CHEM-111 Elements of General Chemistry

Spring 2019 – Section 502 – CRN 35932

Instructor: Dr. Jerry Godbout

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Office Hours: Monday 1:00 pm – 4:00 pm,
Tuesday 3:00 pm – 4:00 pm
Wednesday 3:00 pm – 4:00 pm, and anytime by appointment

Meeting Times: Lecture: Tuesday & Thursday 12:00 – 1:15 pm, HS 101
Lab/Recitation: Thursday 1:30 – 3:30 pm, VAAS 128

COURSE DESCRIPTION 1: The study of stuff, and what it does

COURSE DESCRIPTION 2: 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.
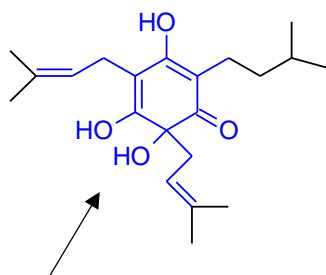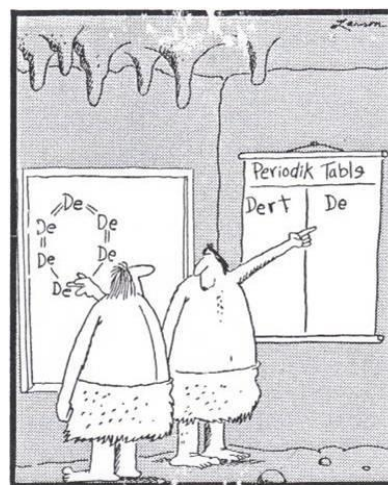

What is this molecule? Tell me (email) for some extra credit!

Guess which one is the instructor's, and guess which one is has gone through various committees and perhaps a lawyer or two?

Early chemists describe the first dirt molecule

WHAT YOU'LL LEARN
COURSE TEACHING & LEARNING OUTCOMES
Relevant sections are given in [brackets] after each SLO
By the end of this course, a successful student will 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. [Appendix B, 1.4 – 1.6]
2. Diagram the structure of the atom in terms of its subatomic particles; and justify the existence and nature of the subatomic particles and the scale of the nucleus using appropriate experiments from scientific history. [2.2 – 2.3]
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. [3.7, 4.3]
4. Apply the mole concept to amounts on a macroscopic and microscopic level and use this to perform stoichiometric calculations including for reactions in solution and gases. [2.4, 6.1 – 6.4, 7.3, 8.3]
5. Apply the gas laws and kinetic molecular theory to relate atomic level behavior to macroscopic properties. [8.1 – 8.5]
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. [4.1 – 4.6, 5.1 – 5.3]
7. Analyze how periodic properties (valence, electronegativity, etc.) and reactivity of elements result from electron configurations of atoms. [3.5 – 3.7]
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. [10.1 – 10.2]
9. Calculate solution concentrations in various units and explain the effects of temperature, pressure and structure on solubility. [11.1 – 11.4]
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. [17.1 – 17.5]
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. [17.6]
12. Recognize oxidation-reduction reactions; and identify oxidizing and reducing agents. [16.1 – 16.2]
13. Describe the dynamic nature of chemical equilibrium and its relation to reaction rates; and apply Le Chatelier's Principle to predict the effect of concentration, pressure and temperature changes on equilibrium mixtures. [13.1 – 13.3]
14. Describe the equilibrium constant and use it to determine whether equilibrium has been established; and calculate equilibrium constants from equilibrium concentrations and vice versa. [13.4]
15. Describe the different models of acids and base behavior and recognize common acids and bases. [14.1 – 14.4]
16. Apply equilibrium principles to aqueous solutions, including acid-base and solubility reactions; calculate pH and species concentrations in buffered and unbuffered solutions. [14.5 – 14.7]
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. Time permitting [20.1 – 20.3]

If none of these make any sense to you at the beginning of the semester – No problem!
We're literally here so you can learn this stuff!

WHAT YOU'LL NEED
(COURSE MATERIALS)

- **Text** Atoms First from OpenStax, Print ISBN 1938168151, Digital ISBN 1947172182, www.openstax.org/details/chemistry-atoms-first Go to the following web address or scan the QR code on the right. This textbook is available for free online! If you prefer, you can also get a print version at a very low cost. The text is available in web view and PDF for free. You can also choose to purchase on iBooks or get a print version via from Open-Stax on Amazon.com. You can use whichever formats you want. Web view is recommended -- the responsive design works seamlessly on any device. If you buy on Amazon, make sure you use the link on your book page on openstax.org so you get the official OpenStax print version. (Simple printouts sold by third parties on Amazon are not verifiable and not as high-quality.)

  Course Text

  Access to UNM Valencia networks, UNM Learn and UNM email: Network access is necessary for some lab activities. Course 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 campus provides internet and computer access at the library, Learning Resource Center, and STEM center.
- **Safety glasses/goggles for lab:** please purchase those in the bookstore to avoid any question of their safety rating
- **USB Flash drive:** to save data collected in lab. Any size is fine, and it does not need to be dedicated to this class
- **A NON-PROGRAMMABLE scientific calculator** with log/antilog and exponential functions: TI-30Xa TI-30X IIS TI-30XS Casio or Sharp equivalents (**cell phones and graphing calculators are not acceptable**). Visit http://www.vrcworks.net/blog/how-to-identify-calculator-is-programmable-or-nonprogrammable-calculator/ will help you tell the difference, or ask your instructor.
- **A notebook (or space in a binder) to**
  - start every new chapter with new vocabulary by Matching Definitions with Key Terms (available as pdf documents on UNM Learn);
  - write down, space out the problems/questions, and to show your work before you submit answers electronically; (3) have it readily available when working with fellow classmate(s), tutor(s) and/or instructor; (4) use as review/study material.
- **Lecture and Lab/Recitation Binder(s)** to organize printed material.

How Do I Earn All Those Points?
(Exams, Quizzes, Homework, and the Like)

	How Many	Points Each	Points Total
Final Exam	1	150	150
In-class Exams	4	130	520
Homework	16	14	224
Quizzes	24	7	168
Attendance	28	8	224
Labs/Rec	14	18	252
Total			1500*

*If you do the math, you will notice that this adds up to 1538 points. The scale however, is based in 1500 points, so there 63 points of extra credit. In addition, the 130-point in-class exams will actually have 140 points. This means that there are actually a total of 78 points of extra credit possible.

Exams

Think of these as opportunities for you to show just how much you have learned. The exam format consists of three types of questions: multiple-choice, short-answer, and multiple part. To help you figure out how well you understand the material, approximately a week in before each exam, a Practice Exam with the Answer Key will be published for students' use

There are 4 scheduled in-class, tentatively on the dates below, although the instructor reserves the right to alter course schedule as the semester progresses. Students will be given advance notice of any change.

	Chapters	Date
Exam 1	1 – 3	Tue, 05 Feb
Exam 2	4, 6, 7	Tue, 05 Mar
Exam 3	9 – 11	Thu, 04 Apr
Exam 4	13, – 15, 16	Tue, 30 Apr
Final	1 – 4, 6 – 11, 13 – 17	Thu, 09 Apr

How Many Points Do I Need For an A?
(What's the grading scale?)

Earn This Many Points	Get This Grade
1425	A+
1350	A
1320	A-
1275	B+
1200	B
1170	B-
1125	C+
1050	C
1020	C-
975	D+
900	D
870	D-
825	F+

What Will Each Class Be Like?
- **Review Online Quiz**: covering material recently covered and any assigned preparation (reading, video, etc)
- **Course Business**
- **Group Activity:** collaborative exercise to help you master that day's topic
- **Reflection:** an opportunity to put the day's lesson into larger perspective, and formulate/ask questions

What Will My Routine Be Like?
- **Before Class**: complete any prepatory assignment (reading, video, etc)
- **During Class:** work with your group to master concepts. The more you put in, the more you'll get out
- **After Class:** work on homework assignment relevant to that day's topic (review notes, **WORK ON PROBLEMS**, think of questions for office hour visits, **MORE PROBLEM**S, etc.)
- **Repeat 29 times!**

WHEN WE LEARN THIS STUFF?
(Schedule is approximate and subject to change by the instructor)

Mtg	Date	Lecture Topics
1	Tue 15 Jan	
2	Thu 17 Jan	Math you'll need to know(1.4 – 1.6, Appendix B)
3	Tue 22 Jan	Atoms, Molecules, and Ions (2.1 – 2.4)
4	Thu 24 Jan	Electronic Structure and Periodic Properties of Elements (3.1 – 3.7)
5	Tue 29 Jan	
6	Thu 31 Jan	
7	Tue 05 Feb	**Exam 1 (Chapters 1 – 3)**
8	Thu 07 Feb	
9	Tue 12 Feb	
10	Thu 14 Feb	Chemical Bonding and Molecular Geometry (4.1 – 4.6)
11	Tue 19 Feb	Composition of Substances and Solutions (6.1 – 6.4)
12	Thu 21 Feb	Stoichiometry of Chemical Reactions (7.1 – 7.4)
13	Tue 26 Feb	
14	Thu 28 Feb	
15	Tue 05 Mar	**Exam 2 (Chapters 4, 6, 7)**
16	Thu 07 Mar	
17	Tue 19 Mar	Gases (8.1 – 8.5)
18	Thu 21 Mar	Thermochemistry (9.1 – 9.4)
19	Tue 26 Mar	Liquids and Solids (10.1 – 10.6)
20	Thu 28 Mar	Solutions and Colloids (11.1 – 11.4)
21	Tue 02 Apr	
22	Thu 04 Apr	**Exam 3 (Chapters 9 – 11)**
23	Tue 09 Apr	
24	Thu 11 Apr	Kinetics (17.1 – 17.7)
25	Tue 16 Apr	Fundamental Equilibrium Concepts (13.1 – 13.4)
26	Thu 18 Apr	Acid-Base Equilibria (14.1 – 14.7)
27	Tue 23 Apr	Equilibria of Other Reactions Classes (15.1 – 15.2)
28	Thu 25 Apr	
29	Tue 30 Apr	**Exam 4 (Chapters 13 – 16)**
30	Thu 02 May	Electrochemistry (16.1 – 16.3)
	Thu 09 May	**Final Exam (12:00 – 2:00 pm)**

Other Things That Aren't Chemistry, But Are Still Important
(Class Policies and Important Dates)

- **Be There** Attendance in lecture and lab/recitation is mandatory. Students are expected to attend all meetings of the classes in which they are enrolled.
  - A student with excessive absences may be dropped from a course by the instructor with a grade of WP or WF or the student may receive a grade of F at the end of the semester.
  - I will exercise my discretion without notice to drop any student who:
    - misses the first two meetings;
    - has not completed any assignments in Connect by the end of the 2nd week;
    - after 2 consecutive unexcused absences;
    - after 4 total absences.
  - An excused absence must be communicated.
  - Students are limited to 2 excused absences BUT they may not be used for days of Exams

- **Be on time.** Lectures and labs/recitations will begin promptly. After 10 minutes, a student will be counted absent. Late arrival or early departure is unacceptable. Absences due to illness or any mitigating circumstance are unavoidable but must be documented or approved in advance. If you must miss a lecture or lab, email me ASAP in order to get your absence excused and discuss when you will turn in or make up any allowable assignments. Students are responsible for all assignments regardless of attendance.

- **Your job begins when class ends:** Electronic homework will be assigned regularly and will be available for a week and over a weekend. Your answers (worked out in your Homework Notebook) are to be submitted and scored on Connect. Late homework will not be accepted.

Important Dates & Holidays	
Fri 25 Jan 2019	Last day to register, ADD sections, and change credit hours Enrollment cancellation for non-payment
Mon 21 Jan 2019	University Holiday – Martin Luther King Day
Fri 01 Feb 2019	Last Day to DROP without "W" grade and 100% tuition refund on LoboWEB,
Fri 08 Feb 2019	Last Day to CHANGE grade option
Sun 10 Mar 2019	Spring Break (through Sat 16 Mar 2019)
Fri 12 Apr 2019	Last Day to withdraw **WITHOUT** Dean's Permission
Fri 03 May 2019	Last Day to withdraw **WITH** Dean's Permission
Thu 09 May 2019	Final Exam (for this section)

Other Things That Aren't Chemistry, But Are Still Important
(University Policies)

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 https://valencia.unm.edu/students/advisement-and-counseling/equal-access-services.html, or scan the QR code at right:

Equal Access Services

Academic Integrity

Having academic integrity is paramount to your success in any class. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. Here is the link to the UNM Academic Dishonesty Policy:

https://policy.unm.edu/regents-policies/section-4/4-8.html. or scan the QR code at right:

The policy states:

Academic Integrity Policy

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, up to and including dismissal, against any student who is found guilty of academic dishonesty or who otherwise fails to meet the expected standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

Academic Dishonesty is defined as:

"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; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

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." by the Department of Education (see page 15 - http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). 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, https://policy.unm.edu/university-policies/2000/2740.html or scan the QR Code at right:

Title IX Policy