December 17, 2009 by CRC Press.
- John Houghton, Global Warming: The Complete Briefing, 4th Edition, 2009, Cambridge Univ. Press.
- Brezonik, P.L.; Arnold, W.A. Water Chemistry: An Introduction to the Chemistry of Natural and Engineered Systems, Oxford University Press. 2011.
- Water Quality and Treatment, 5th edition, R. Letterman, Editor, American Water Works Association, Denver, CO, 1999.
- The IPCC 4th Assessment Reports (in 3 volumes), available at http://www.ipcc.ch/. "*Summary for Policymakers*" (http://ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf).
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ACADEMIC CALENDER

Week	Day 1 (Tuesday)	Day 2 (Thursday)
1	Course intro/objectives/policies/schedule Ch.10 Chemistry of Natural Waters	Ch.10 Chemistry of Natural Waters
2	Ch.10 Chemistry of Natural Waters	Ch.10 Chemistry of Natural Waters
3	Ch.11 Pollution & Purification of Water	**Speaker: Sustainability (USEPA) (Jan 28)**
4	Ch.11 Pollution & Purification of Water	Ch.11 Pollution & Purification of Water
5	**EXAM I (Ch 10, 11) (Feb 16)**	Ch. 16 Wastes, Soils, & Sediments
6	Ch. 16 Wastes, Soils, & Sediments	Ch.1 Stratospheric Chem: The Oz Layer
7	Ch.1 Stratospheric Chem: The Oz Layer Ch.17 Advanced Atmospheric Chem.	Ch.2 The Ozone Holes
8	Ch.3 Chem. of Ground-Level Air Pollut. Ch.17 Photochemical Smog Chemistry	Ch.3 Chem. of Ground-Level Air Pollut.
9	**SPRING BREAK (Mar 15)**	**SPRING BREAK (Mar 17)**
10	Ch.3 Chem. of Ground-Level Air Pollut.	**EXAM II (Ch 1, 2, 3, 16, 17) (Mar 24)**
11	Ch.4 Env./Health Effects of Polluted Air	Ch.5 Greenhouse Effect
12	Ch.5 Greenhouse Effect	Ch.6 Energy Use, Fossil Fuel, CO_2 Emissions, Climate Change
13	Ch.7 Biofuels & Other Alternative Fuels	Ch.8 Renewable Energy Technologies
14	**EXAM III (Apr. 19) (Ch 4, 5, 6, 7, 8)**	Review Session
15	Student Presentations	Student Presentations
16	**FINAL EXAM (May) cumulative**	

Grading Policy

Homework Problems	10%
Group Project	40%
Exam I, II, III (drop lowest grade)	20%
Final exam (cumulative)	30%
	100%

Course Policies:

Homework Problems (10%): Homework problems will be assigned throughout the semester for you to take home and work through. **Doing these problems are mandatory**. Select homework problems will be collected and graded, without prior announcement. It is your responsibility to do all homework and have them ready for when the instructor chooses to collect them for grading. If you do not submit a homework when asked, you will receive a grade of zero for that homework.

Group Project (40%): Students will work in groups. Address a current environmental problem. Develop a brochure to educate the public on an environmental issue.

1. Define the problem in terms of its geographical location, population, and ecosystem.
2. Discuss in terms of the following:
    - Lifecycle of the chemicals (e.g: source, manufacture, storage, handling, transportation, distribution, disposal),
    - Impacts on environment due to mining, manufacture, use, disposal (human and/or ecological health impacts),
    - Discuss appropriate solutions/ technologies for clean-up of solid and/or liquid waste streams.

Deliverables:

- Brochure in color (due on the day of your presentation)
- Oral Presentation (30 minutes), includes question and answer from audience

Suggested Project Topics (air or water toxics)

- Pesticides
- Dioxins, Furans, and PCBs, PAH, Estrogens, Fire retardants, Plastics
- Toxic Heavy Metals (Hg, Pb, As, Cr, Cd), Bisphenol A (BPA)
- Cosmetics, Pharmaceuticals, Clothing
- Acid Rain
- You may suggest another topic of interest. All topics must have instructor approval.

The purpose of this exercise is to research an important topic in the field and share this formation with the class. Students will have an opportunity to practice their public speaking skills and develop their team building abilities. After each presentation, members of the audience will be expected to engage in discussion of the topic. Each presentation will be divided into 2 parts: part 1 will consist of the talk given by the presenter; part 2 will consist of questions for the presenter (from the other students and

faculty in the class) and discussion involving the entire class. Presenters should be prepared to answer logical, relevant questions related to their topic.

Exams (20%): **ALL 3 EXAMS MUST BE TAKEN**, at the scheduled time and on the scheduled day. ***There will be no makeup exams given***. The lowest of the 3 exam scores will be dropped. If you miss one of these exams, you will received a "zero" for the missed exam and it will automatically be the grade dropped as your lowest grade.

Final Exam (30%): **The final exam must be taken**, will be comprehensive, and cannot be replaced by any other grade, so do not miss it. ***No makeup final will be given***. ***NOTE THE DAY AND TIME OF THE FINAL.*** If you miss the final exam, you must have an ***acceptable, documented reason*** for missing this exam (e.g., documented illness, auto accident, participation in UTD-sponsored event, observance of religious holiday). Otherwise, you will receive a "zero" for the final exam and will be included in the calculation of your final class grade. You may arrive late for an exam ***up until the first student finishes and leaves*** (only penalty being that you will have proportionally less time to finish the exam). After this grace period, you will not be allowed to take the exam and will receive a score of "zero".

NOTE: For exams, you have up to ONE WEEK FROM THE TIME THE EXAM IS RETURNED to ask the instructor to reconsider your score (for reasons related to improper grading, addition, etc.). After 1 week, no grade adjustment will be considered.

Makeup Exam: There are **no make-up exams** (see above).

Extra Credit: There is **no extra credit**.

Class Attendance: ***Your attendance is CRITICAL for your ultimate performance in this class. DO NOT SKIP CLASS.***

Classroom Citizenship: The University of Texas System and UTD have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

UTD administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Series 50000, Board of Regents, The University of Texas System*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391) and online at:
http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-HOPV.html

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:
"As a Comet, I pledge honesty, integrity, and service in all that I do."

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.