CHEMISTRY 124.02: *Current Topics In Chemistry*
Spring 2015 Course Syllabus

I. STUDENT LEARNING GOALS

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

- thermodynamics
- electrochemistry
- molecular orbital theory
- excited-state chemistry
- chemical kinetics
- intermolecular forces
- solid-state materials
- acid-base equilibrium

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;
- **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:

- fossil fuels and greenhouse gases
- batteries and fuel cells
- biofuels and sustainable agriculture
- hydrogen energy
- catalysis
- plastics
- photovoltaics
- environmental sensors
- clean water and air
- ocean acidification

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

dates	**topics**	**textbook**
Jan. 12–Feb. 4	thermodynamics, electrochemistry,	Ch. 18, 19
Feb. 6	*Mid-term Exam #1*	
Feb. 9–25	molecular structure, MO theory, excited-states	Ch. 7, 10
Feb. 27	*Mid-term Exam #2*	
Mar. 16–30	kinetics and catalysis	Ch. 13
Apr. 3	*Mid-term Exam #3*	
Apr. 1–22	intermolecular forces, polymers, solid-state	Ch. 11, 12, 25
Apr. 24	*Mid-term Exam #4*	
Apr. 27–May 1	acid-base and solubility equilibrium	Ch. 12, 15
May 7	*Final Exam*	

III. INSTRUCTOR

Prof. Scott D. Cummings
Phone: PBX 5355 E-mail: cummingss@kenyon.edu
Office: Tomsich Hall 314
Office Hours: Tuesdays, Wednesdays, Thursdays 2−4 pm
My full schedule is available at: http://chemistry.kenyon.edu/cummings/schedule.htm

IV. CLASS MEETING TIMES

Period 2 (M,W,F from 9:10–10 am) in Tomsich Hall 101

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: 978-0073221038. *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.
C. a basic scientific calculator — *bring it to every class.*

Important course materials (schedule, reading assignments, videos, Problem Sets, ancillary class materials, and exam information) are available on our **course Moodle Site** at http://moodle.kenyon.edu (log in and select "CHEM 124.02 Current Topics in Chemistry Spring 2015). Some materials will not be distributed in class.
Online quizzes are on the **Sapling Learning** course site "Kenyon College – CHEM 124 – Spring15 – CUMMINGS" 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

CHEM 121 is a prerequisite for this course. Much of what we cover will review and build upon the principles of the first-semester introductory chemistry course, and exams and quizzes coverage will assume an understanding of material from the first semester. In addition, CHEM 126 lab is a *suggested* co-requisite, and some content from the lab (e.g. organic structures and nomenclature) will be incorporated into this course.

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*:

> "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 or Dean for Academic Advising (NOT the instructor) offers an Excused Absence. If you miss an in-class quiz or exam due to severe illness or emergency, your name must appear on the Dean's ***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 attendance policies in the *Scheduling Guidelines for Athletic Contests* (http://documents.kenyon.edu/provost/cas_athlet_sched.doc). By the end of the first week of classes, you should notify the professor of all known 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 to the college policy on Maintenance of Academic Standards and Academic Integrity in the *Course of Study*. Any work you submit for a grade must be your own answers. Progress Reports are submitted for students performing below a grade level of C.

E. ACCESSIBILITY AND ACCOMMODATIONS

If you have a physical, psychological, medical or learning disability that may impact your ability to participate in class or carry out assigned course work, you should contact Erin Salva in the Office of Student Accessibility and Support Services (salvae@kenyon.edu; X5453). She will review your abilities and determine with you what accommodations are appropriate. ONLY the Coordinator of Student Accessibility Support Services approves accommodations for this course, 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 0.5-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 schedule is posted: 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 **Madelyn Cook** (cookm@kenyon.edu), and her availability in the MSSC will be announced in class.

VIII. ASSIGNMENTS and ASSESSMENT

A. STUDY GUIDES and READING ASSIGNMENTS

Each class meeting will be used to explore a new topic. Study Guides (posed to the Moodle site) will provide the **learning goals** and **reading assignments** for each topic. I strongly encourage you to review the reading assignment and Study Guide prior to each class. We will spend class time building upon the core concepts from the readings as we work on examples and problems. *Success in the course depends on your fidelity to this schedule of self-study*.

B. QUIZZES

For many topics, there will be an **online (Sapling) quiz** comprised of questions on core concepts from the assigned readings. For your quiz grade to count, you must complete the quiz before the due date, which is 8 a.m. on the day of the next class, unless otherwise noted (for example, if Topic 5 if covered in class on Wednesday, Quiz 5 is due at 8 a.m. on Friday). The quizzes are set up to allow you five attempts per question (but with a 20% grade penalty for each incorrect answer), and to view solutions offer you instant feedback to assess your learning. Quizzes are to be worked on **individually**.

C. PROBLEM SETS

Problem Sets, involving more advanced and multi-concept problems, 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 collected and graded for overall effort and on your answers to a few select questions. Alternatively, an in-class quiz on select questions from the Problem Set will be offered (possibly unannounced), on which you can use your answer sheets. Exam questions will draw directly from Problem Sets.

D. EXAMINATIONS

Mid-term Exams (in class, 50 minutes) are scheduled for **February 6**, **February 27, April 3** and **April 24**, and a Final Exam is scheduled by the Registrar for **Thursday, May 7** from 6:30–9:30 p.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:

Total points earned determine the course letter grade:

QUIZZES:	200 points total
PROBLEM SETS:	200 points total
MID-TERM EXAMS (4):	400 points total
FINAL EXAM:	200 points

Letter grades for the course are: A (934–1000 points), A^- (900–933), B^+ (867–899), B (834–866), B^- (800–833), C^+ (767–799), C (734–766), C^- (700–733), D^-/D/D^+ (500–699 points), F (below 500 points).

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 grade	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 likely 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; *F* grades are given only for lack of effort (completing assignments) 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".