

CHEMISTRY 100

## CHEMISTRY AND SOCIETY

FALL 2006

**DAVID L. LANGHUS, PH.D.**

OFFICE: HALL OF SCIENCE ROOM 225

MORAVIAN COLLEGE

BETHLEHEM, PA 18018

Office phone: (610) 861-1434

e-mail: langhus@chem.moravian.edu

Web: <http://www.cs.moravian.edu/~langhus>

### RATIONALE

Like it or not, the way we live is influenced in large part by technology. The food we eat, the materials from which our belongings are made, the way we get from place to place and the myriad other features of ordinary life in the modern world are seldom any longer the result of simple physical engagement of natural objects or processes. Whether or not we consider this state of affairs desirable, the fact is that, along with this dependence upon technology, has come a whole new set of problems and issues that need to be addressed by society. Any decision relative to these issues, including simply ignoring them, comes with a cost in terms of dollars, health, life-style, or the like. In a relatively free society, with nobody empowered to unilaterally dictate these decisions to us, we are left with the choice of either letting what happens happen or becoming sufficiently informed regarding this technology to contribute positively to the decision-making process.

This course tackles the significant contribution of chemistry to this technological morass. Enough of the fundamentals of chemistry are explored, together with the quantitative basis for same, to be able to make sense of a handful of the major issues that result. In particular, we will address topics relative to the atmosphere, ozone depletion, global warming, energy production water and acid precipitation, and others, as time permits.

### OBJECTIVES

The goals of this course are as follows:

- To build a basic understanding of the science of chemistry as it is applied to problems facing society.
- To examine a few current issues in enough detail to enable the student to critically examine the claims of the major sides.
- To foster an understanding of the scientific method of inquiry.

### TEXT

The following text, ordered for this course, is available for sale in the College bookstore:

Eubanks, L.P. *et. al.*; *Chemistry in Context*, Fifth edition (McGraw Hill, 2006) ISBN 0-07-282835-8

A laboratory component is scheduled for this course but the lab manual ordinarily accompanying this text will not be used.

Reading assignments from the textbook will be made on a regular basis for the student to do outside of class. While the volume of reading is not particularly great it is important that the material covered be understood well enough to succeed on examinations. Available class time does not permit the luxury of “lecturing from the book”.

## **CLASS WORK**

Class time will be devoted to group-centered activities primarily addressing technical procedures needed to make sense of the textbook. These activities are designed to encourage the student to build the ability to solve simple chemistry problems with the help of small-group interaction.

Active participation on the part of each student is essential to the success of this approach to learning. The contribution of each student has value in the learning process, even though it may not necessarily express “the right answer”. Students who withhold their participation are not only refusing to learn themselves, but are also hindering the learning of others. There is therefore a contribution to the overall course average for class participation which will be reduced if in the instructor’s judgment a student clearly avoids participating on a regular basis.

## **QUIZZES**

A short quiz will typically be administered at the beginning of the class period. The purpose of these quizzes is primarily to encourage students to actually do the work assigned prior to and during class. They also potentially serve as an indication to the instructor regarding the degree of student understanding without invoking the major contribution to the course average incurred by an examination.

## **HOMEWORK PROBLEMS**

At the discretion of the instructor problems may be assigned for the student to solve outside of class. Each student is expected to do his or her own work on these problems and to turn them in on or before the due date indicated except in the case of an excused absence on that day. Students are expected to offer in their solutions an organized, legible and sufficiently complete record of their progress to the final result that partial credit may be unambiguously awarded where appropriate (“show your work!”).

## **EXAMINATIONS**

All exams in this course will be open-book. The student may use a pocket calculator and may consult the textbook, his or her own notes, or other references brought to the exam but may not communicate with other students or use apparatus or materials brought by anybody else.

Examinations are scheduled to be given on the following dates:

First exam	Friday, September 29
Second exam	Friday, October 27
Third exam	Monday, November 20

## **CLASS ATTENDANCE**

A formal record of class attendance will not be kept, although it would be well to note that it is impossible for a student who misses class to contribute to class activity.

Attendance at examinations is mandatory. If the student finds him- or herself, for reasons of illness or other significant inconvenience, unable to appear for an exam, he or she should notify the Dean of Student's office which will circulate a memo to the instructors involved attesting to these circumstances. Only upon receipt of this memo will a makeup exam be administered. Note that, since it is clearly unfair to the bulk of the class if a makeup is easier than its regular counterpart, and since it is impossible to prepare different examinations of exactly equal difficulty, makeup exams will appear slightly more rigorous than corresponding scheduled examinations. If the student knows in advance that he or she will be unable to appear for an exam as scheduled, it may be advantageous to arrange with the instructor to take it ahead of time.

There will be no makeups of missed quizzes. If a student's absence from class is approved in the manner indicated above, the missed quiz will simply not be counted in the average. Otherwise the score of zero will be assigned that quiz.

## **LABORATORY**

Laboratory periods are scheduled once a week beginning at 12:45 PM. The purpose of these exercises is to offer the student a more concrete experience with some of the concepts treated by the textbook or in class. The student will have an opportunity to make various types of measurements on real chemical systems and form appropriate conclusions, just as might be done by the practicing scientist. Among other things, this should foster an understanding of some of the limitations inherent in experimental methods. There will also be opportunities to observe reactions and materials that might involve excessive hazard if done in an uncontrolled manner outside the lab.

Students will work in groups of three or four, assigned at the laboratory instructor's discretion. There is no laboratory manual for this course. Materials outlining the exercise to be performed on a given day will be provided in the lab and typically will not involve prior preparation.

Students who miss a laboratory will be expected to make up the work while another laboratory is in session. Make arrangements with your instructor to complete missed experiments as quickly as possible. If arrangement to make up work is not made within one week of the student's return, a grade of zero will be awarded for that exercise.

A laboratory report form will be provided for each exercise which is to be completed by the group's recorder. All experimental observations are to be recorded on this laboratory report form, or on a fresh sheet of paper, as the recorder prefers, in such a way that the result is legible. If a separate data sheet is used, it is to be submitted along with the properly completed report form provided. Extra report forms will be available if another is needed for some reason. The recorder is responsible for submitting this report for grading on behalf of the group.

The group laboratory report will be scored on the basis of an integer scale from 0 to 10. Under normal circumstances each student will receive the score awarded his or her group's report. In cases where a student refuses to engage the exercise as a member of the group that

student's score may be modified at the discretion of the laboratory instructor. Note in particular that you can't possibly contribute to the work of the group if you aren't there when the work's being done. Expect that arriving late for lab or leaving for any reason while the work is in progress will be rewarded appropriately

Laboratory reports are to be turned in on the day the experiment is completed.

## LABORATORY SAFETY

Each student is expected to conduct him- or herself in an intelligent and orderly manner at all times in the laboratory. Disregard for sensible safety measures constitutes grounds for dismissal from lab. In particular, the following points are to be observed:

- Students will perform only those experiments assigned or otherwise bearing the prior approval of the lab instructor. If you want to try something wild, ask the instructor. He's a chemist and has had his share of fun over the years. The only concern is that what you do must not represent an unreasonable hazard to yourself or others.
- Eye protection which provides protection from all directions is to be worn in the laboratory at all times.
- Footwear must be affixed sufficiently securely that the entire bottom of the foot is protected from the floor at all times. No bare or stocking feet or flip-flops.
- Eating, drinking, smoking and other operations involving contact with the face are prohibited in the lab at all times. If necessary, these activities must be pursued outside the lab. No lab apparatus is to be used in connection therewith.
- The rubber bulb or other mechanical device provided is to be used at all times for drawing solution into pipets. No pipetting by mouth.
- No gummed labels of the sort requiring moistening are to be used in the lab. If you wish to mark glassware, a permanent marker after the fashion of Sanford's Impact or Sharpie will do nicely, provided that the surface is initially dry. The mark may be removed with acetone or other organic solvent.
- Each student is responsible for the cleanliness of his or her area, including the sink adjacent thereto. No solids are to be discarded into the sink. Use the trash container at the door for paper and soft plastic, and the special box provided for broken glass, hard plastic and other sharps.

## GRADING

The following component weights will apply:

Class participation	10%
Quizzes	10%
Homework problems	10%
Laboratory	20%
Class exams	30%
Final exam	20%

The overall score will be computed by normalizing the average obtained in each of the categories above to its respective weight and summing the weighted averages to give a maximum score of 100. Grades will be assigned according to the following:

100–92	A	81–80	B–	69–67	D+
91–90	A–	79–77	C+	66–62	D
89–87	B+	76–72	C	61–60	D–
86–82	B	71–70	C–	59–0	F

All submissions to be considered in computation of the final grade, with the single exception of the final examination, are to be turned in on or before Monday, 11 December, 2006.