CH145, Honors General Chemistry – Fall 2013 – Lecture Syllabus

Instructor: Prof. Kevin Rice  Office Hours: open, or by appt.
Keyes 313  
kprice@colby.edu / x5763

Lectures meet: M-W-F, 10:00 -10:50 AM, Olin 1

Required Materials: • “Chemical Principles” Atkins & Jones, 5ed.
• “Sapling Learning” access code (purchased online)
• Specified calculator

Course webpage: https://wiki.colby.edu/display/CH145

Course description:

CH145 is an alternative to CH141/CH142 for likely science majors who have had substantial chemistry coursework in high school. It is expected that students enter CH145 with a solid understanding of the basic concepts and problem solving skills in chemistry, such as: basic properties of matter, atoms and subatomic particles, unit conversions, stoichiometry and chemical equations, acids and bases, oxidations states, gas laws, calorimetry, and electron configurations. The content of this course will include orbital theory, chemical bonding, thermodynamics and spontaneity, chemical kinetics and equilibria, and electrochemistry.

Course objectives and learning goals:

1. For students to gain a broad understanding of chemistry that leaves them exceptionally prepared for organic chemistry and beyond.
   a. To learn to communicate using the nomenclature used by chemists.
   b. To learn the basic principles of mass balance and chemical equilibria.
   c. To understand the nature of the chemical bond.
   d. To understand the fundamental kinetics and thermodynamics that govern chemical reactions.

2. For students to sharpen their quantitative skills in a scientific context.

3. For students to improve skills in solving problems that involve the integration and synthesis of new knowledge and to master the interface between narrative and mathematical problem solving.

4. For students to improve their oral communication skills.
Grading:
• Exam 1 (12%)—Tuesday, October 1st from 5:30-6:30 PM (room TBA).
• Exam 2 (12%)—Wednesday, October 30th from 5:30-6:30 PM (room TBA).
• Exam 3 (12%)—Monday, November 25th from 5:30-6:30 PM (room TBA).
• Final Exam (20%)—(date, time, and room to be assigned by the Registrar).
• Laboratory (25%)—Attendance is mandatory. You must pass lab to pass CH145.
• Homework (10%)—See below for more information.
• Student Engagement (9%)—Assigned at the Instructor’s discretion.

Reading assignments:
Reading assignments from the required text will be posted to the course webpage weekly.

Lecture:
Lectures for this course are extremely important and it is expected that students will attend all of them and be up to date on all reading assignments. While there will be a tremendous amount of content to get through, active and dynamic class discussions are critical for student engagement, development of the chemist’s lexicon, and establishment of the foundations of critical thinking and problem solving in the discipline. Toward this end, the instructor will regularly post thought questions on the course website that students will be expected to discuss in lecture. There will also be occasional in-class quizzes using an electronic ‘clicker’ system. Part of your grade in CH145 will be based on the instructor’s interpretation of your engagement in the class, which can include active participation in lecture as well as one-on-one office visits with the instructor (see below).

Anticipated course topics and approximate schedule:

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<thead>
<tr>
<th>Week</th>
<th>Chapter</th>
<th>General topic</th>
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<td>1: Sept. 4</td>
<td>1</td>
<td>Electrons &amp; Atoms</td>
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<td>2: Sept. 9</td>
<td>1-2</td>
<td>Quantum &amp; Orbital Theory</td>
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<td>3: Sept. 16</td>
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<td>Chemical Bonding</td>
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<td>4: Sept. 23</td>
<td>4-5</td>
<td>Gas Laws &amp; Intermolecular Forces</td>
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<td>5: Sept. 30</td>
<td>14</td>
<td>Reaction Rates &amp; Mechanisms</td>
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<td>6: Oct. 7</td>
<td>7-8</td>
<td>Enthalpy &amp; Entropy</td>
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<td>7: Oct. 16 (fall break)</td>
<td>8-9</td>
<td>Free Energy &amp; Physical Equilibria</td>
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<td>8: Oct. 21</td>
<td>10</td>
<td>Chemical Equilibria</td>
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<td>9: Oct. 28</td>
<td>11-12</td>
<td>Acid/Base Chemistry</td>
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<td>10: Nov. 4</td>
<td>12</td>
<td>Buffers</td>
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<td>11: Nov. 11</td>
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<td>Titrations &amp; Insoluble Compounds</td>
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<td>12: Nov. 18</td>
<td>13</td>
<td>Electrochemistry</td>
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<td>13: Nov. 25 (Thanksgiving)</td>
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<td>Electrochemistry</td>
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<td>14: Dec. 2</td>
<td>16-17</td>
<td>d-Block Chemistry &amp; Nuclear Chemistry</td>
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Office visits with Instructor:

Students should note the “open door” policy of the Instructor and are encouraged to take advantage of this policy early and often. Concerns about lecture material and/or problem solving strategies are best discussed directly and immediately. In addition to these optional informal visits, all students are required to meet with the Instructor during the semester in a more formal capacity during the week of September 23rd. Appointments with the Instructor are to be made on the CH145 website. During these appointments, students will be asked to discuss their approaches to lecture and course assignments. In addition, the Instructor will discuss the lecture material, asking thought-provoking questions designed more to assess students’ engagement in the course, rather than the extent of amassed knowledge. Students who have attended all lectures, completed all reading and homework assignments, and participated in all laboratory exercises will be thoroughly prepared for these appointments. The “Student Engagement” portion of your grade will be based on these appointments and on lecture participation. Informal office visits with the Instructor may also be considered. Any concerns about a student’s level of engagement will be communicated with that student informally at first then via the academic warning system if necessary. Students are welcome to seek feedback from the Instructor at any time.

Homework assignments:

The homework portion of your grade will be derived from an online homework system, “Sapling Learning.” You will need to purchase an access code from the Sapling website (saplinglearning.com) and set up an account according to the instructions that can be found on the CH145 website. There will be 8-10 graded online homework assignments over the course of the semester. These assignments and their due dates will be announced in lecture and posted on the website. For each assignment, be sure to view the grading details. Most of the assigned problems will involve quantitative problem solving. However, problems involving narrative discussion may also be assigned. Part of your homework grade will also include the in-class quizzes discussed above.

In addition, several practice problems will be assigned. Work through as many of these problems as necessary to make sure you have a good grasp of the material. The key to success in this course is to work through problems without depending heavily on an answer key or the online ‘hint’ feature. Completing several problems in all areas may be necessary to reach the point at which completing a set of problems can be accomplished within the timeframe of an exam.

Exams:

There will be three one-hour midterm examinations that will take place outside of class time (see dates and times above) and a cumulative final exam during the exam period. Exam questions may come from lecture, lab, the text, and/or homework and will be a mix of multiple choice, mathematical, and short answer problems. These exams will be very
challenging, to even the most well prepared student. As such, numerical grades on exam may not necessarily correlate with assigned letter grades. In other words, it is conceivable that a student might never score above 90% on any exam and still earn an ‘A’ in the class.

There will be no make-up exams. If a student anticipates being away for a College activity on the evening of an exam, the Instructor will try to make alternative arrangements, such as having the exam to be administered by an athletic coach. It is the responsibility of the student to let the Instructor know, well in advance, of any potential conflicts and to make the necessary arrangements. Accommodations will also be made for students with serious illnesses or family emergencies. Accommodations for other, non-college related activities or circumstances will not be considered. Should you miss an exam without verified medical cause or other prior approval, you shall receive a zero for that exam. The grade for an exam missed due to an excused absence will be calculated based on your next exam’s grade relative to the class.

Some students may have approval from the Dean of Students’ Office for time extensions on exams. It is the responsibility of the student to communicate arrangements made with the Dean of Students’ Office to the Instructor at the start of the semester. The Instructor will be unable to make any accommodation if these procedures are not followed.

To encourage improvement, all three midterm exam scores can be adjusted upward based on future test scores. Exam grades will be replaced by a grade based upon the average of that exam grade and the subsequent exam grade. The final exam will be used to adjust the third exam grade. Note that this adjustment is automatic, and will only be applied if it improves your grade.

Other course policies, including academic dishonesty:

The Chemistry Department policies regarding exams, attendance, and academic honesty will apply to this course. This information is available on the department website at: http://www.colby.edu/chemistry/Attend_Exam.html. You are encouraged to study and discuss course material with other students. However, anything you submit for a grade (including online homework and laboratory assignments) must be solely your own work. If you are unsure about what constitutes academic dishonesty in this course, it is safest to check with your Instructor first.

Extra help:

You are strongly encouraged to seek extra help if you are having difficulty with material or assignments in this course. Your Instructor should be your primary resource in getting help – don’t hesitate to speak with Prof. Rice at any time. Help is also available at the Chemistry Help Center, staffed by experienced and knowledgeable chemistry majors, which is open four evenings per week in Keyes 104 (M-Th, 7:30-9:30). These students will be happy to answer questions and help with problems.