CHEM 111-550: Elements of General Chemistry, Dual Credit

Spring 2016

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Course Description: One-semester course in general chemistry, especially for non-science majors in the health sciences except pre-medicine and medical technology. (Credit not allowed for both CHEM 111 and CHEM 121L.) Meets New Mexico Lower Division General Education Common Core Curriculum Area III: Science (NMCCN 1114). Prerequisite: ACT=>22 or SAT=>510 or MATH 103 or MATH 121 or MATH 150 or MATH 162 or MATH 163 or MATH 180 or MATH 181 or MATH 264

Required Materials

- **Access to the class text**: Introduction to Chemistry, by Bauer, Birk, and Marks. Reading assignments are outlined in the last page of the syllabus.
- **Access to UNM Learn and UNM email**: Grades, homework, and additional materials will be posted on UNM Learn and important class announcements will be made to your UNM email address. Please check your email regularly.
- A **non-programmable calculator** with log/antilog and exponential functions to bring to each class (cell phones and graphing calculators are not acceptable).

Suggested Materials:

- A **periodic table**. A copy of the periodic table used on exams is provided in the Chapter 1 folder.
- A **3-ring binder** for handouts, worksheets, and notes taken during class, as well as a pen/pencil with which to take notes during lectures.

Additional Resources

- **Your high school instructor** will be your most immediate resource for this class.
- **Email**: I can be reached at any time via email. However, due to email volume, I may not respond until the following day but if it has been more than 48 hours and I have yet to get back to you, please send a follow-up email to make sure the first one reached me.
- **Your classmates**: While assignments must be your own work, I encourage you to work together on in-class exercises and discussions out of class. Approaching a problem with multiple points of view allows everyone to benefit, can reveal questions you hadn't expected, and allows you an opportunity to solidify your own knowledge by explaining your understanding to others.

CHEM 111 Course Learning Outcomes

At the end of this course, you should be able to:

1. Use dimensional analysis, the SI system of units and appropriate significant figures to express quantities, convert units and perform quantitative calculations in science.
2. Diagram the structure of the atom in terms of its subatomic particles. Justify the existence and nature of the subatomic particles and the scale of the nucleus using appropriate experiments from scientific history.

3. Use the IUPAC system of nomenclature and knowledge of reaction types to describe chemical changes, predict products and represent the process as a balanced equation.
4. Apply the mole concept to amounts on a macroscopic and a microscopic level and use this to perform stoichiometric calculations including for reactions in solution and gases.
5. Apply the gas laws and kinetic molecular theory to relate atomic level behavior to macroscopic properties.
6. Describe the ways in which atoms combine to form molecules (ionic and covalent). Apply knowledge of electronic structure to determine molecular structure, geometry and hybridization.
7. Analyze how periodic properties (valence, electronegativity, etc.) and reactivity of elements result from electron configurations of atoms.
8. Explain the intermolecular attractive forces that determine physical properties; apply this knowledge to qualitatively evaluate these forces and predict the physical properties that result.
9. Calculate solution concentrations in various units and explain the effects of temperature, pressure and structure on solubility.
10. Explain rates and rate laws; determine the rate, rate law and rate constant of a reaction and calculate concentration as a function of time and vice versa.
11. Explain the collision model of reaction dynamics, including activation energy, catalysts and temperature; derive a rate law from a reaction mechanism and evaluate the consistency of a mechanism with a given rate law.
12. Recognize oxidation-reduction reactions and identify oxidizing and reducing agents.
13. Describe the dynamic nature of chemical equilibrium and its relation to reaction rates; apply Le Chatelier's Principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures.
14. Describe the equilibrium constant and use it to determine whether equilibrium has been established; calculate equilibrium constants from equilibrium concentrations and vice versa.
15. Describe the different models of acids and base behavior and recognize common acids and bases.
16. Apply equilibrium principles to aqueous solutions, including acid-base and solubility reactions; calculate pH and species concentrations in buffered and unbuffered solutions.
17. Recognize the basic radioactive decay modes, compare the penetrating and ionizing power of various types of radiation, fill in a missing species in a balanced nuclear equation and perform half-life calculations for radioactive isotopes.

CLASS POLICIES

Attendance and Participation expectations: Classroom attendance as well as 'virtual' attendance are mandatory. There will be periodic assignments found on UNM Learn; failure to complete these assignments on time will result in being dropped from the class. To ensure the online system is functioning, a start-of-term assignment will be due at the end of the second week (January 29); failure to complete this assignment will also result in being dropped from the class.

Homework: There will be 5 homework assignments over the course of the term, each one covering the material for an exam (four mid-terms and the final); they will be available on UNM Learn for downloading and printing two weeks before they are due. These assignments are intended to provide you with practice

and review over concepts that will be on the associated exam. Homework assignments are due the day of the exam whose material they cover.

Exams: You will be allowed a 3" x 5" HANDWRITTEN notecard for all exams. No additional material may be attached to the card. For the final exam, you will be allowed an 8.5" x 11" HANDWRITTEN reference sheet. You will be provided with a periodic table and scratch paper for each exam. For each exam, bring your UNM ID, a #2 pencil, and a calculator with no programs stored in it (i.e., no graphing calculators will be permitted). Cheating on an exam will result in a grade of F in the class.

Late assignments and make-up policy:

- Homework may be completed late for partial credit, though 5% will be deducted from your assignment grade for every day your homework is late, to a maximum of -100% after 20 days.
- Exams **cannot** be made-up if you are absent. I do drop your lowest midterm exam score, so if you miss one exam, it will not count against your grade.

Grades will be posted on UNM Learn. If you take the final exam, you will not be able to drop the class and will be assigned a letter grade A-F. The grade boundaries below will be finalized at the end of the semester. I WILL NOT change final grades unless there has been a legitimate error in grading.

Regular coursework from your high school instructor: Because this is a dual credit course, coursework assigned by your high school instructor also counts towards your grade in this course. Your instructor's policies regarding late work and grading apply to all coursework they assign.

Your final grade will be based on your progress in the following categories

- Regular coursework from your high school instructor 50%
- Homework assignments 10%
- Four cumulative, in-class tests (lowest will be dropped) 30%
- Mandatory comprehensive final exam 10%

Grades boundaries: A (100-90%), B (89-80%), C (79-70%), D (69-60%), F (59% and below)

Campus policy reminders

Academic honesty: Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, including dismissal, against any student who is found responsible for academic dishonesty. Any student who has been judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course. Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests or assignments; claiming credit for work not done or done by others; hindering the academic wok of other students; and misrepresenting academic or professional qualifications within or outside the University.

Depending on the severity of the offense, students caught cheating may receive a zero on the assignment, be dropped from the course, or receive an 'F' in the course. Don't cheat.

Sexual misconduct and gender discrimination: In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered responsible employees. This designation requires that any report made to a faculty member, TA, or GA regarding sexual misconduct or gender discrimination must be reported to the Office of Equal Opportunity and the Title IX Coordinator. For more information on this policy, see: https://policy.unm.edu/university-policies/2000/2740.html

My advice to you for succeeding in this course

Study better—this is not necessarily the same thing as studying more. Quality over quantity!

- Each chapter has **Learning Outcomes** posted on UNM Learn; you can use these as study guides to check whether you can accomplish the specific tasks laid out in each outcome.
- **Don't just read the textbook over and over again**; instead, try summarizing key points from each section, in your own words, and identifying subjects that you can't satisfactorily explain as areas for further study.
- Do **practice problems** from the textbook and on practice exams—don't just read the answers!
- Any time you make an error or get an incorrect answer, re-cover that topic to make sure you understand what you did incorrectly and how to avoid the same problem in the future.
- **Form study groups!** You benefit when you explain a concept to another student and when another student can do the same for you, and everyone benefits from approaching problems from multiple angles.

Above all, please don't be afraid to ask for help! If you find that you are struggling with any aspect of the course, talk to your instructor as soon as possible. We are here to help you succeed in chemistry and can also help with developing your own study and preparation strategies.

Schedule of Topics and Exams for Fall 2015

Subject to change based on testing schedule, but the final exam must be completed no later than 5/13.
Note that a start of term assignment, found online in the Exam 1 folder, is due January 29th at 11:59 PM.

Belen HS	Los Lunas HS	Topic and reading coverage (Intro to Chemistry by Bauer, Birk, and Marks)
1/20	1/20	Introduction, Matter and Energy (1.1-1.4, Toolboxes 1.1-1.3)
1/25	1/25	Atomic Structure and the Periodic Table (2.1-2.5)
1/27	1/27	Chemical Compounds (3.1-3.3)
1/29	2/1	Nomenclature (3.4-3.7)
2/2	2/3	Chemical Composition, Empirical Formulas, and Solutions (4.1-4.4, Toolbox 4.1)
2/4	**2/8**	**Exam 1 (Chapters 1-4), HW 1 is due**
2/8	2/10	Chemical Reactions (5.1-5.5)
2/10	2/15	Balanced Reaction Calculations (6.1-6.3)
2/16	2/17	Limiting Reagents (6.4-6.7)
2/18	2/22	Electron Configuration (7.2.7.6)
2/22	2/24	Periodic Properties (7.7)
2/24	2/29	Chemical Bonding (8.1-8.3)
2/26	3/2	VSEPR and Polarity (8.4)
3/1	**3/7**	**Exam 2 (Chapters 5-8), HW 2 is due**
3/3	3/9	Intermolecular Forces (10.1-10.3)
3/7	3/14	Solubility and Solution Stoich (11.1-11.3, 11.5)
3/9	3/16	Reaction Rates (12.1-12.3)
3/11	3/21	Chemical Equilibrium (12.4-12.6)
3/15	3/23	Acids and Bases (13.1-13.3)
3/17	3/28	pH and Buffers (13.4-13.6)
3/21	**3/30**	**Exam 3 (Chapters 10-13), HW 3 is due**
3/25-4/3	*4/4-4/8*	*Spring break*
4/4	4/11	The Ideal Gas Law and Kinetic Molecular Theory (9.1-9.5)
4/6	4/13	Organic Chemistry (16.1-16.9) *see coverage note on UNM Learn in April
4/12	4/18	Protein Denaturation lab (Dr. TK visit)
4/14	4/20	Proteins and DNA (17.1-17.2)
4/18	4/25	Oxidation-Reduction (14.1-14.2)
4/20	4/27	Nuclear Chemistry (15.1-15.3)
4/26	**5/2**	**Exam 4 (Chapters 9, 14-17), HW 4 is due**
4/28	5/4	Review for Final Exam (Dr. TK visit)
5/4	**5/9**	**Final Exam, Final HW is due**

Important university deadlines:

January 29	Last day to add course, change section, or change grade mode on LoboWeb
February 5	Last day to drop without a grade and with 100% refund
April 15	Last day to drop without approval Student Services
May 6	Last day to change grade mode in person with form or drop with approval of Student Services