CHEMISTRY 141
General Chemistry II
SUMMER SEMESTER 2007

Lecturer: Dr. Craig C. McLauchlan
Office: 206 Science Laboratory Building (SLB)
Research Lab: 207 SLB
Phone: 438-7019
E-mail: ccmclau@ilstu.edu
Lecture Hours: M, W, F 9:00-11:00 am in JH225
Office Hours: As posted on course web page (typically T 11a-12p) or by appointment (via e-mail or phone call)

Laboratory Coordinator: Dr. C. C. McLauchlan
Laboratory Instructors: Dr. C. C. McLauchlan
Laboratory Hours: T, R 8:30-11:00 am in SLB 104
General Help Session: Wed 12-2, with Dr. McLauchlan


Recommended Texts: R. Wilson, Solutions to Exercises (ISBN: 0-13-009798-5)
J. Hill, Student’s guide (ISBN: 0-13-009795-0)

Course URL(Web Page): http://www.ilstu.edu/~ccmclau/che141/

Course Objective:
At the end of these six weeks students will be able to understand, describe, and apply chemical kinetics, equilibrium, and their thermodynamical basis to general chemical systems. In addition, students will be able to understand the basic principles of electrochemistry, nuclear chemistry, and the chemistry of coordination compounds. They will also be able to relate their chemical knowledge to modern and relevant aspects of chemistry.

Course Description
The course consists of three 120 minute lectures and two 150 minute laboratory session per week. Each student is fully responsible for her/his own performance. Therefore, you are encouraged to keep up to date with the lectures, readings, homework, and laboratory issues.

Lecture Attendance
Your attendance of lectures is expected and encouraged. This will be highly beneficial to you because in a six week course every day is like 2½ days during the semester. The material presented in the lectures is the core of the course and will be the bulk of the examinations. Reading and Homework assignments will be made during lectures regularly and will be posted in the course web site. You will also receive information relevant to your laboratory session. Also, please note the comment at the end of this syllabus that you are responsible for all announcements made in lecture. Attendance in class will also allow you to participate in in-class quizzing, worth 100 points at the end of the semester.
**Topics**
Material to be covered is that of Chapters 10-24, not strictly in that order. Core topics will be the material given during lectures, while special topics will be left to students to read on their own.

**Core topics:**
Chapter 13. Solutions: Solubility, colligative properties.
Chapter 14. Chemical kinetics: Reaction rates, time and concentration, temperature and rates, reaction mechanisms.
Chapter 15. Chemical equilibrium: equilibrium, the equilibrium constant; Le Chatelier’s principle
Chapter 16. Acid-Base equilibria: Acids and bases, the ion product of water, pH, strong acids and bases, weak acids, weak bases, conjugated acid-base pairs
Chapter 17. Additional aspects of aqueous equilibria: The common-ion effect, buffers, acid-base titrations, solubility equilibria, factors affecting solubility, formation of complex ions, precipitation
Chapter 19. Chemical Thermodynamics: Spontaneous processes, reversibility, entropy and the second law of thermodynamics, entropy in reactions, Gibbs free energy, free energy and temperature, free energy and equilibrium.
Chapter 20. Electrochemistry: Red-Ox reactions, voltaic cells, cells emf, emfs and equilibrium, electrolysis.
Chapter 21. Nuclear Chemistry: Radioactivity, nuclear transmutations, radioactive decay, energy changes, fission, fusion
Chapter 24. Chemistry of coordination compounds: Metal complexes, polydentate ligands, chelates, nomenclature, isomerism, color and magnetism, crystal-field theory

**Special Topics:**
Chapter 12: Modern materials: liquid crystals, polymers, biomaterials, ceramics, superconductors, thin films, nanomaterials.
Chapter 13: Colloids
Chapter 14: Catalysis and catalysts, enzymes
Chapter 17: Chemistry of the environment: Atmospheric chemistry (ozone layer depletion), Chemistry of the troposphere (acid rain, smog, world climate), Water chemistry; Green chemistry
Chapter 20: Batteries, fuel cells, corrosion.
Chapter 21: detection of radioactivity, radioactive tracers, beneficial uses of nuclear chemistry.
Chapter 22: Chemistry of non-metals: Hydrogen, noble gases, halogens, oxygen, the other group 6A elements, nitrogen, the other group 5A elements, carbon, the other group 4A elements, boron.
Chapter 23: Metals and metallurgy: pyrometallurgy, hydrometallurgy, electrometallurgy, metallic bonding and properties; alloys, transition metals.

**Laboratory**
The *laboratory humidos* experiments reinforce, through experience, some of the concepts you learn during the lecture. The laboratory introduces you to scientific apparati, collection of scientific data, and the manipulation of chemical reagents and provides you with an opportunity to rationalize results and draw scientific conclusions about experimental observations. Your laboratory instructor will provide details about safety and laboratory policies in their syllabus. **Attendance in the laboratory is mandatory.** There will be NO MAKE-UPS for missed laboratories.
GRADING ISSUES

Remember that your grade in this course is solely your responsibility. I will provide a lot of opportunities for you to do well. Your grade will be based on your performance in the following arenas: in-class quizzes, laboratory (quizzes and reports), and 5 exams (four hour exams and a final exam). In addition, and based on exam performance, I may supply some exam bonus (extra credit) assignments.

1. In-class quizzes: In-class quizzes will be administered periodically during this course. The material covered in each quiz is related to the subject being discussed during the lecture and/or that is assigned for homework. Staying on top of the material is the best way to do well on these quizzes. The quizzes will be taken in class and we may have more than one quiz during any class period. 80% of these quizzes will count towards your final grade – I will drop the lowest 20%.

2. Laboratory: Your laboratory grade is based on lab reports, quizzes, and your laboratory notebook. Quizzes will be administered weekly at the beginning of every laboratory session about the lab to be performed that week. CHE141 has quite strict rules and grading so you are encouraged to familiarize yourself with those policies as supplied by me on a separate sheet. For more information about the laboratory visit the course web page at: http://www.ilstu.edu/~ccmclau/che141/.

3. Exams: There will be three 100 point, 50 min. in-class “hour” exams on the following dates:

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Friday, June 1st</td>
</tr>
<tr>
<td>2</td>
<td>Wednesday, June 13th</td>
</tr>
<tr>
<td>3</td>
<td>Monday, June 25th</td>
</tr>
</tbody>
</table>

The hour exams will be held during the first 50 minutes of our time together.

The final exam is comprehensive and is worth 150 points. It will be 120 minutes long and will be held:

Friday, June 29th

THERE WILL BE NO MAKE-UP EXAMS

For each exam bring only a #2 pencil and a scientific calculator (not programmable, no laptops). A periodic table will be provided. Students late for an examination may not be allowed to take the exam at the discretion of the instructor.

Final Grade: The final grade will be determined through the following algorithm:

<table>
<thead>
<tr>
<th></th>
<th>Maximum number</th>
<th>Points each</th>
<th>Maximum points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best 80 % In-class “quizzes”</td>
<td>?</td>
<td>?</td>
<td>100</td>
</tr>
<tr>
<td>Laboratory Grade</td>
<td>1</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Hour Exams</td>
<td>3</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>Final Exam</td>
<td>1</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>700</td>
</tr>
</tbody>
</table>

The grade scale is:

- ≥595 pts A
- 525-594 pts B
- 455-524 pts C
- 385-454 pts D
- <385 pts F
OTHER POLICIES

1. If the final exam is missed without a valid excuse (valid: medical, legal, domestic emergencies) provided in writing before the exam, then the grade for the final exam will be zero and will result in the assignment of a grade of “F” for the course. If you miss the final with a valid excuse, you will receive an incomplete (I) for the course (see above).

2. If you miss one of the hour exams (i.e. not the final exam) with a valid excuse the grade of the exam will be prorated from all the other exams in the course (including the final exam grade). Owing to the accelerated nature of this course, if a second exam is missed with OR without a valid excuse, a grade of zero will be assigned to that exam. No more than one excusable absence from exams will be allowed.

3. Laboratory is a very important component of the course. A minimum of 10 sessions (there are only 12) MUST be attended to PASS the course. Failure to comply with this policy will result in a grade of “F” for the course regardless of your exam performance.

4. Homework assignments and any changes made to this syllabus will be announced in class. It is your responsibility to attend every lecture and be aware of any announcements.

5. You are responsible for obeying the safety rules in the laboratory. If you are in violation of any of these rules your instructor and/or TA will notify you and suggest a compliance procedure. Failure to comply will result in your immediate suspension from the ongoing laboratory exercise and a grade of zero for that exercise.

6. If you miss a laboratory exercise and have a valid excuse, notify your instructor as soon as possible so he/she can take the appropriate action to assign a grade. Failure to notify may result in a grade of zero for such exercise.

7. Students are expected to follow the Student Code of Conduct.
   (http://www.sdrs.ilstu.edu/Student_Conduct.shtml)

8. Other policies, including, but not limited to, those regarding Academic Integrity, apply according to the Undergraduate Catalog.

Any student needing to arrange a reasonable accommodation for a documented disability should contact Disability Concerns at 438-5853 (voice), 438-8620 (TT/TDD).

DISCLAIMER: Any changes to this syllabus will be announced in class, therefore, it is the responsibility of the student to attend every lecture and be aware of any announcements.