

## Syllabus: CHEM-1120 GENERAL CHEMISTRY II

Spring Semester 2009

### Instructor

Dr. Mark D. McClain, Professor of Chemistry and Associate Dean, Lifelong Learning and International Programs

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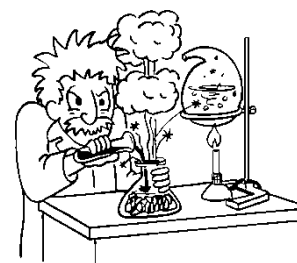
### Office Hours:

Collins 12—11 AM TR, 1 PM MWR or by appointment through Linda Chrystal

### Course Time and Locations

Lecture MWF 11 AM ENS 210

Laboratory MTW or R 2 PM ENS 227



### Course Description

A continuation of CHEM-1110 *General Chemistry I* including the physical chemistry concepts of kinetics and equilibrium. Inorganic topics include acids and bases, oxidations-reduction reactions, nuclear chemistry, and the descriptive chemistry of the main group and transition elements. Lab exercises stress quantitative analytical techniques and include application of visible light spectroscopy. Lab reports require use of spreadsheets or other computer software and statistical analysis of data. Three lectures and one three-hour lab per week. *Prerequisite: CHEM-1110 General Chemistry I* **4 semester hours**

### Learning Outcomes

This course is the second part of a broad introduction to university chemistry designed to achieve Science & Mathematics Department objectives to train students for teaching, medical, environmental, agricultural, science, and science-related professions.

- Objective 1 (*Cognitive, Factual*) Learners will recall chemical terms, concepts, and classifications for kinetics, equilibrium, acids and bases, oxidations-reduction reactions, nuclear chemistry, and descriptive chemistry of the main group and transition elements.
- Objective 2 (*Cognitive, Conceptual*) Learners will describe various types of matter (solids, liquids, solutions) and chemical reactions (acid base, precipitation, and oxidation-reduction) from atomic perspective.
- Objective 3 (*Cognitive, Conceptual*) Learners will evaluate whether equilibrium has been established for a chemical reaction and determine what changes will occur if equilibrium is disturbed.
- Objective 4 (*Cognitive, Procedural*) Learners will interpret and analyze word problems to solve chemical calculations using relevant concepts, data, and methods.
- Objective 5 (*Cognitive, Procedural*) Learners will collect and interpret gravimetric, volumetric, and spectroscopic chemical data to formulate conclusions expressed with clarity and precision.
- Objective 6 (*Cognitive, Procedural*) Learners will effectively communicate chemical concepts in scientific writing.

Specific Learning Goals for each chapter are articulated on the prepared Detailed Class Schedules.

Teacher Education Program Unit and Program Assessments assigned to this course:

Unit Outcome	Program Outcome	Decision Points	Assessment
Competence	NSTA Std 1a.	4	#1 Content Knowledge
Competence	NSTA Std 1a.	1, 2, 3, 4	#2 Content Knowledge

## Information via CedarNet

I will heavily rely on CedarNet to provide or distribute information. Check your email often for late breaking news. I will assume you look every day. Detailed Class Schedules, Chapter Keys, Study Questions, lecture slides, and grade information are always available on [WebCT](#).

## Required Textbooks

- *Chemistry & Chemical Reactivity*, 7th ed. by Kotz, Treichel, and Townsend; ISBN-13: 978-0-495-38703-9
- *Student Solutions Manual for Chemistry & Chemical Reactivity*, 7th ed., by Alton Banks; ISBN-13: 978-0-495-38707-7
- *CHEM-1120 Lab Booklet*, from Chemical Education Resources

## Other Learning Tools

- Calculator with logarithms and scientific notation—*required for exams*
- *Detailed Class Schedule*, by Dr. McClain—*required (WebCT)*
- *A Study Guide* by Moran and Townsend, ISBN-13: 978-0-495-38708-4 —*strongly recommended*
- *Chapter Study Questions*, by Dr. McClain—*strongly recommended (WebCT)*
- *Preparing for Your ACS Examination in General Chemistry: The Official Guide*, by Lucy and Dwaine Eubanks—*strongly recommended* (available in the Science & Math Department Office and on reserve in the library)

## STUDENT RESPONSIBILITIES

### Lecture Attendance and Attention

You are expected to be in class when humanly possible. Attendance will be monitored and occasionally attendance or reading quizzes will be administered. Excessive absence will most likely adversely affect your learning and as a result, your grade. When class has begun, please give me your respectful attention; save private conversations until after class and use your laptop only for taking notes. Unless you obtain permission in advance, you may not make audio or video recordings of your instructor. All cell phones should be turned off and may not be used during class.

### Preparation for Class

The Detailed Class Schedule will list the required reading for each lecture. To be prepared for class, you must read the textbook assignment before coming to lecture. All of the material will not be covered in lecture; I will explain difficult concepts or expand upon some areas, while neglecting others altogether. Students are responsible to demonstrate mastery of the learning goals, which may include concepts covered in the text, lectures, and any other assigned work. You will probably need to read the textbook a few times to completely grasp all of the good stuff. Please bring your unanswered questions to class or office hours.

### Homework

Assigned homework problems will be listed on the Detailed Class Schedule. Homework will *not* be collected. Students are expected to do all of the assigned problems and as many of the others as necessary for content mastery. Do not spend too much time on one problem—get help! Try to complete the problems *without* consulting the chapter (unless data is needed from a table) because you will not be working the quizzes or exams with your book open! If you must refer back to the text, work through several more similar problems. You should plan to spend at least 6 hours a week completing homework and studying for class.

### Mathematical & Computational Skills

Since General Chemistry is a quantitative science utilizing many formulas, students must have mastery of algebraic manipulation and exponential notation, as well as the use of the quadratic equation and logarithms. Please consult Appendix A of the textbook for a refresher of these concepts. We will also work with graphing using Excel several times for laboratory exercises. A detailed list of the equations and memory list items from the prerequisite CHEM-1110 General Chemistry I is available on WebCT

### Study Groups & Tutoring

Students are heartily encouraged to form study groups for assistance, accountability, and encouragement. Groups should meet face-to-face or use whatever online format works best (e.g. facebook group or WebCT Blackboard chat). The Student Government Association also provides group tutoring for General Chemistry; session and contact information will be given in class. A list of private tutors is available upon request.

### Long-term Retention

Chemistry is necessarily a demanding hierarchical discipline: skills and knowledge must be gained on-time and maintained over time to master chemistry. You cannot cram for this course and retain your “learning.” To assist student learning, lectures and assessments are designed with intentional review. The nationally-normed American Chemical Society General Chemistry Exam will be given at the end of the course to assess long-term retention of chemistry knowledge. A Study Guide for the ACS exam will be sold at cost (\$13) in the Science & Math Department Office (ENS 230) to interested students. The wise student will lay down a firm chemical foundation through intentional review of the concepts this semester.

### Getting Help

Students are expected to diligently labor to please the Lord in General Chemistry, investing their precious time and energies to develop their God-given gifts and abilities. While consistently working hard may not always result in a desired grade, it is your best shot at attaining sufficient course knowledge and skills to achieve your full potential. The instructor will help you in this process as much as he is able, but you must do your part, including seeking help as needed.

## LEARNING ASSESSMENT

### Quizzes

Reading quizzes (<5 minutes, 5pts) will be administered on an occasional, unannounced basis to assess preparation for class. Quizzes will begin promptly—do not be late to class! *The lowest reading quiz grade will be dropped.* There are no make-ups for reading quizzes, but students may be excused from a quiz according to class policy. Do not leave class after a reading quiz without permission or your quiz will be voided.

### Exams

Exams (50 minutes, 100 pts) will require you to demonstrate mastery of the learning goals. Each exam may include one question that is deliberately designed to be a review of earlier material from this semester. *The lowest exam grade will be dropped, except for the ACS final exam.* You must bring a calculator for your own personal use—you may not share.

1-26-09	Exam #1 (chapters 12- 14)	2-16-09	Exam #2 (chapters 15 & 16)
3-16-09	Exam #3 (chapters 17 & 18)	4-3-09	Exam #4 (chapters 19 & 20)
4-24-09	Exam #5 (chapters 21 & 22)		

### Final Exam

The final exam (110 minutes, 150 pts) will be comprehensive multiple-choice test given during the scheduled time only (10:30 AM on April 29, 2009). It is designed by the American Chemical Society to evaluate understanding of a broad range of chemical principles from a yearlong study of General Chemistry.

For best results, prepare for each exam carefully and consistently. Review and develop proficiency in any weak areas revealed by the previous exam or the homework. Then, develop a plan for systematic review of each chapter throughout the semester, perhaps using the *ACS Exam Guide* or a study group. Review the notes for General Chemistry I available on WebCT. An “all nighter” of sincere effort cannot make up for a semester or two of poor study habits.

## Written Assignments

Two short papers (2 pp) will be assigned to help students refine their written expression with scientific information and to hone critical thinking skills. Assignments will be graded for accuracy, grammar, spelling, format, and insight. Laser printed copies must be submitted by the due date. Late papers will lose 10% for every day late—*don't wait until the last minute!*

## Grade Calculation

Points are earned through quizzes, exams, and laboratory assessment. No extra credit will be offered—do your best on the assigned material.

Lecture (80%)	
Top 4 exams	400 pts
Final exam	150 pts
Written Assignments	50 pts
Reading Quizzes	? pts

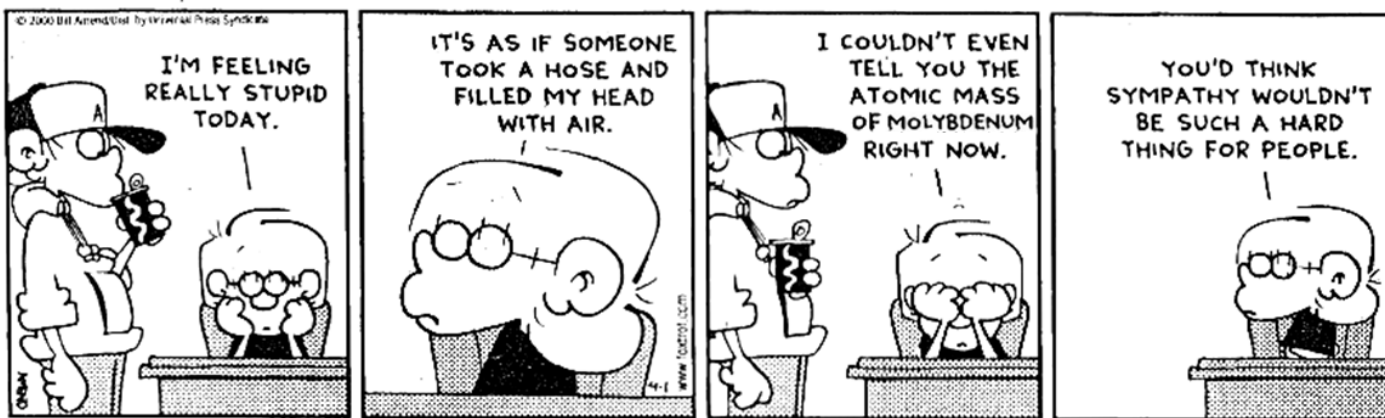
Laboratory (20%)  
Determined by lab instructor

Semester grades are determined by adding 80% of the lecture average to 20% of the lab average. Final averages will not be rounded up—if you want the grade, you must earn it!!

"thorough mastery"	100 ≥	<b>A</b>	≥ 94	"well above average"
	94 >	<b>A-</b>	≥ 91	
"average achievement"	91 >	<b>B+</b>	≥ 88	
	88 >	<b>B</b>	≥ 84	
	84 >	<b>B-</b>	≥ 81	
	81 >	<b>C+</b>	≥ 77	
"unsatisfactory"	77 >	<b>C</b>	≥ 72	
	72 >	<b>C-</b>	≥ 68	
	68 >	<b>D+</b>	≥ 66	
	66 >	<b>D</b>	≥ 62	
	62 >	<b>D-</b>	≥ 59	
	59 >	<b>F</b>	≥ 0	

← typical class average

## FOXTROT by Bill Amend



## COURSE POLICIES

### Academic Accommodations

If you believe you may need support in managing the impact of a disability, please contact Marilyn Meyer, Coordinator of Disability Services for Students. Faculty rely on Disability Services to verify the need for academic accommodations and to identify reasonable and appropriate accommodation strategies. Examples of disability are AD/ HD, Specific Learning Disabilities, Hearing, Vision, Health Impairment, Psychological, Orthopedic, and Traumatic Brain Injury. Disability Services is part of the Academic Enrichment Center (a.k.a The Cove) located in the Center for Biblical and Theological Studies, Office #223. Contact info: phone 766-3843, email meyerem@cedarville.edu, web [www.cedarville.edu/DisabilityServices](http://www.cedarville.edu/DisabilityServices).

**Academic Honesty**

I have no tolerance for academic dishonesty. At the very least, you will receive a zero for all work involved and most likely an “F” for the semester. Guilty students will be reported to the Academic Vice President, which may result in further disciplinary action. Examples of unacceptable behavior would include plagiarism, giving *or* receiving information on an exam or quiz (verbally, visually, electronically, telepathically, etc.), lying, falsifying data, dry labbing, and copying lab reports. You may only use calculators for calculating—not for storage of constants, equations, or class notes. Your eyes should stay focused on *your* test papers. Please keep your Accu-Scan sheet covered when you are not using it to reduce the chance that someone will accidentally see your answers.

**Excuses & Make-ups**

Sickness will require appropriate verification. Unacceptable excuses could include “overslept”, “going home for weekend”, “suspended”, etc. I will try to be fair to everyone when considering excuses, but will not enable abuse of my kindness. Official athletic events and excursions approved by the Faculty Academic Advisory Committee will be excused. Exams will only be given at the announced times unless **prior** approval has been obtained. There are no make-ups for the final exam. In the event you were unable to attend an exam, you must promptly provide an acceptable *written* explanation to have your excuse considered. Due to the unannounced nature of reading quizzes, there will be no make-ups. Excuses must be promptly submitted for consideration (generally within one day).

**Revision/Correction**

The instructor reserves the right to make changes to this syllabus if circumstances warrant such change. All changes will be provided to the students in writing and available on WebCT.

**About Your Instructor...**

Dr. Mark McClain is in his 13<sup>th</sup> year of teaching General Chemistry at Cedarville University. He hails from Clarks Summit in the northeastern corner of Pennsylvania, but met his wife as a student at Cedarville University. Since graduate school at the University of Michigan, Dr. McClain has been a post-doctoral researcher at Sandia National Laboratories in Albuquerque, NM, a Senior Research Associate of the National Research Council, and Cedarville University Faculty Scholar of the Year. He has collaborated with the Air Force Research Lab in Dayton for electronically conductive organic materials research. The McClains have five children (15, 13, 11, 8, and 6) and reside in lovely metropolitan Xenia living out their “This Old House” renovation fantasy.

It’s my desire to get to know every one of my students and I intentionally do several things to achieve this goal. I will learn all of your names by mid-semester. On Fridays, I set aside the noon hour to eat lunch with any students interested in enjoying Chemistry Lunch at Chuck’s. This has involved two to more than twenty folks, but it’s a great opportunity to get acquainted and talk about most anything (but usually not chemistry). Finally, our family hosts a cookout in Xenia in April as a yearend treat. This is your best opportunity to get to know my family, but you are certainly welcome to say “Hello” if you spy us out and about.

# Semester at a glance

Week	Monday	Wednesday	Friday
1		7-Jan Syllabus & expectations	9-Jan Class #1
2	12-Jan Class #2	14-Jan Class #3	16-Jan Class #4
3	19-Jan Class #5	21-Jan Class #6	23-Jan Class #7
4	26-Jan <b>Exam #1</b>	28-Jan Class #8	30-Jan Class #9
5	2-Feb Class #10	4-Feb Class #11	6-Feb Class #12
6	9-Feb Class #13	11-Feb Class #14	13-Feb Class #15
7	16-Feb <b>Exam #2</b>	18-Feb Class #16	20-Feb Class #17
8	23-Feb Class #18	25-Feb Class #19	27-Feb Class #20
9	2-Mar <b>Spring Break</b>	4-Mar <b>Spring Break</b>	6-Mar <b>Spring Break</b>
10	9-Mar Class #21	11-Mar Class #22	13-Mar Class #23
11	16-Mar <b>Exam #3</b>	18-Mar Class #24	20-Mar Class #25
12	23-Mar Class #26	25-Mar Class #27	27-Mar Class #28
13	30-Mar Class #29	1-Apr Class #30	3-Apr <b>Exam #4</b>
14	6-Apr Class #31	8-Apr Class #32	10-Apr <b>Easter Break</b>
15	13-Apr <b>Easter Break</b>	15-Apr Class #33	17-Apr Class #34
16	20-Apr Class #35	22-Apr Class #36	24-Apr <b>Exam #5</b>
17	27-Apr Class #37	29-Apr <b>Final Exam 10:30-12:30</b>	

\*\*Schedule subject to change as necessary.