Chaminade University of Honolulu, Spring 2015
CH 102 CHEMISTRY FOR THE CONCERNED WORLD CITIZEN
Syllabus

Instructor: Mr. William F. Bow
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Lecture section: 01
MWF 11:30-12:20 PM, Henry Hall 109
Office Hours: T, W, R 12:30 - 2:30 PM or by appt.

Required Text Book:

Chemistry in Context: Applying Chemistry to Society: A Project of the American Chemical Society, McGraw Hill, Sixth Edition, 2009.

Web Pages: https://www.edmodo.com (Group Code: j4x7be)
Announcements; lecture highlights; exam solutions

Course Objectives:

This is a one-semester course during which a number of environmental issues, familiar to most college students, are explored from a chemical perspective providing the students a conceptual background necessary for a full understanding of environmental and socio-economical implications of these issues. Discussions of ozone layer depletion followed by global warming / the greenhouse effect, will lead to a molecular approach to be adopted for the rest of the course. In the foregoing discussions students will be able to understand the molecular basis of all the processes. In the same context molecular changes, which accompany energy absorption, will be discussed. Environmental issues caused by acid rain will be a basis to investigate water at the molecular level as well as cellular and ecological levels. Concepts related to the chemistry of solutions will be introduced at this stage.

As the course progresses, larger molecules will be the topic of discussion. Synthetic polymers of small carbon compounds will shift the emphasis to industrial chemistry and consequently to industrial waste, which will allow us to go into the concept of biodegradability. At this juncture the course will take more of a biological flavor while retaining the molecular basis. Enzymatic reactions will be discussed, and the roles of enzymes will be compared to those of non-biological catalysts. General principles of enzyme inhibition will be explored with familiar specific examples such as HIV protease inhibitors, which will take the biological content of the course to its logical conclusion, namely drug design. Aspirin will be compared to Vioxx, a drug manufactured by Merck and recalled a few years ago due to some side effects. The students will have a chance to reevaluate their views on the pharmaceutical industry based on some specific examples given in the course, and others they will have researched themselves.

In sharp contrast to the studies of large molecules, the last four lectures of the semester will illustrate a change of "scale" and will be devoted to processes which take place at the nucleus of the atom. The large energy changes occurring in nuclear reactions allow such processes to be utilized in power plants as well as in warfare agents. The course is likely to convince the

students how molecules, large and small, have such a profound impact on eco-systems. With the increased awareness gained from the course, it is hoped that the students, in the short and long term, will work towards reducing the unfavorable aspects of this impact.

The specific learning outcomes expected from the course are listed below:

- Learn the chemical basis of environmental changes such as global warming / the greenhouse effect and ozone layer depletion
- Learn to quantify chemical substances using different parameter such as mass units, number of particles, and moles
- Understand chemical and physical basis of the role of water in maintaining temperate living conditions
- Learn to express acidity using various parameters
- Be aware of the consequences of acid rain
- Learn to identify polymers in terms of their monomeric units
- Distinguish between biodegradable and non-biodegradable compounds and recognize any possible ecological impact from them
- Understand how enzymes and other catalysts work
- Understand the general principles of enzyme inhibition and recognize how this concept can be utilized to fight diseases
- Understand the principles of nuclear decay
- Have a full grasp of the origin and various uses of nuclear power

Exams and Grading: Three 50-minute midterms, quizzes (no make-ups), homework assignments, class discussions, and a ninety minute comprehensive final.

Course Grades: The course grades will be based on the following weighted percentages and grading scale. Any changes will be announced in class.

Attendance/Homework/Participation	10%
Quizzes	15%
Midterm Exams	45% (15% each exam)
Final Exam	30%

GRADE	FINAL PERCENTAGE
A	90-100 %
B	75-89 %
C	60-74 %
D	40-59 %
Fail	below 40 %

This course is taught in accordance with Chaminade University's policies and mission statement. Core values addressed during the semester, such as diversity, peace, equality and social justice are blended into the course.

General policies adopted in this course are outlined in the Student Policy Manual.

Students are advised to review further divisional policies regarding the use of digital communication devices during class, as well as behavior which would cause distraction, such as (but not limited to) coming late to class and/or walking out of the room during class.

WEEK	DATE	CHAPTER	TOPICS
1	1/12		Syllabus and Course Introduction
	1/14	1	Matter (pure substances and mixtures); Atoms and molecules
	1/16	1	Chemical reactions and conservation of mass
2	1/19		**HOLIDAY**
	1/21	1	Oxygen, ozone, other components of the atmosphere
	1/23	2	Atomic structure, isotopes, molecular modeling
3	1/26	2	Ozone layer and CFC's
	1/28	3	Greenhouse effect
	1/30	3	Carbon cycle and climate change
4	2/2	4	Conservation of energy; Heat and temperature
	2/4	4	Reactions involving heat
	2/6	4	Fuel
5	2/9	5	Properties of water
	2/11	5	Water as a solvent; Solutions and concentrations
	2/13	5	Ionic and Covalent compounds; Drinking water
6	2/16		**HOLIDAY**
	2/18	1-4	**EXAM 1**
	2/20	6	Acids and bases
7	2/23	6	Understanding pH and neutralization
	2/25	6	Acid rain
	2/27	8	Reduction/Oxidation reactions
8	3/2	8	Electron transfer; Batteries and Fuel cells
	3/4	8	Biochemical electron transfer; Capturing the sun's energy
	3/6	9	Polymers (biological) Synthesis and Degradation
9	3/9	9	Polymers (synthetic) Production and Application
	3/11	10	Introduction to Organic Chemistry
	3/13	10	Survey of Natural Products and Homeopathic Remedies
10	3/16	10	Organic Synthesis
	3/18	5-9	**EXAM 2**
	3/20	10	Pharmaceutical drug design and synthesis
SPRING BREAK 3/23 – 3/27			
11	3/30	7	Nuclear Fission
	4/1	7	Radioactivity and nuclear waste; Environmental issues
	4/3		**HOLIDAY**

12	4/6	11	Nutrition
	4/8	11	Energy from food stuffs
	4/10	11	Understanding food labels and energy equivalents
13	4/13	12	Introduction to genetics
	4/15	12	DNA replication, transcription, and translation (protein synthesis)
	4/17	12	Genetic Engineering and Gene recognition and therapy
14	4/20		Relevant topics #1
	4/22	7, 10, 11, 12	**EXAM 3**
	4/24		Relevant topics #2
15	4/27		Relevant topics #3
	4/29		Relevant topics #4
	5/1		Relevant topics #5
16	5/6		**FINAL EXAM (11:00 AM - 1:00 PM)**