

## Chemistry and Society

CHEMISTRY 100

FALL, 2010

email: martin@moravian.edu

Home Phone: 610 - 837-7294

(please not after 9 PM)

Dr. A. H. Martin

Office: HOSCI 224

Office Hours: M W F 9:00 - 10:00

or by arrangement

Office Phone: 610 - 861-1433

## LECTURE TEXT

L. Eubanks, C. Middlecamp, N. Pienta, C. Heltzel, & S. Keller, *Chemistry In Context*, 6<sup>th</sup> Edition, McGraw Hill, New York, 2009.

## Online Learning Center

[http://highered.mcgraw-hill.com/sites/0073048763/student\\_view0/index.html](http://highered.mcgraw-hill.com/sites/0073048763/student_view0/index.html) This web-site contains activities and additional material to aid the student in the study of this course.

## Course Blackboard Site

Chem100.F10 Chemistry and Society

Code: Martin

## COURSE DESCRIPTION

This course provides an introduction of the science of chemistry for the nonscience-oriented student. Chemical topics are introduced as related to some of the problems related to society today. These issues will be examined in enough detail to enable the students to critically examine these issues from a number of different viewpoints. The students will also be aided in fostering an understanding of the scientific method of inquiry.

The course is divided into three major blocks. The first (covering Chapters 1 - 3) deals with our atmosphere and the air we breathe. The second block (covering Chapters 9 - 12) concerns materials and substances that influence our daily lives (drugs, plastics, foods, genetic engineering). The third block (covering Chapters 4, 7, and 8) looks at current and future energy sources.

## COURSE EXPECTATIONS

Students completing this course will be expected to have an understanding of but not limited to the following

- how science and scientists function
- how to analyze and evaluate the reliability of scientific data
- the basic chemical nature of matter
- ability to do basic chemical calculations
- organic molecules and the basic organic functional groups and asymmetry
- the make-up of biologically active molecules including sugars, fats, proteins & DNA
- nature of polymers

- the nature of drugs and drug testing
- the current forms of energy
- basic nuclear chemistry
- modern methods of energy production
- basic electrochemistry and battery operation
- air pollution
- the depletion of the ozone layer
- global warming

### ATTENDANCE

A student is required to attend all regular class and laboratory meetings. If a class is missed, it is the responsibility of the student to obtain the given material on his own time. If an exam is missed, for a **VALID REASON ACCOMPANIED BY A WRITTEN EXCUSE ONLY**, the student should arrange a make-up time with the instructor as soon as possible after the exam. Missed laboratories or class activity sessions **CANNOT** be made up. Thus, students are encouraged not to schedule conflicts that result in their missing a laboratory. Missing a significant number of laboratories or class activities, for any reason, could result in a lowering of the students course grade.

### COURSE GRADE

Hour Exams (2) .....	30%
Laboratory .....	25%
Energy Presentation .....	15%
Group Class Activities .....	5%
Homework .....	5%
Final Examination .....	20%

Your minimum letter grade will be determined as follows, where the % represents your final average calculated as described above.

A	93% and up	C	73 to 76%
A-	90 to 92%	C-	70 to 72%
B+	87 to 89%	D+	67 to 69%
B	83 to 86%	D	63 to 66%
B-	80 to 82%	D-	60 to 62%
C+	77 to 79%	F	Below 60%

### LECTURE-DISCUSSION CLASSES

The lecture-discussion periods, **T Th 1:10 to 2:20 PM**, HOSCI 202 (Mellon) are the time during which the course material will be introduced and discussed. Attendance at all of these classes is required as absence generally results in a poorer than expected showing on the work in the course. Hence, **ATTENDANCE WILL BE TAKEN AT ALL CLASSES**. Students who consistently miss class are subject to possible lowering of their grade from the scale above.

## GROUP CLASS ACTIVITIES

Approximately five chemical concepts will be introduced using group class activities conducted during the lecture-discussion classes. The group responses to these activities will be graded in a similar fashion to the laboratory reports (see later in this syllabus). All members of the group present for the activity will receive the same grade. Any missed group activities will be assigned a grade of zero. There will be no make-up of group class activities.

## GRADED HOMEWORK

Since chemistry is best learned by keeping up with the material covered, rather than in large chunks just before the exam, a daily homework assignment will be given at the end of most class periods. These assignments will be due at the next lecture-discussion period. These assignments will usually be collected on and the grade from these assignments will constitute the homework portion of the grade. **NOTE: TO GET CREDIT FOR A COLLECTED HOMEWORK ASSIGNMENT THE STUDENT MUST BE PRESENT AT THE CLASS DURING WHICH THE ASSIGNMENT WAS COLLECTED. NO LATE ASSIGNMENTS WILL BE ACCEPTED. ALL ASSIGNMENTS NOT TURNED IN WILL BE ASSIGNED A GRADE OF ZERO, UNLESS AN EXCUSE FOR ABSENCE FROM THE CLASS IS PROVIDED.** Homework assignments will be given out in the class the period before they are due either by PowerPoint slide or by a class handout. If you are absent from that class, you need to contact another classmate in this section to obtain the assignment. The instructor will not provide copies of the assignment after the class in which it is distributed. The solutions to these graded homework assignments will be posted on the course documents section of the course's Blackboard page, usually shortly after the class in which they are due.

## NONGRADED HOMEWORK

For each chapter there are a number of assigned problems listed on the last page of this syllabus. You should work these problems in order to get a better understanding of the material covered in this course. The text answers to these problems (as well as all of the end of the chapter problems) will be posted on the Blackboard page for the course. These are in .pdf format and readable with Adobe Reader.

## EXAMINATIONS

There will be two hourly examinations given in this course. These will be at the end of each of the first two topical units. The dates for these exams are **Thursday, September 30 (Chapters 1 - 3)** and **Thursday, November 4 (Chapters 9 - 12)**. You should mark these dates on your calendar to aid in avoiding conflicts with examinations in other courses. The specific material to be covered on each exam will be announced by the instructor prior to the exam. At least part the Tuesday's class before each exam will be used as a review session for the exam.

## FINAL EXAMINATION

A final examination will be given on **Friday, December 17, 2010 at 8:30 AM in HOSCI 202**. The material on this exam will be primarily that from the last block of topics discussed (Chapters 4, 7 and 8 plus the energy talks) There will also be some questions dealing with the major themes of the first two blocks of material.

## ENERGY PRESENTATIONS

Early in the semester, the class will be divided into three or four member research teams. Each research team will be assigned a topic dealing an emerging alternative energy technology. Each team will be required to produce a 20 minute ( $\pm 2$  minutes) presentation on the topic. These presentations are encourage to be multimedia in nature. The energy presentations are scheduled to be given **Tuesday, November 30** and **Thursday, December 2**. A more specific assignment on this aspect of the course will be distributed later in the semester.

## TENTATIVE CLASS SCHEDULE

Below is a very tentative list of the topics to be discussed during each class meeting. The only dates that will not vary are the dates of the examinations and the dates of the energy presentations.

Day	Date	Topic	Text. Ref
Tues.	Aug. 31	Introduction, The Atmosphere	Chapter 1
Thurs.	Sept. 2	Classification of Matter	Chapter 1
Tues.	Sept. 7	Periodic Table, Risk Analysis, Air Pollution	Chapters 1
Thurs.	Sept. 9	Ozone Layer Electromagnetic Radiation	Chapters 2
Tues.	Sept. 14	Atomic Make Up	Chapter 2
Thurs.	Sept. 16	The Ozone Crisis	Chapter 2
Tues.	Sept. 21	Moles and Molecules	Chapter 3
Thurs.	Sept. 23	Global Warming	Chapter 3
Tues.	Sept. 28	Review Problem Session	Chapts. 1 - 3
Thurs.	Sept. 30	<b>Exam 1</b>	-----
Tues.	Oct. 5	Drugs	Chapter 10
Thurs.	Oct. 7	Drugs	Chapter 10
Tues.	Oct. 12	<b>No Class - Fall Break</b>	-----
Thurs.	Oct. 14	Chemical Make-Up of Polymers	Chapter 9

Day	Date	Topic	Text. Ref
Tues.	Oct. 19	Plastics	Chapter 9
Thurs.	Oct. 21	Foods & Nutrition	Chapter 11
Tues.	Oct. 26	Foods and Nutrition	Chapter 11
Thurs.	Oct. 28	DNA & Genetic Code	Chapter 12
Tues.	Nov. 2	Review Problem Session	Chapts. 9 - 12
Thurs.	Nov. 4	<b>Exam 2</b>	-----
Tues.	Nov. 9	Energy & Fossil Fuels	Chapter 4
Thurs.	Nov. 11	Transformation of Energy	Chapter 4
Tues.	Nov. 16	Nuclear Chemistry	Chapter 7
Thurs.	Nov. 18	Nuclear Energy	Chapter 7
Tues.	Nov. 23	Oxidation-reduction, Batteries, Solar Cells, Fuel Cells	Chapter 8
Thurs.	Nov. 25	<b>No Class – Thanksgiving Break</b>	-----
		Thanksgiving Break	
Tues.	Nov. 30	Energy Group Presentations	-----
Thur.	Dec. 2	Energy Group Presentations	-----
Tues.	Dec. 7	Hydrogen Economy, Review Problem Session	Chapter 8

The final exam will be given on **Friday, Dec. 17, 2010 at 8:30 PM in HOSCI 202.**

## LABORATORY SYLLABUS

### OBJECTIVES

The objectives of the laboratory experience in the *Chemistry and Society* course are

- To expose the student to hands on experience working with real chemical systems.
- To show the student how to draw concrete conclusions from collected scientific data.
- To foster in the students an indication of the limitations present in scientific experimentation.

### GENERAL EXPECTATIONS

Laboratory work in this course will be done in a group fashion, with all members of the group receiving the same grade. Exceptions to this policy will be for cases where a student is late for lab, or does not actively participate in the group laboratory activities.

**No make up laboratories will be held. A student missing a laboratory will be assigned a grade of zero for that experiment, unless a valid excuse is presented to the instructor.**

All experimental observations are to be recorded on the laboratory report form provided, in such a way that the result is legible.

**Although an effort has been made to avoid the use of dangerous chemicals in this laboratory program, students are expected to follow normal laboratory safety procedures. In that regard, students are required to wear safety glasses while doing the laboratory work. In addition, students are required to wear substantial shoes, NOT sandals or flip-flops, to work in the laboratory. Failure to follow the above procedures could result in the student being asked to leave the laboratory, with a zero being assigned for that day's laboratory work. See further rules later in this syllabus.**

### LABORATORY REPORTS

A laboratory report form will accompany the lab handout for a given exercise. This form must be used. Reports submitted on media other than this form will not be accepted for evaluation. Each laboratory group is to turn in a legible copy of the laboratory report.

Laboratory reports which have been completed properly and in which the group demonstrates a reasonable grasp of the content and significance of the experiment will be deemed satisfactory and receive the grade of S (85%). Reports that are acceptable but contain deficiencies will receive the grade of S- (75%). Those demonstrating superior effort and understanding will be awarded the grade of S+ (95%), and those, which are unusually outstanding, will receive the grade O (100%). The grade of U (60 %) is assigned reports that are not acceptable. Such a report might be submitted by a group who has gone through the motions

of performing an experiment, but fails to present a reasonable analysis of the data obtained or to demonstrate an understanding of its significance. No credit is awarded reports that are not submitted at all.

### TENTATIVE LABORATORY SCHEDULE

Lab #	Date	Experiment
1	8/31	Chemical ID
2	9/7	Periodic Table
3	9/14	Molecular Modeling 1
4	9/21	Conversion of $\text{NaHCO}_3$ to $\text{NaCl}$
5	9/28	Small Scale Greenhouse Gas Emissions
6	10/5	Preparation of Aspirin
7	10/12	No Lab – Fall Break
8	10/19	Molecular Models II
9	10/26	TLC Analysis of OTC Drugs
10	11/2	Polymers
11	11/9	Sugar in Cereal
12	11/16	Analysis of Meals
13	11/23	Fuel Combustion
14	11/30	Food Combustion
15	12/7	To be announced

### LABORATORY SAFETY

Each student is expected to conduct himself/herself in an intelligent and orderly manner at all times while in the laboratory. Disregard for sensible safety measures will result in dismissal from the laboratory. In particular, the following points are to be observed.

- Students will perform only those experiments assigned or otherwise bearing the prior approval of the laboratory instructor.
- **Students will be provided with safety glasses by the instructor. Eye protection is to be worn over the eyes *at all times* when working in the laboratory. The use of contact lenses in the laboratory, even with safety glasses, is very hazardous and is discouraged.**
- **Eating, drinking and smoking are prohibited in the laboratory at all times.** If necessary, these activities must be pursued outside the laboratory. No laboratory apparatus or glassware is ever to be used in connection therewith. **At no time shall any food or drink be brought into the laboratory.**

- Students should confine long hair.
- **Students should wear shoes that completely covers the foot (i.e. not flip-flops, crocs, or sandals).**
- Each student is responsible for the cleanliness of his own area, including the adjacent sink. No solids are to be discarded into the sink. Use the trashcan by the door. Any hazardous materials, as identified in the lab handout or by the lab instructor, are to be disposed of in the special receptacles provided.
- If somebody near you is doing something dangerous or in a careless fashion, bring it to his attention gently. If the behavior persists, inform the instructor. This may make you unpopular, but will reduce your chance of injury due to somebody else's negligence.

### Assigned Textbook Problems

#### Assigned Textbook Problems

Some examination questions may be similar to these end of the chapter problems. The textbook's solutions to these problems will be posted in the Assigned Problems folder on Blackboard.

#### Exam 1

##### **Chapter 1 Questions:**

Emphasizing Essentials: 5, 9, 10, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 26, 27

Concentrating on Concepts: 30, 31, 34, 36, 37, 38, 39, 41

Exploring Extensions: 57, 60

##### **Chapter 2 Questions**

Emphasizing essentials: 2, 3, 4, 7, 9, 13, 14, 19, 20, 21, 22, 23, 25, 26, 27, 29

Concentrating on Concepts: 31, 34, 35, 36, 40, 41, 42, 43, 46, 47, 48, 50

Exploring Extension: 53, 56, 57, 58

##### **Chapter 3 Questions**

Emphasizing Essentials: 4, 12, 13, 14, 18, 19, 20, 22, 24, 26, 29

Concentrating on Concepts: 31, 33, 35, 37, 38, 39, 40, 41, 42, 43, 45, 47, 49, 50

Exploring Extensions: 55, 58

#### Exam 2

##### **Chapter 10 Questions**

Emphasizing Essentials: 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 16, 20, 22, 23, 24, 25, 26

Concentrating on Concepts: 29, 31, 33, 35, 36, 37, 39

Exploring Extensions: 46, 50

**Chapter 9 Questions:**

Emphasizing Essentials: 1, 2, 3, 4, 5, 8, 10, 11, 12, 13, 16, 17, 18, 22, 23

Concentrating on Concepts: 28, 29, 30, 31, 32, 33, 38, 40, 46, 47

Exploring Extensions: 48, 55, 57

**Chapter 11 Questions**

Emphasizing Essentials: 1, 3, 5, 6, 8, 9, 11, 12, 13, 15, 17, 18, 19, 20, 21, 23, 24, 25, 29,  
30

Concentrating on Concepts: 33, 34, 36, 37, 39, 40, 41, 43, 44, 47, 48, 49

Exploring Extensions: 51, 55

**Chapter 12 Questions**

Emphasizing Essentials: 1, 3, 4, 6, 7, 10, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26

Concentrating on Concepts: 27, 29, 31, 33, 36, 42, 43

Exploring Extensions: 47, 48, 49

**Final Exam**

**Chapter 4 Questions**

Emphasizing Essentials: 1, 5, 6, 7, 8, 10, 14, 17, 18, 19, 20, 21, 22, 23

Concentrating on Concepts: 24, 26, 27, 30, 32, 33, 34, 35, 37, 38, 39, 40, 42

Exploring Extensions: 45, 48, 52, 53, 54, 56, 57

**Chapter 7 Questions:**

Emphasizing Essentials: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22

Concentrating on Concepts: 24, 26, 27, 28, 29, 30, 31, 33, 34, 37, 38, 41, 42, 43

Exploring Extensions: 44, 50

**Chapter 8 Questions**

Emphasizing Essentials: 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16, 17, 20, 21, 23, 26, 27

Concentrating on Concepts: 29, 31, 32, 33, 34, 38, 40, 41, 44, 45, 46, 48, 51

Exploring Extensions: none