SYLLABUS – CHEMISTRY FUNDAMENTALS II (CHM 2046) – FALL 2013
SECTION 0001 – CLASS NUMBER 84578 – 3.0 credit hours
As of 4 Aug 2013

Instructor  Dr. Stephen M. Kuebler  Office  Phys. Sci. Bldg. 347
E-mail  kuebler@ucf.edu  Tele  407-823-3720
Office hours  Wed. & Fri., 9:30 am - 12:00 pm
Class meetings  Tues. & Thur., 10:30 am – 11:50 am, VAB 132

Objectives
1. To help students further their understanding of the fundamental concepts of modern chemistry, building upon topics covered in CHM 2045;
2. To help students learn to apply these concepts for solving chemical problems.

Materials
   ISBN-10: 0321706153
2. Access code for “Mastering Chemistry”, on-line study and homework system (required)
3. WebCourses (https://webcourses.ucf.edu)

Overview
The Fundamentals of Chemistry 2045/2046 series is intended to provide science students with a solid understanding of the foundational concepts in chemistry. Chemistry is often referred to as the "central science" because its fundamentals must be understood for detailed study of nearly all other physical and engineering sciences. However, chemistry is also relevant for non-scientists because it provides explanations for so many things we encounter (and often take for granted) in everyday life. Stop to think for a moment about the following. What is plastic and how is it made? What are alloys and why are some stronger than pure metals? Why are the sky and the oceans blue? (Same color, different reasons!) Why is grass green, or blood red? (Different colors but due to closely related chemical structures!) How do bio-molecules, like DNA, make life possible? In this course we will gain exposure to important concepts that provide a starting point for answering these and many other questions about our world, and we will lay the foundation for further study of chemistry and other sciences. We will also discover that chemistry is a dynamic discipline that is ever growing and changing, as people attempt through scientific research to develop a more complete description of our physical universe.

Topics
- Intermolecular forces (Ch. 11)
- Solutions and their behavior (Ch. 12)
- Chemical kinetics (Ch. 13)
- Chemical equilibria (Ch. 14)
- Chemistry of acids and bases (Ch. 15)
- Aqueous equilibria (buffers, solubility, titrations, Ch. 16)
- Entropy and free energy (Ch. 17)
- Electron transfer reactions (Ch. 18)
- Main group chemistry (topics throughout Chs. 11-18)
- Nuclear chemistry (selected topics)

Course Pre-Requisites
Chemistry is a cumulative subject, much like mathematics. Students are expected to have a firm understanding of concepts from the pre-requisite course, Fundamentals of Chemistry 1 (CHM 2045), and
exams will draw heavily upon concepts from this pre-requisite. The final exam will be a standardized test covering all material from CHM 2045 and CHM 2046.

Course Format
The course will follow the chapters of the text in sequence, beginning with chapter 11. Due to our limited contact time, lectures may not cover every subject in a given chapter comprehensively; however, students are responsible for all material presented in the textbook chapter. Topics will be covered according to the tentative schedule listed below. The schedule is subject to change, depending upon our rate of progress.

<table>
<thead>
<tr>
<th>Day</th>
<th>Chapter</th>
<th>Lecture Topic</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday, August 20, 2013</td>
<td>11</td>
<td>Orientation; Intermolecular forces</td>
<td></td>
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<tr>
<td>Thursday, August 22, 2013</td>
<td></td>
<td>Intermolecular forces</td>
<td>Last day to drop</td>
</tr>
<tr>
<td>Sunday, August 25, 2013</td>
<td></td>
<td></td>
<td>Intro-to-MC and Math Review HW due</td>
</tr>
<tr>
<td>Tuesday, August 27, 2013</td>
<td></td>
<td>Intermolecular forces</td>
<td></td>
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<tr>
<td>Thursday, August 28, 2013</td>
<td></td>
<td>Intermolecular forces</td>
<td></td>
</tr>
<tr>
<td>Sunday, September 01, 2013</td>
<td></td>
<td></td>
<td>HW 11 (only one for this chapter)</td>
</tr>
<tr>
<td>Tuesday, September 03, 2013</td>
<td>12</td>
<td>Solutions and their behavior</td>
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<tr>
<td>Thursday, September 05, 2013</td>
<td></td>
<td>Solutions and their behavior</td>
<td></td>
</tr>
<tr>
<td>Sunday, September 06, 2013</td>
<td></td>
<td></td>
<td>HW 12.1 due</td>
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<tr>
<td>Tuesday, September 10, 2013</td>
<td></td>
<td>Solutions and their behavior</td>
<td></td>
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<tr>
<td>Thursday, September 12, 2013</td>
<td>13</td>
<td>Kinetics</td>
<td>HW 12.2 due</td>
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<tr>
<td>Sunday, September 15, 2013</td>
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<tr>
<td>Tuesday, September 17, 2013</td>
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<td>Exam 1 (chs. 11-12)</td>
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<td>Thursday, September 19, 2013</td>
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<td>Kinetics</td>
<td>HW 13.1 due</td>
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<td></td>
<td></td>
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<tr>
<td>Tuesday, September 24, 2013</td>
<td></td>
<td>Kinetics</td>
<td></td>
</tr>
<tr>
<td>Thursday, September 26, 2013</td>
<td>14</td>
<td>Equilibria</td>
<td>HW 13.2 due</td>
</tr>
<tr>
<td>Sunday, September 29, 2013</td>
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<td></td>
<td></td>
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<tr>
<td>Tuesday, October 01, 2013</td>
<td></td>
<td>Equilibria</td>
<td></td>
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<tr>
<td>Thursday, October 03, 2013</td>
<td></td>
<td>Equilibria</td>
<td></td>
</tr>
<tr>
<td>Sunday, October 06, 2013</td>
<td></td>
<td></td>
<td>HW 14 due (only one for this chapter)</td>
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<tr>
<td>Tuesday, October 08, 2013</td>
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<td>Exam 2 (chs. 13-14)</td>
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<tr>
<td>Thursday, October 10, 2013</td>
<td>15</td>
<td>Acids and bases</td>
<td>HW 15.1 due</td>
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<tr>
<td>Sunday, October 13, 2013</td>
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<td></td>
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<tr>
<td>Tuesday, October 15, 2013</td>
<td></td>
<td>Acids and bases</td>
<td></td>
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<tr>
<td>Thursday, October 17, 2013</td>
<td></td>
<td>Acids and bases</td>
<td></td>
</tr>
<tr>
<td>Sunday, October 20, 2013</td>
<td></td>
<td></td>
<td>HW 15.2 due</td>
</tr>
<tr>
<td>Tuesday, October 22, 2013</td>
<td>16</td>
<td>Aqueous equilibria</td>
<td></td>
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<tr>
<td>Thursday, October 24, 2013</td>
<td></td>
<td>Aqueous equilibria</td>
<td>28 Oct. is last day to withdraw</td>
</tr>
<tr>
<td>Sunday, October 27, 2013</td>
<td></td>
<td>Aqueous equilibria</td>
<td>HW 16.1 due</td>
</tr>
<tr>
<td>Tuesday, October 29, 2013</td>
<td></td>
<td>Aqueous equilibria</td>
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</table>
Thursday, October 31, 2013

Sunday, November 03, 2013

Tuesday, November 05, 2013

Exam 2 (chs. 15-16)

Thursday, November 07, 2013

Entropy and free energy

Sunday, November 10, 2013

HW 17.2 due

Tuesday, November 12, 2013

Entropy and free energy

Thursday, November 14, 2013

Entropy and free energy

Sunday, November 17, 2013

HW 17.2 due

Tuesday, November 19, 2013

18 Electron transfer reactions

Thursday, November 21, 2013

Electron transfer reactions

Sunday, November 24, 2013

HW 18.1 due

Tuesday, November 26, 2013

Electron transfer reactions

Thursday, November 28, 2013

Last day of class

Sunday, December 01, 2013

Thanksgiving holiday

HW 18.2 due

Tuesday, December 10, 2013

Final Exam

10:00a - 12:50p

Evaluation

Performance will be evaluated based on points earned in the following assessments.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weighting</th>
</tr>
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<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>20%</td>
</tr>
<tr>
<td>Final exam</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Points from each assessment will be weighted as specified above, and the final grade earned will be determined by the percentage of total weighted points using the scale below. There are no opportunities for extra credit in this course.

<table>
<thead>
<tr>
<th>Percentage of weighted points</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 to 100</td>
<td>A</td>
</tr>
<tr>
<td>90 to &lt; 93</td>
<td>A -</td>
</tr>
<tr>
<td>87 to &lt; 90</td>
<td>B +</td>
</tr>
<tr>
<td>83 to &lt; 87</td>
<td>B</td>
</tr>
<tr>
<td>80 to &lt; 83</td>
<td>B -</td>
</tr>
<tr>
<td>77 to &lt; 80</td>
<td>C +</td>
</tr>
<tr>
<td>73 to &lt; 77</td>
<td>C</td>
</tr>
<tr>
<td>70 to &lt; 73</td>
<td>C -</td>
</tr>
<tr>
<td>67 to &lt; 70</td>
<td>D +</td>
</tr>
<tr>
<td>63 to &lt; 67</td>
<td>D</td>
</tr>
<tr>
<td>60 to &lt; 63</td>
<td>D -</td>
</tr>
<tr>
<td>&lt; 60</td>
<td>F</td>
</tr>
</tbody>
</table>
Online Resources

WebCourses
This syllabus, test answer keys, and other "hand-outs" can be downloaded from WebCourses. All students are already enrolled in WebCourses. WebCourses is accessible from https://my.ucf.edu/

E-mail Communication
I will communicate with students frequently using e-mail. UCF now requires faculty to communicate with students exclusively via their knights.ucf.edu accounts. Make sure that you check your knights account frequently. If you do not, you may miss important announcements regarding grades, exam content, etc.

Homework
Students will complete weekly homework assignments on-line using the Mastering Chemistry system. Homework assignments are due every Sunday evening at 11:00 pm, including the weekend after Thanksgiving holiday. Credit will not be awarded for late assignments. Each student must register themselves for Mastering Chemistry.

Creating your Mastering Chemistry user account
1. Use Internet Explorer for all work in Mastering Chemistry.
2. Navigate to http://www.masteringchemistry.com
3. Follow the instructions to register as a new user.
4. When asked to enter your “student ID”, input your NID (e.g. ku701454). This is important! If you do not enter your NID correctly, your scores may not match up in the system when it comes time to compute final grades.
5. When queried, enter the access code that came with your text book package. The access code can also be purchased separately at masteringchemistry.com.
6. Enter the Course ID for our section. Our course ID is: KUEBLER2046FALL2013

Homework Scoring
Note that you must click <submit> to enter your answer for scoring. Students have unlimited attempts at each problem. Points are awarded for correct answers, minus a deduction for incorrect answers. For numerical problems, the deduction is 3% for each incorrect answer. For multiple-choice problems, percent-deduction = 100 / (#-of-choices - 1).

How to Do Well with Mastering Chemistry
Read and take your own notes on the chapter before starting homework. See the "Study Tips" below for more good advice on this... After reading the chapter, print out the assignment and work it on paper, then login to enter a few answers at a time. Do not attempt to work problems staring at the computer screen -- this does not bring good results! You may use hints without penalty, but you are strongly encouraged to search out the answer using the text before accessing hints. After submitting an answer, you may return to a problem and rework it for practice as many times as you like.

IMPORTANT: Start early! The homework assignments alone will require two to four hours per week, and much longer if you have not read and absorbed the chapter.
Test Policies and Format

NCS Test Forms
- Exams will be computer graded using the pink NCS Test Forms only. No other type will be graded.
- Each student is responsible for bringing their own test forms, writing instruments, and calculators.

Exam Administration
- On exam days, students are required to bring their University ID. IDs will be checked at the door. Students who do not have their University ID will not be admitted to the exam.

Content of Exams
- Exams will test concepts heavily, as well as the ability to solve chemical problems.
- Exams will be progressively comprehensive, meaning exams will emphasize material covered in the completed unit, but will also draw upon information covered in previous units.
- Students are expected to have a firm mastery of concepts from Fundamentals of Chemistry I (CHM 2045) and test questions will draw heavily upon this content.
- The final exam will be comprehensive of all material covered in the course.
- Correct answers will reflect proper use of scientific notation, significant digits, correct units.

Use of Calculators and Other Aids
- Students may use electronic calculators during tests, but calculators built into cell phones are not permitted.
- Text books, notes, and reference materials may not be used during the exam.
- Violation of the conditions outlined above will be regarded as cheating and will result in a zero for that test.

Curving Exam Scores
- Exams will be “curved” by adding to each student’s raw score the points needed to bring the highest raw score in the class to 100%. If at least one student achieves a perfect score without curve, this will be taken as evidence that the exam difficulty was appropriate for the class, and no curve will be applied to the group.

Makeup exams and absence from tests
- Make-up tests will be administered by appointment only when a test is missed due to Authorized University events and co-curricular activities (e.g. football or cheerleading competition, see: #4-401.1 at http://policies.ucf.edu)
- There are no make-up tests for exams missed for other reasons, including illness.
- A test missed for illness will be excused if the student provides a note signed by their health provider stating they were unable to take the test on the scheduled day due to malady. The final grade will then be calculated from a proportionally weighted average of the remaining exams and assignments.
- Exams missed without an approved University excuse will receive a zero.

Classroom Conduct and Courtesy
All students are expected to conduct themselves in a manner consistent with the student code of conduct, as set forth in the Golden Rule (http://www.goldenrule.sdes.ucf.edu), so that everyone in the class has an opportunity to learn, free from interruptions and distractions. This means that:
• Cell phones are off and not used at all during class.
• Students do not converse during class.
• Students are attentive to lecture and do not text or engage in distracting computers use, including email, surfing the web, playing video games, etc.
• Students come to class on time. If you arrive late, please enter quietly and sit toward the back.

Please do all you can to help maintain a positive and productive classroom environment.

Disability Access Statement
The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. This syllabus is available in alternate formats upon request. Students with disabilities who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations. Students who need accommodations must be registered with Student Disability Services, Student Resource Center Room 132, phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, before requesting accommodations from the professor. Further information about UCF student disability services is available at http://sds.sdes.ucf.edu and sds@ucf.edu.

Amendment of Syllabus
The instructor reserves the right to modify the schedule, the testing procedure, and the grading basis if, in the professional judgment of the instructor, such modification is in the best interest of fulfilling the course objectives and assuring the academic integrity of the course and the University.

Letters of Reference
Students who request a letter of reference will be accommodated (1) only if they earn an “A” and (2) only following conclusion of the course.
STUDY TECHNIQUES

**Commitment**

Chemistry is not an easy subject! Its mastery requires a great deal of dedication and discipline. A good rule of thumb for all college courses is that one should plan to spend about three hours studying for every one hour of classroom time. Chemistry can require even more than this. So, you should expect to spend about 9+ hours per week studying chemistry, in addition to class time. Studying is not limited to attending class. You can at most learn about 20% of the material through class attendance alone. The other 80% will come from (1) reading the text, (2) taking your own notes during reading, and (3) working many problems.

**Active versus Passive Learning**

An important distinction can be made between passive and active learning. If you read a book about how to play guitar, you would not expect to be able to play the instrument without actually taking one in hand and practicing, right?! Similarly, we cannot expect to understand chemistry just from reading a textbook. Rather, we have to do chemistry to really learn it! Reading the textbook is the first step, but it is only a passive activity. While reading, you take in information, but you are not necessarily applying it. Active learning is anything that requires you to **assimilate and apply concepts and facts** you are exposed to from a passive activity. Retention and comprehension tends to be low if only passive learning activities are employed. A much better way to study is to incorporate an active-learning component.

To make reading the textbook an active process, do the following. Maintain a notebook in which you create your own **comprehensive** notes while reading the chapter. First read a sub-section (typically 2-4 pages). At the end of each section, set the book aside and create in the notebook a summary of the key concepts using your own words. Write down as much detail as you can recall. Students are expected to learn mathematical equations and commit them to memory, so make this part of your study regimen. Include equations in your notebook and define all the variables. Make diagrams that illustrate the concepts as best as you can. Then go back and scan the section, checking for accuracy and identifying omissions. Focus additionally on concepts that were not clear from the first reading and add these to your notebook. Repeat this process until your notebook contains a complete and accurate summary of the section. Afterward, move on to the next section.

**Apply this same process to example problems.** Read the problem to its conclusion. Then copy the question into your notebook and attempt to answer it without referring to the text. You will be surprised to find that in many cases you cannot complete the problem, even though you just read it! This is completely normal. Go back to the text, re-read the problem, then return to your notebook and try to complete the problem. Continue this process until you can complete the problem on your own. To really, get the approach to the problem, repeat the process a second time. This approach -- actively translating concepts into your own words coupled with repetition -- will affix the ideas into your mind.

**Working end-of chapter problems**

Working problems is another great active learning process that is essential for success in this course. Upon completing the chapter, work as many problems as possible. If you cannot work a problem, look through your notes for hints that will guide you toward a solution. If you do not find information to solve the problem, refer to the chapter (particularly the examples exercises). Record into your own notebook any additional information you need to complete the problem. Check your answer and approach against those for similar problems, and compare solutions also using the solutions manual. Do not look at solutions for this or similar problems until you have made an attempt using your own notes, and then the textbook, as a reference. Working problems this way -- first relying on your own memory, then referring to your notes, then referring back to the textbook -- will help you figure out what concepts you are missing, and it will improve the
efficiency of your study. For example, if you find you cannot work problems even after referring to your notes, then you know that your notetaking is not sufficiently comprehensive, and you can remedy that as you move on to new material. The more problems you work, the more solid will be your understanding of the material.

Preparing for an exam

When studying for an exam, review your own notes and re-work the example and end-of-chapter problems. Make flash-cards or study questions for each concept in the text and test yourself. For example, if you learn that there are six common strong acids, then make a flash card with the question: "What are the six common strong acids?", then write the answer on the flip-side. Study your flash-cards "both ways": (1) read the questions, then provide the definition from memory; and (2) read the definition, then provide the key term in the question from memory. Make sure your test preparation materials reinforce not only facts, but also your concepts. Continuing with the example of the strong acids, have a separate card in which you ask yourself: "Why are those particular chemical structures strong acids?"

Review: Exams provide feedback on what you really learned

When you get your score on a test, be sure to review the problems you missed and re-study the relevant sections in the textbook. Look back at your notebook to see if the information needed to answer the question can be found there. This will help you determine why you are missing questions. If it is not in your notebook, then you know you are missing critical information in your first read of the text. If you do find the relevant material in your notebook, then you know you need more repetition for the ideas to sink in.

Electronic study resources

Most textbooks include on-line or CD-based study resources, including the on-line homework systems. Students are encouraged to use these electronic resources, but they must appreciate that these materials are no substitute for diligent reading and study of the text itself per the process outlined above.

Getting additional help

If you are having trouble at any point during the course, you are strongly encouraged to come for office hours, but please do so only after making a genuine effort to learn the material. Students should also take advantage of the free Tutorials and Supplemental Instruction (SI) available through the Student Academic Resource Center (SARC, www.sarc.sdes.ucf.edu, Tele: 407-823-5130). These resources have proved to be very helpful for students in the past!

Additional Study Resources