

CHEM 111-501: ELEMENTS OF GENERAL CHEMISTRY

Fall 2015

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Drop-in office hours (A134): MT 1:00-2:30 PM,
WR 2-3 PM

STEM center hours: T 10 AM – noon

Class: MW 10:30-11:45 in A127

Lab: W, noon-2 in A128

Supplemental Instruction: Austin Leydecker,
hours TBD

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

- o **Online homework system through McGraw-Hill Connect/LearnSmart (LS):** If you do not already have an access code, you may purchase one by going to our course's Connect website (<http://connect.mheducation.com/class/toewskeating-501>) and click 'Register.' You will be asked for your email address and then given the option to purchase a bundle containing access to Connect/LearnSmart and the e-book (there is also a trial period option—if you choose this, make sure you purchase the full access option before the expiration of the trial period).
- o **Access to the class text:** Introduction to Chemistry, by Bauer, Birk, and Marks. Reading assignments are outlined in the syllabus and will also be posted/updated on LearnSmart/Connect. You automatically receive access to the e-book upon purchasing the homework system; if you would like a physical copy, you may purchase a current or previous edition of the text from any source; the 4th version is the most recent one, but previous versions can be found online for considerably cheaper. I will also be placing two to three copies on reserve at the library.
- o **Access to UNM Learn and UNM email:** Grades 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. Valencia provides internet and computer access at the library, Learning Resource Center and STEM center.
- o A **non-programmable calculator** with log/antilog and exponential functions to bring to each class (cell phones are not acceptable).
- o **Personal Protective Equipment** (safety goggles, lab coat, close-toed non-high-heeled shoes, socks, clothing covering lower extremities) for 'wet lab' days.

Suggested Materials:

- o A **periodic table**. I will provide copies of the table I give you on exams for the first week but I strongly suggest that you bring a periodic table to every class period.
- o A **3-ring binder** for handouts, worksheets, and notes taken during class, as well as a pen/pencil with which to take notes during lecture

Additional Resources

- o **Drop-in office hours and help sessions:** Our SI leader and I will both have regular office hours which will also periodically function as help sessions before exams. Please make use of this time—office hours allow us to give you more individualized help! The schedule can be found on Learn in the Course Information folder and at the top of this syllabus.
- o **Appointments:** If you would like to discuss something in person or have a problem to address but cannot make my regular office hours, email me and we arrange some other time to meet.
- o **Email:** You can also reach us via email; due to email volume, I ask that you include Chem111 in the subject line. If we haven't responded to you in 48 hours, consider sending a follow-up email as your first email may have been buried in a large volume of emails.
- o **STEM center:** UNM-Valencia provides tutoring and faculty mentorship to help students achieve success in STEM courses. You may use their facilities for individual and/or group tutoring sessions, both on an appointment and walk-in basis. Additionally, I spend two hours there each week to provide help and answer questions. Please visit their website for hours of operation and additional contact information (<http://vcstem.unm.edu>); the STEM center is located in the Learning Resource Center, room 108.
- o **Your classmates:** While homework, lab reports, and exams 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 expectations: Attendance in lecture and lab/recitation is mandatory. I will exercise my discretion to drop you from the course after 2 unexcused absences, without notice; likewise, any student who misses the first two lectures of the term will be dropped. If you must miss a lecture or lab, email me ASAP in order to avoid an unexcused absence. Lectures and labs will begin promptly; late arrival or leaving early is disrespectful of your classmates. In special cases, please discuss this with me.

Class preparation: Reading Quiz assignments will be available on LearnSmart/Connect one week before they are due. Before each class, you should read the assigned sections in the textbook and complete the assignment. The questions are generally intended to be worked in 15-30 minutes and will typically cover basic concepts and definitions. These assignments are due the night before class at 11:59 PM; you may complete them after the due date for practice, but will receive no credit. At the beginning of the week, you will also have a 'muddy point' assignment, in which I ask you to consider the previous week's material and note one concept that you would like to see reviewed in class.

Class participation: Some portion of every class period will be spent working on in-class exercises, which will be collected for a grade. I encourage and will sometimes require you to work in small groups, but unless otherwise specified, the worksheet you turn in at the end of class must be your own work. These worksheets cannot be made up if you miss a class.

Homework: Weekly homework assignments will be available on Connect the week before they are due. In general, homework covering material up until a given Wednesday must be completed by the following Wednesday night at 11:59 PM (due dates and coverage may be modified based on exam placement and Fall/Thanksgiving breaks). Homework assignments are intended to give you additional practice on difficult concepts as well as opportunities to synthesize the knowledge you have acquired in new ways. These assignments should take 2-3 hours and can be completed in several 'sessions' (which is a better idea than starting Wednesday night).

Lab/Recitation: Our weekly lab/recitation time will be used for experiments, quizzes, demonstrations, problem solving, lecture, and review sessions. Information covered during these periods will be on exams.

- o Personal Protective Equipment (PPE) is required for lab experiments and consists of: **goggles, closed flat shoes** (no high heels, no exposed toes or heels), **clothing covering your lower extremities**, and **lab coats**. You will not be allowed in lab without proper PPE on lab days (indicated on the syllabus).
- o You are responsible for reading the lab materials ahead of time and completing the Pre-Lab Assignment, as well as writing up and analyzing your results in Post-Lab assignments. On days we do not conduct experiments, we will have lab worksheets, which may or may not include a pre-lab portion.
- o Points will be deducted for tardiness, lab safety violations, and other class disruptions.
- o Your lowest lab grade will be dropped.

Exams: You will be allowed a 3" x 5" HANDWRITTEN notecard for all exams. I will provide you with a notecard the week before each exam. 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:

- o Reading quizzes and muddy points will not be accepted late
- o Homework may be completed late for partial credit, though 10% will be deducted from your assignment grade for every day your homework is late (late penalty is capped at -50%).
- o Late post- and pre-labs will not be accepted unless they are late because you were absent the day they were due.
 - If you miss a lab for any reason, turn in any assignment that was due that day as soon as possible, but no later than the next class section you are able attend. We can discuss arrangements when you email me in order to avoid an unexcused absence.
- o Exams, labs, and worksheets completed in-class cannot be made-up if you are absent. You are welcome to complete worksheets for days and labs you missed, but they will not be accepted for credit. 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; Connect/LearnSmart will only contain your class prep and homework grades. 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.

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

- | | |
|---|-----|
| o Class preparation (reading quizzes, muddy points) | 10% |
| o In-class participation/worksheets | 10% |
| o Weekly homework assignments | 20% |
| o Lab Assignments | 20% |
| o Four cumulative, in-class tests (lowest will dropped) | 30% |
| o 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

Equal Access Services: If you have a documented disability or psychological/medical condition that may affect your performance in this class, please register with Equal Access Services as soon as possible so I can provide your accommodations in a timely manner. EAS can provide a quiet place to take exams, additional time, and additional services if there is a documented need. For more information, please see their website at <http://www.unm.edu/~vcadvise/equalaccess.htm>.

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 work 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.

My advice to you for succeeding in this course

Keep up with the reading and class preparation assignments! Because I expect you to come to class having completed the relevant reading, we will spend little time on definitions and instead focus on applying concepts from the text and tackling more difficult problems. In other words, you will not get the full benefit of class without preparation.

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 me as soon as possible. If you feel lost, plan to attend at least one SI session or office hour a week and bring a list of specific questions. 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

Any changes will be announced on UNM Learn, the UNM email system, and LearnSmart/Connect if applicable

Unless otherwise noted in the "Assignment notes" column, you can expect the following assignments to be due every week:

Sundays, 11:59 PM: Reading quiz over Monday's reading AND muddy point over last week's topics

Tuesdays, 11:59 PM: Reading quiz over Wednesday's reading

Wednesdays at the beginning of the lab session: this week's pre-lab and last week's post-lab/worksheet

Due at 11:59 PM on the specified day: Homework typically covering topics from the previous week

Week starting (Sunday)...	Class on Monday	Class on Wednesday	Lab on Wednesday (Bold text indicates required PPE*)	Assignment notes
Aug 16 Week 1	Introduction, Matter and Energy (1.1-1.4)	Problem Solving and Conversions (Toolboxes 1.1-1.3)	Safety, Measurement, Sig Figs (Toolbox 1.2)	Tue: Reading quiz covers all of chapter 1, no HW or muddy point this week
Aug 23 Week 2	Atomic Structure (2.1-2.3)	Periodic Table (2.4-2.5)	More Conversions	Wed: Chapter 1 HW
Aug 30 Week 3	Chemical Compounds (3.1-3.3)	Chemical Composition (4.1-4.3, Toolbox 4.1)	Nomenclature (3.4-3.7)	Wed: Chapter 2 HW, extra credit math review
Sep 6 Week 4	No Class: Labor Day	Empirical formulas and Solutions (4.3-4.4)	Dilutions lab (4.4)	Sun: Muddy point is still due, no reading quiz Wed: Chapter 3 HW
Sep 13 Week 5	Exam 1 (Chapters 1-4)	Chemical Reactions (5.1-5.3)	Chemical Reactions Lab (5.4-5.5)	Sun: Chapter 4 HW, no reading quiz or muddy point
Sep 20 Week 6	Balanced Reaction Calculations (6.1-6.3)	Limiting Reagents (6.4-6.7)	Electron Configuration (7.2-7.6)	Wed: Chapter 5 HW
Sep 27 Week 7	Periodic Properties (7.7)	Chemical Bonding (8.1-8.3)	VSEPR and Polarity (8.4)	Wed: Chapter 6 HW Sat: Chapter 7 HW
Oct 4 Week 8	Review Chapters 5-8	Exam 2 (Chapters 5-8)	Mystery Lab	Sun: Muddy point but no reading quiz Tue: Chapter 8 HW
Oct 11 Week 9	Intermolecular Forces (10.1-10.3)	Solubility and Solution Stoichiometry (11.1-11.3, 11.5)	Intermolecular Forces Lab	Reading quizzes still due, but no HW or muddy point this week
Oct 18 Week 10	Reaction Rates 12.1-12.3)	Chemical Equilibrium (12.4-12.6)	Equilibrium Lab	Wed: Chapter 11 HW
Oct 25 Week 11	Acids and Bases (13.1-13.3)	pH and Buffers (13.4-13.6)	Acids and Bases Lab	Wed: Chapter 12 HW
Nov 1 Week 12	Exam 3 (Chapters 10-13)	Ideal Gas Law and Kinetic Molecular Theory (9.1-9.5)	The Ideal Gas Law (9.1-9.3)	Sun: Chapter 13 HW, no muddy point or reading quiz

Nov 8 Week 13	Oxidation-Reduction (14.1-14.2)	Nuclear Chemistry (15.1-15.3)	Mystery Lab	Wed: Chapter 9 HW
Nov 15 Week 14	Organic Chemistry (16.1-16.9)	Proteins and DNA (17.1-17.2)	Mystery Lab	Wed: Chapter 14/15 HW
Nov 22 Week 15	Biochemistry Topics (TBA)	Review Chapters 9, 14-17	Open Review	Wed: Chapter 16/17 HW
Nov 29 Week 16	Exam 4 (Chapters 9, 14-17)	Review for final exam	Review of cumulative practice exam	Sun: No reading quiz or muddy point Wed: Final HW

Final Exam: Monday, December 7 from 10:30 AM-12:30 PM in A127

Important university deadlines:

August 28	Last day to add course, change section, or change grade mode on LoboWeb
September 4	Last day to drop without a grade and with 100% refund
September 11	Last day to change grade mode in person using a form
November 6	Last day to drop without approval Student Services