CHEMISTRY 121: INTRODUCTORY CHEMISTRY
Fall 2012 COURSE SYLLABUS for section 01

I. STUDENT LEARNING GOALS

A. To understand the **chemical principles** underlying the topics of:

- reactions and stoichiometry
- solutions
- gases
- bonding and structure
- quantum theory
- thermochemistry
- chemical equilibrium
- acid-base chemistry

B. To be able to apply this knowledge to a wide range of chemistry exercises in order to sharpen **problem-solving skills**. To accomplish this, student will:

- **memorize** a core set of chemical terms, definitions, and equations (to be given);
- **apply knowledge directly** to explain or predict the chemistry involved in sustainability topics;
- **transfer knowledge** by applying the core principles to understand new and unfamiliar chemistry examples;
- **integrate knowledge** and skills from various topics to address examples that incorporate several different chemical principles;
- **reason** by combining an understanding of the core principles with general critical thinking and quantitative skills to solving these problems.

C. To recognize the application of this knowledge and these problem-solving methods to **important sustainability challenges and solutions**, including:

- clean water and air
- acid rain
- greenhouse gases
- ocean acidification
- fossil fuels: challenges and future
- sustainable agriculture
- biofuels
- hydrogen energy
- solar energy
- batteries

II. SCHEDULE (*tentative; details of reading assignments for each topic will be posted on Moodle*)

date	**topic**	**textbook reading**
Sep. 3	Topic 1: Chemical Composition and Stoichiometry	Ch. 2 and Ch. 3
Sep. 10	Topic 2: Chemical Reactions and Solutions	Ch. 4
Sep 17	Topic 3: Gases	Ch. 5
Sep. 24	*Mid-term Exam #1*	
Sep. 26	Topic 4: Bonding and Structure	Ch. 9
Oct. 8	Topic 5: Quantum Theory	Ch. 7
Oct. 19	Topic 6: Molecular Orbital Theory	Ch. 10
Oct. 26	*Mid-term Exam #2*	
Oct. 29	Topic 7: Thermochemistry	Ch. 6
Nov. 7	Topic 8: Chemistry and Sustainability	
Nov. 14	*Mid-term Exam #2*	
Nov. 26	Topic 9: Chemical Equilibrium	Ch. 14
Dec. 5	Topic 10: Acid-Base Chemistry Quantum Theory	Ch. 15
Dec. 20	*Final Exam*	

III. INSTRUCTOR

Prof. Scott D. Cummings phone: X5355 e-mail: cummingss@kenyon.edu
office: Tomsich Hall 314 office hours: *TBA*
My schedule is posted on my office door and at:
http://chemistry.kenyon.edu/cummings/schedule.htm

IV. CLASS MEETING TIMES

Section 01 meets in Tomsich Hall 101 during period 2 (9:10–10 am on M,W,F).

V. REQUIRED MATERIALS

Materials are available for purchase at the Kenyon College Bookstore and kenyon.bkstr.com.

A. *Chemistry* 9th edition by Raymond Chang. ISBN: 9780072980608 *Note: Reading assignments and homework problem numbers will be based on the 9th edition. Students purchasing any other edition will need to reconcile any differences between texts.*
B. Sapling Learning Online Homework (two-semester access). ISBN: 9780983385967.
C. a basic scientific calculator — *bring it to every class.*
D. (OPTIONAL) a molecular structure model set (Freeman; ISBN 9780716748229); may be useful in this and other chemistry courses.

Important course materials (schedule, reading assignments, videos, Problem Sets, some ancillary class materials, and exam information) are available on our **course Moodle Site** at http://moodle.kenyon.edu (log in and select CHEM 121.01). Some materials will not be distributed in class. Online quizzes are on the **Sapling Learning** course site for "CHEM 121.01 – Fall12" at https://www.saplinglearning.com. Some class announcements may be made by **e-mail** to your Kenyon account.

VI. COURSE and COLLEGE POLICIES

A. PRE-REQUISITES

Although there is no prerequisite course, most students will have completed a year of chemistry in high school. If you have not already dome so, complete the **Chemistry Placement Survey** (link available at http://www.kenyon.edu/chemistry.xml). The chemistry department uses this 20-minute survey/quiz to appropriately place students in the introductory course that best matches their chemistry background and demonstrated skills.

B. ATTENDANCE REQUIREMENTS

Class meetings are an important part of this course, and students are expected to attend all classes. Excessive absences will lead to a lower grade and may lead to expulsion from the course. I call your attention to the college policy on class attendance in the *Course of Study* (http://www.kenyon.edu/x11750.xml):

> "Absences for reasons of illness are not ordinarily excused: only when a student is declared by the College physician to be infirm (in a hospital or at home) will a health report be sent from the Health and Counseling Center to the dean of students, giving the days when each patient is judged infirm and recommending that the student's class absences be excused."

ONLY the Dean of Students (NOT the instructor) offers an **Excused Absence**. If you miss a quiz or in-class exam due to severe illness or emergency, your name must appear on the Dean of Students *Excused Absence List* in order to make up the work; otherwise a failing grade will be given. In the event of an absence from class, the student is responsible for securing any notes, handouts or announcements from the class.

Student-Athletes: I call your attention to the college policy on class attendance in the *Scheduling Guidelines for Athletic Contests* (http://www.kenyon.edu/PreBuilt/provCASatleticsgl.doc). By the end of the first week of classes, please notify the professor all potential athletic conflicts, which should not exceed 10% of our semester meeting times (4 classes).

C. CLASSROOM ETIQUETTE

Personal laptop computers are not allowed in the classroom. To maintain a respectful learning environment, please **turn off cell phones**. Because of the room arrangement and capacity, please **be on time to class** and **refrain from leaving the room** during class, if possible.

D. ACADEMIC STANDARDS and HONESTY:

I call to your attention the college policy on **Maintenance of Academic Standards and Academic Honesty** in the *Course of Study*. I am required to send Progress Reports for students performing below a grade level of C. I run this and all my courses with the assumption of complete academic honesty by all students.

E. STUDENTS WITH DISABILITIES:

If you have a physical, psychological, medical, or learning disability that may impact your ability to carry out assigned course work, I urge you to contact the Office of Disability Services (130 Olin Library, X5453). The Coordinator of Disability Services, Erin Salva (salvae@kenyon.edu), will review your concerns and determine with you what accommodations are appropriate. ONLY the Coordinator of Disability Services can make accommodations, but please feel free to discuss your concerns in private with me. All information and documentation of disability is confidential.

VII. STUDYING and OUT-OF-CLASS ASSISTANCE

Students are expected to read the textbook, study lecture notes, work on homework problems, and discuss chemistry with classmates and the instructor outside of the regular meeting time. **You should be studying** ~7–9 hours a week outside of class for a ½-credit course. In addition, I recommend that you study *throughout the week*, and not just before an exam or quiz. My primary goal is to help you to learn how to teach yourself, so meeting with me will be most productive when you have already put significant effort into your studies. The introductory chemistry sequence is cumulative, so you must retain your command of the material throughout the year. You are in charge of learning the material that we cover, and I am here to assist you.

I am available to meet with students throughout the week, and encourage you to discuss your studies with me during regular office hours, by appointment, or by chance whenever my office door is open. My full schedule with office hours is available at http://chemistry.kenyon.edu/cummings/schedule.htm.

Peer chemistry tutors are available at **The Math and Science Skills Center** to assist you as you work to improve problem-solving and chemistry skills, work on problem sets, and prepare for quizzes and exams. The Center, located in Tomsich 101, is open on Sunday, Tuesday, and Thursday evenings from 7–10 pm. The lead tutor for this course is **Daniel Akuma** (akumad@kenyon.edu), and his availability in the MSSC will be announced in class.

VIII. ASSIGNMENTS and ASSESSMENT

A. SELF-STUDY ASSIGNMENTS

We will spend approximately three or four class meetings exploring each topic in the course. **Learning goals** and **assignments** for each topic are posted to the course Moodle site. **Prior to each class, students should complete the textbook and video assignments and complete the associated online (Sapling) quiz questions** for each sub-topic. We will spend class time building upon the core concepts from the readings and videos as we work on examples and problems (including some of those on Problem Sets). **Success in the course depends on your fidelity to this schedule of self-study before coming to class**.

B. QUIZZES

For each topic, there will be an **online quiz** comprised of questions on core concepts from the assigned reading and lecture videos. You should complete the questions associated with each subtopic before our class meeting on that subtopic in order for your grade for those questions to count. There are also practice exercises available for each topic. The quizzes are set up to allow you to repeat questions several times (but with a 20% grade penalty for each new attempt) until you achieve the correct answer, and offer you instant feedback to assess your learning. Quizzes are to be worked on **individually**.

There may be **unannounced quizzes** given in class during the semester. See attendance policy (above) regarding missed in-class quizzes.

C. PROBLEM SETS

A **Problem Set** involving more advanced problems for each topic will be due in class at 9:10 am on the announced due date. You are **encouraged to work with other students** on these assignments, but please recognize the difference between working with and copying from others. You must submit your own answers, which reflect your own understanding of each question. Your submission will be graded for overall effort and on your answers to a few select questions. Some exam questions will draw directly from Problem Sets.

D. EXAMINATIONS

Mid-term Exams are scheduled for **September 24**, **October 26,** and **November 14** (in class, 50 minutes), and a Final Exam is scheduled by the Registrar for **December 20** from 8:30–11:30 a.m. **Please note these dates and times and do not plan travel on these days; no alternate exam times can be offered**. See attendance policy (above) regarding missed in-class exams. All exams are cumulative in coverage.

E. COURSE GRADES:

Grades earned for each assessment category below (along with an evaluation of class participation) determines the course grade:

QUIZZES:	10%
PROBLEM SETS:	20%
MID-TERM EXAMS:	45%
FINAL EXAM:	25%

Letter grades for the course are: A^-/A (90–100%), B^-/B/B^+ (80–89%), C^-/C/C^+ (70–79%), D^-/D/D^+ (50–69%), F (below 50%).

F. GRADING PHILOSOPHY AND METHODS

Grades serve two purposes: to provide feedback to students (*formative* evaluation) and to evaluate student work to determine a course grade (*summative* evaluation). Using quizzes and exams, I aim to assess various aspects of student academic work: critical reasoning, quantitative reasoning, knowing basic information, recognizing concepts and themes, thinking by analogy, learning from previous mistakes, and demonstrating a commitment to improvement.

What is the format of assessment?

For practical and pedagogical reasons, assessment of the knowledge you gain in this course is based on in-class exams and quizzes that test your ability to identify core concepts, solve problems and demonstrate understanding within a limited (but reasonable) amount of time.

Exams will typically include some very basic questions (which I anticipate nearly all students will be able to answer correctly), several standard questions (which should be familiar to students who have completed reading assignments and worked on problem sets), and one challenge problem (which I anticipate very few students will be able to answer correctly).

How is student work graded?

For individual questions and total exams and quizzes, points are earned for correct answers and approach to solving quantitative questions and insight and reasoning for qualitative questions:

numeric grade	**letter**	**quality of work**
90–100%	**A**	correct answer (with appropriate significant figures for numeric answers) and approach
80–89%	**B**	sound approach to problem solving and demonstrated understanding of fundamental concepts, but with some mistakes
70–79%	**C**	adequate attempt, but misunderstanding of some key concept
50–69%	**D**	inability to solve problem
0–50%	**F**	didn't try (50% for missing a question completely; 0% for absence from class)

All work is evaluated on this absolute grading scale and is *NOT* graded "on a curve". You are not competing against each other for grades, so you are encouraged to work with each other in your studies.

What is the typical distribution of grades?

Although grades are not "curved", there will be a distribution of grades among students in the class. Students in most courses perform at a range of levels, typically a reflection of various factors: effort in the course, interest in the topic and commitment to succeed, preparation with pre-requisite knowledge and skills, and native abilities with the topic. If I have designed my assessment tools effectively, then grades will reflect this spread in student performance: some *A* grades for truly outstanding work, *B* grades for work that shows a sound approach and solid understanding, *C* grades for work that is adequate, *D* grades for work that is deficient, and *F* grades for lack of effort or attendance. If everyone earns an *A* grade, then the exam or course was too easy; if everyone earns a *C or D* grade then the exam or course was too difficult. For a typical grade distribution, roughly half of the students earning grades that are "below average" and half of the students earning grades that are "above average".