

Lecture, Recitation: Dr. Charles H. Mahler, 321-4351 or 322-8840 (h), [mahler@lycoming.edu](mailto:mahler@lycoming.edu)

Labs: Dr. Jeremy D. Ramsey, 321-4103, [ramsey@lycoming.edu](mailto:ramsey@lycoming.edu), Heim 232

CHM Office Hours: **Heim 202, MWF 10–11 AM, MW 1–2 PM**, by appointment, or drop by.

*If you have questions or comments about anything in the course, please come see me. I am ready and willing to meet with you and discuss your concerns, answer questions, explain concepts, solve problems, etc. I would rather help you to understand something before a quiz or lab or test or other assignment, than to find out you do not understand it while grading your work.*

**Lecture: Monday, Wednesday, Friday**, 11:30 AM to 12:20 PM in Heim G09.

**Recitation: Thursday**, 7:45 to 8:35 AM or 1:00 to 1:50 PM in Heim G09

**Labs: Tuesday**, sections M/MT, 8:45 to 11:35 AM; **Thursday**, sections Q/QT, 8:45 to 11:35 AM; **Thursday**, sections R/RT 2:00 to 4:50 PM; all in Heim 204. (Note: “T” in a lab section means it has afternoon recitation).

Prerequisite: Successful completion of or credit for Chemistry 110

Materials for Course:

- Nivaldo Tro "Chemistry: A Molecular Approach" Second Edition, Prentice-Hall
- Casio FX-260 solar calculator (cannot be shared during exams and quizzes)
- Laboratory Notebook
- Chemistry 111 Lab Manual / Handouts
- Safety glasses or goggles

Evaluation and Grading:

To pass the course you must pass both lecture and lab. Grades will be based on the following:

- |                     |                   |
|---------------------|-------------------|
| • 5 best Quizzes    | 100 points        |
| • Laboratory        | 110 points        |
| • 3 Exams           | 300 points        |
| • <u>Final Exam</u> | <u>140 points</u> |
| TOTAL               | 650 points        |

**All examinations are comprehensive, especially the final**, which is a comprehensive, multiple-choice test, prepared by the American Chemical Society, covering **both** semesters (i.e. Chemistry 110 and 111).

Extra credit: 2 points (to a limit of 13 points), will be given for each Chemistry Colloquium attended.

Alternative extra credit will be available for those whose schedules conflict with colloquium (but you must see me to arrange this by Friday, March 23, 2012).

The final letter grade is determined by this scale: **A** ≥ 90% > **B** ≥ 80% > **C** ≥ 70% > **D** ≥ 60% > **F**. Plus and minus grades are included in these ranges and will be determined at the end of the semester. Adjustments to this scale are possible, but unlikely. To receive a passing grade, you must achieve at least 60% of the points in both the lecture (quizzes, exams) and laboratory portions of this course.

<u>Exams:</u>	<u>Hour Exam 1</u>	Friday, February 10, 2012
	<u>Hour Exam 2</u>	Friday, March 9, 2012
	<u>Hour Exam 3</u>	Friday, April 13, 2012
	<u>Final Exam</u>	1:00 to 4:00 PM, Monday April 23, 2012

Quizzes: There will be six quizzes, each on a Friday. The lowest quiz grade will be dropped. The quiz dates are: January 20, 27; February 3, 24; March 2, 30. Problems on quizzes will be similar to homework problems. (Homework will be assigned, but not collected).

Course Description: A continuation of CHEM 110, with emphasis placed on the foundations of analytical, inorganic, and physical chemistry. Topics include kinetics, general and ionic equilibria, acid-base theory, electrochemistry, thermodynamics and nuclear chemistry. The laboratory treats aspects of quantitative and qualitative inorganic analysis.

Material covered: The chapters to be covered are listed below. More detailed assignments will be posted on the class Moodle page.

<i>Chapter</i>	<i>Topic</i>
11	Liquids, Solids and Intermolecular Forces
12	Solutions
13	Chemical Kinetics
14	Chemical Equilibrium
15	Acids and Bases
16	Aqueous Ionic Equilibrium
17	Free Energy and Thermodynamics
18	Electrochemistry
19	Radioactivity and Nuclear Chemistry

Course Objectives: Upon completion of this course, each student should be able to:

1. Identify types of intramolecular forces, their relative strengths and their effects on physical properties. Interpret phase diagrams and calculate energies associated with phase changes.
2. Express solution concentration in a variety of units. Determine the effect of solute concentration on the colligative properties of the solution.
3. Derive rate laws from experimental data and perform calculations using integrated rate laws. Identify factors that influence the rate of reaction. Understand the relationship between mechanism and the rate law.
4. Describe what is meant by "equilibrium." Write equilibrium expressions and perform equilibrium calculations. Identify how a system at equilibrium will respond when perturbed.
5. Describe acids and bases according to Brønsted-Lowry, Arrhenius and Lewis definitions and explain conjugate acid-base relationships. Conduct pH calculations. Describe how structure influences acid strength.
6. Describe how buffer solutions work and perform buffer calculations. Describe factors that influence the solubility of slightly soluble salts and perform calculations.
7. Describe enthalpy, entropy, and free energy. Determine whether a chemical process will be spontaneous.
8. Describe voltaic and electrolytic cells. Write oxidation-reduction reactions and calculate cell potentials.
9. Demonstrate proficiency with basic laboratory techniques and the ability to work safely in the laboratory environment.

Relevant Departmental and College Learning Goals: This course contributes to the following departmental learning goals, that "Students who complete a major in chemistry will be able to:

1. Exhibit proficiency in the major sub-disciplines of chemistry [intro. physical, analytical, and inorganic]
2. Perform wet laboratory techniques as appropriate...
4. Exhibit integrative, problem-solving skills, such as ... data manipulation, and data interpretation
5. Communicate the results of chemical investigations effectively in written and oral form
7. Demonstrate responsible conduct in the laboratory, including laboratory safety..."

In support of the Lycoming College mission, this course seeks to help students enrolled in it to "develop communication and critical thinking skills" and "explore ... scientific traditions".

Attendance and Absences Policy: Regular attendance at lecture and recitation is **expected**. Students with four or more absences will incur a reduction in their final grade of 2% per day missed (beyond four). I do not distinguish between excused and unexcused absences. In the case of a campus-wide flu outbreak, Lycoming College advises that you do not attend class until any fever has dissipated for 24 hours. I will honor this policy, so *if you find that you have contracted the flu*, you should contact Dr. Mahler (or Dr. Ramsey for lab) using your Lycoming email prior to missing your first class (or lab).

**No** make-up exams will be given. If you miss an exam due to an unforeseen emergency, you need an excuse approved by a Dean or the Provost. The (cumulative) final exam grade (as a percent) will be substituted for **one** excused exam grade (as a percent). Barring exceptional circumstances, **all** subsequent missed exams will receive a grade of zero. If you know that you will be unable to attend class on the day of an exam (for a funeral, health-related circumstance, or Lycoming athletics), it is your responsibility to contact the instructor a week before to arrange to take the exam early. **No examinations will be given after the scheduled exam date/time.**

No makeup quizzes will be given, and all missed quizzes will receive a grade of zero. The lowest quiz grade (of six) will be dropped.

All lab changes and make-ups should be arranged with Dr. Ramsey, who is teaching all lab sections.

Homework: Each chapter will have a set of recommended problems which students are strongly encouraged to work. These will not be collected, but they will be similar to questions on quizzes and exams.

Review Sessions and Moodle: A review session will be held before each exam from 8:30 to 10 PM the Wednesday prior (place to be announced). Final exam review time is TBA.

You are expected to check the course's Moodle website frequently, as it is where the course syllabus, announcements, assignments, answer keys for quizzes and exams, and schedules will be posted. The web address (URL) for Chemistry 111's Moodle page: <http://moodle.lycoming.edu/moodle/course/edit.php?id=1684>

Academic Dishonesty (from the *Student Handbook*):

Academic dishonesty is a willful perversion of truth, or stealing, cheating, or defrauding in instructional matters. Students will have engaged in academic dishonesty if they copied the work of another without attribution, willfully allowed another to copy their work, falsified information, submitted the work of another as though it were their own, or committed other acts of plagiarism or actions deemed to be dishonest by the instructor. **ACADEMIC DISHONESTY IS A VERY SERIOUS CHARGE, WHICH CAN LEAD TO SUSPENSION FROM THE COLLEGE.** All students should become familiar with the rules of academic honesty and apply them in ALL academic work. Instances of academic dishonesty will result in failure of the course and will be reported to the Provost.

Technology Policy: While you are expected to attend and participate in this class, your cell phone, computer, MP3 player, and other personal electronic devices are **not**. Use of such personal electronic devices during class will not be permitted, and will result in your dismissal from the class for the day. This will be counted as a class absence. During exams and quizzes, the use of cell phones, computers, MP3 players, and other personal electronic devices (except non-programmable calculators) will be considered academic dishonesty. This will be reported to the Provost and will result in a zero being awarded for the quiz or examination (No exceptions!).

Electronic devices (cell phones, computers, etc.) may be forbidden in lab. If not, their use is strongly discouraged, as chemicals may damage them. If you choose to use them in lab, it is at your own risk. The only calculator that you may use in this course is the Casio FX-260 Solar. We have taken this step because we have found that some basic scientific calculators produce erroneous results due to the programming utilized

by the manufacturer to round numbers and because we have found that many students have difficulty using scientific calculators. Having one model will allow the instructors to introduce directions for using the calculator that will be applicable to all students in the course. It is suggested that you utilize this calculator even outside of class so that you will become familiar with it. ***Students found using an alternate calculator during an exam or quiz will receive a zero for the assignment (No exceptions!).***

#### General Comments:

Students are responsible for knowing material in the assigned reading, problems, labs, and lectures. Working problems, studying and understanding the material are keys to doing well. It is assumed that the students are familiar with the background material in Chemistry, Physics and Mathematics. While I am glad to help you in reviewing these topics, it is your responsibility to make up any weaknesses or deficiencies you might have. Much of the course material involves a high degree of conceptual understanding (not simple memorization), so adequate preparation and study are essential. It is **not** sufficient to learn the material from the lecture alone - you should read and think about the topics covered **before** attending lecture. If you still can't get a problem or concept, please see me for help. We will cover much detailed and difficult material this semester, so our pace must be geared toward those who are prepared to learn. In homework and exams be neat, box answers, show your work and units (partial credit will be given).

#### College Policies, Disabilities, and Distribution Requirement:

*Administrative procedures* (withdrawals, etc.) will follow the published guidelines and rules of the college and department.

If you have a specific disability and choose to request academic accommodations to meet your needs, please consult with Mr. Dan Hartsock, Co-ordinator of Services for Students with Disabilities. His office is in the Academic Resource Center on the third floor of Snowden Library.

Because this course meets a distribution requirement, it includes a writing component. At least 10 pages of writing will be expected from each student during the semester, some of which will be formally evaluated. If you need help with writing, please feel free to ask the instructors for assistance. You can also get assistance with writing at the writing center on the third floor of Snowden Library

#### Laboratory Attendance and Safety:

Acceptable performance in the laboratory is imperative for success in chemistry and attendance in laboratory is mandatory. **No student will pass the course with less than a score of 60% in the laboratory portion of the course.** You will be expected to arrive to laboratory on-time and be safe. Missing the prelab session may result in your dismissal from the lab for the day. Makeup laboratory experiments will be difficult, if not impossible, and will only be permitted for legitimate reasons. All laboratory makeup sessions must be approved by and arranged through Dr. Ramsey, the laboratory coordinator. Safe laboratory practices, including proper attire, will be expected at all times.

Safe laboratory practices, including proper attire, will be expected at all times. Long pants are required as well as closed toe shoes (no sandals or bare feet). Wearing contact lenses during laboratory session is strongly discouraged. If you feel you need to wear your contact lenses during laboratory session, you should first discuss this with the laboratory coordinator. You will not be permitted to begin any experimental procedures until all safety concerns have been addressed. **Repeated safety violations will cause your expulsion from the laboratory and a zero for the experiment.**