

# CHEM-111 Elements of General Chemistry

Summer 2018 – Section 501 – CRN 14699

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Office Hours: TBD, and anytime by appointment

Meeting Times: Lecture: Tuesday & Thursday 9:00 – 11:30 am, VHS 101  
Lab/Recitation: Thursday 12:00 – 2:00 pm, VAAS 128

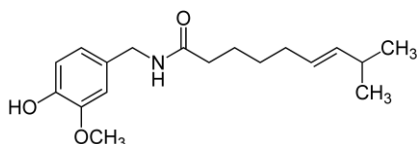
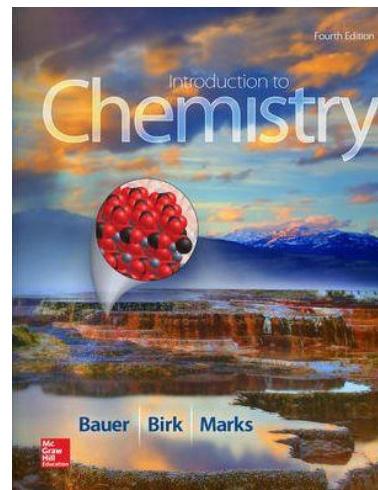
COURSE DESCRIPTION 1: The study of stuff, and what it does

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.

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

Periodic Table of the Elements

|                            |                           |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          |                             |                            |                           |                          |                           |                          |
|----------------------------|---------------------------|-------------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|------------------------------|------------------------------|--------------------------|-----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|
| 1                          |                           |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          |                             |                            |                           |                          |                           | 18                       |
| H<br>Hydrogen<br>1.008     |                           |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          |                             |                            |                           |                          |                           | He<br>Helium<br>4.003    |
| 2                          |                           |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          |                             |                            |                           |                          |                           |                          |
| 3                          | 4                         |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          | 13                          | 14                         | 15                        | 16                       | 17                        | 18                       |
| Li<br>Lithium<br>6.941     | Be<br>Beryllium<br>9.012  |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          | B<br>Boron<br>10.811        | C<br>Carbon<br>12.011      | N<br>Nitrogen<br>14.007   | O<br>Oxygen<br>15.999    | F<br>Fluorine<br>18.998   | Ne<br>Neon<br>20.180     |
| 11                         |                           |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          |                             |                            |                           |                          |                           |                          |
| Na<br>Sodium<br>22.990     | Mg<br>Magnesium<br>24.305 |                               |                            |                             |                            |                            |                            |                            |                              |                              |                          | Al<br>Aluminum<br>26.982    | Si<br>Silicon<br>28.086    | P<br>Phosphorus<br>30.974 | S<br>Sulfur<br>32.064    | Cl<br>Chlorine<br>35.453  | Ar<br>Argon<br>39.948    |
| 19                         | 20                        | 21                            | 22                         | 23                          | 24                         | 25                         | 26                         | 27                         | 28                           | 29                           | 30                       | 31                          | 32                         | 33                        | 34                       | 35                        | 36                       |
| K<br>Potassium<br>39.098   | Ca<br>Calcium<br>40.078   | Sc<br>Scandium<br>44.956      | Ti<br>Titanium<br>47.867   | V<br>Vanadium<br>50.942     | Cr<br>Chromium<br>51.996   | Mn<br>Manganese<br>54.938  | Fe<br>Iron<br>55.845       | Co<br>Cobalt<br>58.933     | Ni<br>Nickel<br>58.693       | Cu<br>Copper<br>63.546       | Zn<br>Zinc<br>65.38      | Ga<br>Gallium<br>69.723     | Ge<br>Germanium<br>72.631  | As<br>Arsenic<br>74.922   | Se<br>Selenium<br>78.971 | Br<br>Bromine<br>79.904   | Kr<br>Krypton<br>83.798  |
| 37                         | 38                        | 39                            | 40                         | 41                          | 42                         | 43                         | 44                         | 45                         | 46                           | 47                           | 48                       | 49                          | 50                         | 51                        | 52                       | 53                        | 54                       |
| Rb<br>Rubidium<br>84.464   | Sr<br>Strontium<br>87.62  | Y<br>Yttrium<br>88.906        | Zr<br>Zirconium<br>91.224  | Nb<br>Niobium<br>92.906     | Mo<br>Molybdenum<br>95.94  | Tc<br>Technetium<br>98.906 | Ru<br>Ruthenium<br>101.07  | Rh<br>Rhodium<br>101.07    | Pd<br>Palladium<br>106.42    | Ag<br>Silver<br>107.868      | Cd<br>Cadmium<br>112.411 | In<br>Indium<br>114.818     | Sn<br>Tin<br>118.710       | Sb<br>Antimony<br>121.760 | Te<br>Tellurium<br>127.6 | I<br>Iodine<br>126.905    | Xe<br>Xenon<br>131.29    |
| 55                         | 56                        | 57-71                         | 72                         | 73                          | 74                         | 75                         | 76                         | 77                         | 78                           | 79                           | 80                       | 81                          | 82                         | 83                        | 84                       | 85                        | 86                       |
| Cs<br>Cesium<br>132.905    | Ba<br>Barium<br>137.327   | Lanthanides                   | Hf<br>Hafnium<br>178.49    | Ta<br>Tantalum<br>180.948   | W<br>Tungsten<br>183.84    | Re<br>Rhenium<br>186.207   | Os<br>Osmium<br>190.23     | Ir<br>Iridium<br>192.222   | Pt<br>Platinum<br>195.084    | Au<br>Gold<br>196.967        | Hg<br>Mercury<br>200.592 | Tl<br>Thallium<br>204.383   | Pb<br>Lead<br>207.2        | Bi<br>Bismuth<br>208.980  | Po<br>Polonium<br>209    | At<br>Astatine<br>210     | Rn<br>Radon<br>222       |
| 87                         | 88                        | 89-103                        | 104                        | 105                         | 106                        | 107                        | 108                        | 109                        | 110                          | 111                          | 112                      | 113                         | 114                        | 115                       | 116                      | 117                       | 118                      |
| Fr<br>Francium<br>223      | Ra<br>Radium<br>226       | Actinides                     | Rf<br>Rutherfordium<br>261 | Db<br>Dubnium<br>262        | Sg<br>Seaborgium<br>263    | Bh<br>Bohrium<br>264       | Hs<br>Hassium<br>265       | Mt<br>Meitnerium<br>266    | Ds<br>Darmstadtium<br>267    | Rg<br>Roentgenium<br>268     | Cn<br>Copernicium<br>269 | Uut<br>Ununtrium<br>270     | Fl<br>Flerovium<br>271     | Uup<br>Ununpentium<br>272 | Lv<br>Livermorium<br>273 | Uus<br>Ununseptium<br>274 | Uuo<br>Ununoctium<br>275 |
| 57                         | 58                        | 59                            | 60                         | 61                          | 62                         | 63                         | 64                         | 65                         | 66                           | 67                           | 68                       | 69                          | 70                         | 71                        |                          |                           |                          |
| La<br>Lanthanum<br>138.905 | Ce<br>Cerium<br>140.12    | Pr<br>Praseodymium<br>140.908 | Nd<br>Neodymium<br>144.242 | Pm<br>Promethium<br>144.913 | Sm<br>Samarium<br>150.36   | Eu<br>Europium<br>151.964  | Gd<br>Gadolinium<br>157.25 | Tb<br>Terbium<br>158.925   | Dy<br>Dysprosium<br>162.500  | Ho<br>Holmium<br>164.930     | Er<br>Erbium<br>167.259  | Tm<br>Thulium<br>168.934    | Yb<br>Ytterbium<br>173.055 | Lu<br>Lutetium<br>174.967 |                          |                           |                          |
| 89                         | 90                        | 91                            | 92                         | 93                          | 94                         | 95                         | 96                         | 97                         | 98                           | 99                           | 100                      | 101                         | 102                        | 103                       |                          |                           |                          |
| Ac<br>Actinium<br>227      | Th<br>Thorium<br>232.038  | Pa<br>Protactinium<br>231.036 | U<br>Uranium<br>238.029    | Np<br>Neptunium<br>237.048  | Pu<br>Plutonium<br>244.064 | Am<br>Americium<br>243.061 | Cm<br>Curium<br>247.070    | Bk<br>Berkelium<br>247.070 | Cf<br>Californium<br>251.080 | Es<br>Einsteinium<br>252.083 | Fm<br>Fermium<br>257.095 | Md<br>Mendelevium<br>258.10 | No<br>Nobelium<br>259.10   | Lr<br>Lawrencium<br>262   |                          |                           |                          |



## 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. [Math Toolboxes 1.1 – 1.3]
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. [3.1 – 3.5, 5.1 – 5.5]
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. [6.1 – 6.7, 9.5]
5. Apply the gas laws and kinetic molecular theory to relate atomic level behavior to macroscopic properties. [9.1 – 9.4]
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. [7.1 – 7.5, 8.1 – 8.3, 8.5]
7. Analyze how periodic properties (valence, electronegativity, etc.) and reactivity of elements result from electron configurations of atoms. [7.7]
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. [10.2 – 10.4]
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. [12.1]
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. [12.2 – 12.3]
12. Recognize oxidation-reduction reactions; and identify oxidizing and reducing agents. [14.1 – 14.5]
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. [12.4, 12.6]
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. [12.5]
15. Describe the different models of acids and base behavior and recognize common acids and bases. [13.1 – 13.3]
16. Apply equilibrium principles to aqueous solutions, including acid-base and solubility reactions; calculate pH and species concentrations in buffered and unbuffered solutions. [13.3 – 13.6]
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. [15.1 – 15.3]

**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)

- **Online homework system** with e-book through McGraw-Hill Connect/LearnSmart (LS). The QR code on the left is a link to purchase the access code. You may find it cheaper somewhere else, but this is what you'll need. Once you have purchased the access code you will need to register with this class. Go to the following web address or scan the QR code on the right and click the "register now" button.



QR Code to **buy**  
McGraw-Hill Connect



QR Code to **register**  
McGraw-Hill Connect

<http://connect.mheducation.com/class/j-godbout-chem-111-501-tr-900---1130>

- 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. NOTE: There is also a trial period option. If you choose this, make sure you purchase the full access option before the trial period expires. Access to the class text: Introduction to Chemistry (4th ed), by Bauer, Birk, and Marks. (You automatically receive access to the e-book upon purchasing the homework system; if you would like a physical copy as well (not required), you may purchase a current or previous edition of the text from any source. The 4<sup>th</sup> version is the most recent one, but previous versions can be found online for considerably cheaper.
- **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        | 300         | 300          |
| In-class Exams | 2        | 190         | 380          |
| Homework       | 15       | 17          | 255          |
| Quizzes        | 12       | 14          | 168          |
| Attendance     | 16       | 13          | 208          |
| Labs/Rec       | 14       | 18          | 252          |
| Total          |          |             | 1500*        |

\*If you do the math, you will notice that this adds up to 1563 points. The scale however, is based in 1500 points, so there are 63 points of extra credit. In addition, the 190-point in-class exams will actually have 200 points. This means that there are actually a total of 83 points of extra credit possible.

### 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+             |

### 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 2 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 - 6    | Tue, 26 Jun |
| Exam 2 | 7 - 12   | Tue, 17 Jul |
| Final  | 1 - 15   | Thu, 26 Jul |

The final exam is cumulative, although there will be an emphasis on Chapters 13 - 15.

### 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 preparatory 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 PROBLEMS**, etc.)
- **Repeat 15 times!**

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

| <b>Meeting</b> | <b>Date</b> | <b>Lecture Topics</b>   |
|----------------|-------------|---|
| 1              | Tue 05 Jun  | Math you'll need to know(& Math Toolboxes 1.1 – 1.3)                                    |
| 2              | Thu 07 Jun  | Atoms, Ions, Periodic Table: 2.1 – 2.5  |
| 3              | Tue 12 Jun  | Chemical Compounds: 3.1 – 3.7   |
| 4              | Thu 14 Jun  | Chemical Composition: (4.2 – 4.4)<br>Chemical Reactions & Equations (5.1 – 5.5)         |
| 5              | Tue 19 Jun  | Quantities in Chemical Reactions (6.1 – 6.7)  |
| 6              | Thu 21 Jun  | Electron Structure of the Atom (7.1 – 7.7)  |
| 7              | Tue 26 Jun  | Exam 1 (Chapters 1 – 6, 1 <sup>st</sup> half of class)<br>Chemical Bonding (8.1 – 8.3)  |
| 8              | Thu 28 Jun  | Chemical Bonding (8.4 – 8.5)  |
| 9              | Tue 03 Jul  | The Gaseous State (9.1 – 9.5)   |
| 10             | Thu 05 Jul  | The Liquid and Solid States (10.1 – 10.4)   |
| 11             | Tue 10 Jul  | Solutions (11.1 – 11.6)   |
| 12             | Thu 12 Jul  | Reactions Rates & Chemical Equilibrium (12.1 – 12.6)                                    |
| 13             | Tue 17 Jul  | Exam 2 (Chapters 7 – 12, 1 <sup>st</sup> half of class)<br>Acid and Bases (13.1 – 13.6) |
| 14             | Thu 19 Jul  | Oxidation-Reduction Reactions (14.1 – 14.5)   |
| 15             | Tue 24 Jul  | Nuclear Chemistry (15.1 – 15.3)   |
| 16             | Thu 26 Jul  | Final Exam  |

## 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 08 Jun 2018 | Last day to register (although if you're reading this you already are registered), ADD sections, and change credit hours<br>Enrollment cancellation for non-payment |
| Fri 15 Jun 2018 | Last Day to DROP without "W" grade and 100% tuition refund on LoboWEB,<br>Last Day to CHANGE grade option   |
| Wed 04 Jul 2018 | Independence Day Holiday (campus closed)  |
| Fri 13 Jul 2018 | Last Day to withdraw <b>WITHOUT</b> Student Services Permission   |
| Fri 27 Jul 2018 | Last day to change grading options<br>Last Day to withdraw <b>WITH</b> Student Services Permission  |
| Thu 26 Jul 2018 | Last day of instruction and final exam (for this section)   |
| Sat 28 Jul 2018 | Semester ends   |

## 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 following QR code:



Equal Access Services

### 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.

### 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, <https://policy.unm.edu/university-policies/2000/2740.html> or scan the following QR Code:



Title IX Policy