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CHEMISTRY 1110 / GENERAL CHEMISTRY I

Semester
CRN #
Lecture:
Lab:

Professor:
Office:
Office Phone:
E-mail:

Credit Hours: 4

Prerequisites: Exemption from or completion of ENGL 0810, READ 0810 and MATH 0810. MATH 1710 or equivalent.

Catalog Description: This course is a study of fundamental concepts of atoms and molecules, chemical bonding, formula and equation writing, naming compounds, quantitative relationships involving formulas, classification of the elements and selected compounds, shapes of molecules, stoichiometry, and gas laws.


Register for Sapling Learning online homework system.


Lab Requirements: A lab coat and safety googles/glasses are required for the laboratory portion of this course. A separate syllabus will be provided for the laboratory portion of this course.

Supplemental Materials: Scientific Calculator

Group for Whom the Class is Intended:
This course is intended for students pursuing degrees and programs in the allied health field of study and the Tennessee Transfer pathway in chemistry.
Program Learning Outcomes:

After completing the requirements of CHEM 1110, students will be able to:

1) Conduct an experiment, collect and analyze data, and interpret results in a laboratory setting.
2) Analyze, test, and evaluate a scientific hypothesis.
3) Use basic scientific language and processes, and be able to distinguish between scientific and non-scientific explanations.
4) Identify unifying principles and repeatable patterns in nature, the values of natural diversity, and apply them to problems or issues of a scientific nature.
5) Analyze and discuss the impact of scientific discovery on human thought and behavior.

Student Learning Outcomes:

By the end of the course, students will be able to:

1. Identify the key components of the scientific method.
2. Differentiate between states of matter.
3. Differentiate between homogeneous and heterogeneous mixtures.
4. Categorize properties of matter as physical or chemical and extensive or intensive.
5. Use SI units and prefixes.
6. Perform conversions between different temperature scales and units of mass, distance, and volume.
7. Perform density calculations.
8. Distinguish between accuracy and precision.
9. Apply dimensional analysis to solve problems.
10. Understand the concept of the atom and the nature of an element.
11. Identify the location and physical properties of the proton, neutron, and electron in an atom.
12. Utilize mass number to identify the number of protons, neutrons and electrons for a given isotope.
13. Use the rules of nuclear stability to predict radioactivity of a particular nucleus.
15. Understand the concept of the mole and atomic mass.
16. Calculate the molar mass of a compound.
17. Interconvert between mass, moles, and number of atoms using conversion factors of molar mass and Avogadro’s number.
18. Understand the laws of conservation of mass and conservation of energy.
19. Describe the photoelectric effect and blackbody radiation.
20. Understand the relationship between and perform calculations for frequency, wavelength, the speed of light, and energy of electromagnetic radiation.
21. Understand the contributions of de Broglie, Heisenberg, and Schrodinger in explaining the behavior of an electron.
22. Provide meaning to the four quantum numbers and know the allowable values for each.
23. Apply Hund’s rule, Pauli exclusion principle, and Aufbau principle for writing electron configurations of an atom.
24. Use the periodic table to write electron configurations.
25. Differentiate between covalent compounds and ionic compounds.
26. Use the periodic table to determine the number of valence electrons an atom has and how that contributes to reactivity.
27. Define effective nuclear charge, atomic radius, ionic radius, electron affinity, and ionization energy.
28. Distinguish between the periodic trends of atomic radii, ionic radii, electron affinity, and ionization energy.
29. Apply the octet rule for bonding.
30. Use the Born-Haber process to predict the energy needed to form an ionic solid.
31. Use nomenclature rules for naming ionic compounds, covalent molecules, polyatomic ions, and acids.
32. Compare and contrast the general chemistry of some of the main group elements: alkali metals, alkaline earth metals, halogens, and noble gases.
33. Draw Lewis dot structures for molecules.
34. Predict resonance structures of molecules and the stability of the structure based on formal charges.
35. Determine the polarity of a molecule using electronegativity differences.
36. Use the VSEPR model to predict the geometry and shape of a molecule.
37. Compare and contrast valence bond theory and molecular orbital theory.
38. Predict the hybridization of orbitals to explain bonding in molecules.
39. Use molecular orbital diagrams to predict bond order and stability of molecules.
40. Define chemical reaction, chemical equation, reactant and product.
41. Use coefficients to balance chemical equations.
42. Perform calculations using stoichiometry.
43. Identify the limiting reactant in a reaction and use it to predict the theoretical yield.
44. Calculate the molarity of a solution and dilution concentration.
45. Utilize titration data to calculate volume or concentration of a given solution.
46. Use percent composition and/or combustion analysis to determine the empirical formula of a compound.
47. Recognize the relationship between the empirical formula and molecular formula of a compound.
48. Describe the common types of reactions: combustion, combination, and decomposition.
49. Differentiate between strong electrolytes, weak electrolytes, and non-electrolytes.
50. Identify strong and weak acids and bases.
51. Apply solubility rules to determine if a reaction will yield a precipitate.
52. Write molecular, ionic, and net ionic equations for a given reaction.
53. Identify spectator ions in a reaction.
54. Give Arrhenius and Brønsted definitions of an acid and a base.
55. Predict the neutralization reaction between an acid and a base.
56. Identify the different components of an oxidation-reduction reaction.
57. Assign oxidation numbers to atoms in a compound using oxidation number rules.
58. Predict the ability of an element to be reduced or oxidized using the activity series.
59. Balance redox reactions by applying the half-reaction method.
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60. Recognize common types of energy and the relationship between each: chemical, potential, and kinetic.
61. Label the system and the surroundings for a given experiment.
62. Understand how heat and work affect the internal energy of a system.
63. Characterize state and non-state functions.
64. Calculate the enthalpy of reaction using constant-pressure or constant-volume calorimetric data.
65. Distinguish between heat capacity and specific heat.
66. Apply Hess’s law to calculate the enthalpy of reaction in multi-step reactions.
67. Relate the nature of the standard state and heats of formation.
68. Utilize bond enthalpies or standard heats of formation to calculate the enthalpy of a reaction.
69. List the basic postulations in the kinetic molecular theory of gases.
70. Classify the relationships between pressure, volume and temperature in context of Boyle’s, Charles’, and Avogadro’s laws.
71. Calculate pressure, volume, number of moles, or temperature using the ideal gas law given all other values.
72. Perform stoichiometry with gases.
73. Apply Dalton’s law of partial pressures to determine mole fraction, total pressure, or individual pressure of a gas.
74. Differentiate between effusion and diffusion.
75. Find molar mass and/or density of a gas by utilizing the ideal gas equation.
76. Characterize properties of an ideal gas versus a real gas.
77. Understand the variables in the van der Waals equation.

**Student Objectives:**
Throughout the course, students will have the opportunity:
1. To attend all lectures and to attend and participate in all labs
2. To spend time outside class for independent study
3. To diligently study both text and notes
4. To seek outside help from the instructor as needed
5. To demonstrate a working knowledge of chemistry to be assessed by lecture and lab exams

**Attendance Policy:** Regular attendance is essential to successfully navigate the rigors of this course. Roll will be called at the beginning of class. If you are tardy for a class it is your responsibility to let the instructor know after class has ended.

**General Classroom Policies:**

- Courtesy to one another is expected at all times.
- Be on time, as lecture and lab begin on time.
- No food, drink, or children are permitted in classrooms or labs.
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- Cell phones should be turned off or be set on vibrate prior to entering classroom.
- Prepared notes will NOT be provided to students. If you miss a day of class, please get a copy of the notes from a fellow student.
- Unless special permission has been given by student services, I do not allow students to tape either my lectures or my labs.
- Exams will be corrected and returned to you within one week after the exam. I will NOT grade exams the same day, or in the presence of students. Do not call or come to my office for grades prior to the next regular class session after an exam.

**Exam policies:**

- **There will be four exams, three in lecture and one in lab.** Each lecture exam is worth 100 points and the lab final is worth 150 points. Exam dates will be announced during scheduled lecture and lab meetings. Your laboratory instructor will provide a separate course outline.
- **YOU MAY MAKE UP ONLY ONE LECTURE EXAM.** You must make up the exam within one week of the missed exam during office hours. Any student missing a second or third exam will receive a zero for those exams.
- **The final exam is comprehensive. It is worth 200 points. There are no make-ups allowed for the final.**

**Major Assignments and Method for Calculating the Final Grade:**

**Points Breakdown:**

- 500 points (Four Lecture Exams and Comprehensive Final)
- 250 points (Lab Reports and Exam)
- 100 points (Quizzes)
- **150 points (Homework)**
- 1000 points (750 from lecture & 250 from lab)

**Grading Policies:**

**Grading Scale:**

- \( A = 90\% - 100\% \) or 900 – 1000 points
- \( B = 80\% - 90\% \) or 800 – 899 points
- \( C = 70\% - 80\% \) or 700 – 799 points
- \( D = 60\% - 70\% \) or 600 – 699 points

**Note:** If your average is 89.4, your grade will be a B. If your average is 79.4, your grade will be a C. If your average is 69.4, your grade will be a D. If your average is 59.4, your grade will be a F.
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**Course Policies:**

**Academic Misconduct Policy:**
Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class. Based on their professional judgment, instructors have the authority to impose the following academic sanctions: (a) require the student to repeat the assignment for full or partial credit; (b) assign a zero, an F, or any other grade appropriate for the assignment or examination; (c) assign an F for the course. In addition, disciplinary sanctions may be imposed through the regular institutional procedures. For more information, see MSCC Policy 3:02:00:03.

**Classroom Misconduct Policy:**
The instructor has the primary responsibility for maintenance of academic integrity and controlling classroom behavior, and can order temporary removal or exclusion from the classroom of any student engaged in disruptive conduct or conduct that violates the general rules and regulations of the institution for each class session during which the conduct occurs. Extended or permanent exclusion from the classroom, beyond the session in which the conduct occurred, or further disciplinary action can be effected only through appropriate procedures of the institution.

Disruptive behavior in the classroom may be defined as, but not limited to, behavior that obstructs or disrupts the learning environment (e.g., offensive language, harassment of students and professors, repeated outbursts from a student which disrupt the flow of instruction or prevent concentration on the subject taught, failure to cooperate in maintaining classroom decorum, etc.), text messaging, and the continued use of any electronic or other noise or light emitting device which disturbs others (e.g., disturbing noises from beepers, cell phones, palm pilots, lap-top computers, games, etc.). For more information, see MSCC Policy 3:02:00:03.

**Class Cancelation Policy:**
If class is cancelled for any reason, you will be notified via our D2L page and will be told there how to prepare for the next class period. For these reasons, students are advised to take advantage of the Motlow Rave system in order to receive text messages when class is canceled. For more information, see [https://www.getrave.com/login/mscc](https://www.getrave.com/login/mscc).”

**Emergency Procedures Policy:**
In case of a **medical emergency** we will immediately dial 9-911 and report the nature of the medical emergency to emergency response personnel. We will try to stay with the person(s) in need and maintain a calm atmosphere. We will talk to the person as much as possible until response personnel arrive on campus, and we will have someone go outside to meet emergency personnel and direct them to the appropriate location.

In the event of an emergency (drill or actual), a signal will be sent. Based on that signal, students will follow the procedures below for that specific type of emergency:
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**Loud warbling sound throughout Building (FIRE)**
Collect purses and coats and proceed immediately out of your room and exit through the closest emergency exit. Proceed to the Designated Assembly Area closing windows and doors as you exit. Remain there until the "All Clear" Signal is given by an Emergency Management Team member. (Instructors- Provide your Designated Assembly Area, and its location to students)

**Tornado Siren (SEVERE WEATHER):**
Proceed to the closest designated severe weather shelter on the 1st floor and proceed all the way into the shelter. Crouch down on the floor with your head between your knees facing away from the outside walls. Remain there until the "All Clear" Signal is given. (Instructors- Provide the recommended room number or hallway location to students)

**Air Horn (1 Long Blast) and Face to Face All Clear (INTRUDER/HOSTAGE):**
Ensure door is closed, locked and lights turned off. If your door will not lock, move some tables and chairs in front of the door quickly. Move immediately to the rear of the room away from the door and sit on the floor- out of sight if possible. Remain calm and quiet and do not respond to any inquiries at the door unless you have been given the "All Clear" and a member of law enforcement or your campus Emergency Management Team member makes face-to-face contact at your door.

**Classroom Locked-door Policy:**
In order to adhere to MSCC Emergency Preparedness Policy and to facilitate effective classroom management, the classroom door will remain closed and locked for the duration of the class period.

**Educational Technology:**

**Accessing Campus Computers or the MSCC Library from off Campus:**
Your Username format is your First Initial, Last Name and Month and Day Birthday in the Format of MMDD. Example: Marcia Smith born on April 11, 1992 - Username: msmith0411. Your Pin will be the numeric pin you created when you initially applied to Motlow College.

**Using D2L:**
For help with D2L including how to submit materials to a Dropbox, see this page: [http://www.mscc.edu/techtube.aspx](http://www.mscc.edu/techtube.aspx)

**Technical Support/Assistance:**
Students having problems logging into a course, timing out of a course, using course web site tools, or any other technical problems, should contact the MSCC Technology Help Desk at 931-393-1510 or toll free 1-800-654-4877, Ext. #1510 (or d2lhelp@mscc.edu)
**Disability Services/Accommodations:**
Motlow College is committed to meeting the needs of qualified students with disabilities by providing equal access to educational opportunities, programs, and activities in the most integrated setting appropriate. This commitment is consistent with the College’s obligations under Section 504 of the Rehabilitation Act of 1973 and the American with Disabilities Act of 1990 (ADA). Together, these laws prohibit discrimination against qualified persons with disabilities. To this end, the Director of Disability Services for Motlow College coordinates services and serves as an advocate and liaison for students with disabilities attending Motlow College. Contact the Director of Disability Services here: [http://www.mscc.edu/disability/index.aspx](http://www.mscc.edu/disability/index.aspx).

Students with disabilities who would need assistance in an emergency evacuation should self-disclose that need to the instructor no later than the second day of class or second group meeting.

**Confidentiality of Student Records:**
The education records of current and former students at Motlow State Community College are maintained as confidential records pursuant to The Family Educational Rights and Privacy Act (FERPA) of 1974 as amended. For further information, see MSCC Policy No. 3:02:03:00.

**Student Success:**

**Tutoring:**
MSCC Instructors can guide students to specific resources regarding Tutoring in their discipline. In particular, students may find help with Math and Essay Writing via each campus’ Learning Support labs. Students should contact the labs on their campus to schedule appointments for help. For additional help, see the Student Success page: [http://www.mscc.edu/student_success/index.aspx](http://www.mscc.edu/student_success/index.aspx)

**Academic Advisement:**
MSCC Instructors can guide students to specific resources regarding Advisement. For additional help, see the Academic Advisement page: [http://www.mscc.edu/advisement/index.aspx](http://www.mscc.edu/advisement/index.aspx)

**Tentative Class Schedule:**

<table>
<thead>
<tr>
<th>TENTATIVE LECTURE SCHEDULE</th>
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<tr>
<td><strong>LECTURE TOPICS</strong></td>
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<tr>
<td>Chemistry: Matter and Measurement</td>
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<tr>
<td>The Structure and Stability of Atoms</td>
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<tr>
<td>Periodicity and the Electronic Structure of Atoms</td>
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EXAM I

- Ionic Bonds and Some Main-Group Chemistry
- Covalent Bonds and Molecular Structure

Chapter 4

Chapter 5

EXAM II

- Mass Relationships in Chemical Reactions
- Reactions in Aqueous Solution

Chapter 6

Chapter 7

EXAM III

- Thermochemistry: Chemical Energy
- Gases: Their Properties and Behavior

Chapter 8

Chapter 9

EXAM IV

Miscellany: Please check your FALL 2014 Schedule of Classes for information about dates for refunds, withdrawals, and other deadlines that may pertain.

ALWAYS SEE AN ADVISOR BEFORE REGISTERING FOR CLASSES. Any member of the faculty can and will act as your advisor.

*Please talk to me if you are experiencing difficulty or need help.