**TENNESSEE STATE UNIVERSITY**

**Department of Chemistry**

**CHEM 1110-01: General Chemistry I**

**SPRING 2017**

**Instructor:**

**Office:**

**Phone: 615-963-5321**

**E-mail:**

**Office Hours:** Monday (10-12 Boswell 214); Tuesday (1-2 Boswell 106, 2-2:30 Boswell 214);

Thursday (1-2:30 Boswell 214)

**Class location:** Boswell 12

**Class Schedule:** Monday & Wednesday, 8:00 AM – 9:25 AM

**Textbook:** "Chemistry" by Zumdahl and Zumdahl, 9th Ed., Brooks/Cole Publisher

ISBN-10: 1-285-92407-X; ISBN-13: 978-1-285-92407-6

Students using the digital textbook bundle in elearn will use the Course Key

[E-X7FGPMH3QQEEK](https://login.cengagebrain.com/course/E-X7FGPMH3QQEEK) to gain access to their textbook.

**Prerequisites:** High school chemistry or CHEM 1000 and two years of high school algebra or MATH 1010. Students without any previous chemistry course should consider taking CHEM 1000 before taking this course.

**Course Description:** A comprehensive study of chemical principles designed for students pursuing a career in chemistry or other scientific areas. Material to be covered includes introduction to metric system and scientific notation, structure of matter, nomenclature, composition and reaction stoichiometry, types of chemical reactions, atomic structure, chemical bonding, reactions in aqueous solutions, gases and kinetic molecular theory, and thermochemistry.

**Course Competencies:** Upon completion of the course the student should be able to:

* Describe the method scientists use to study nature
* Use scientific notation in expressing very large and very small numbers
* Use dimensional analysis in solving various types of problems
* Describe matter in terms of states, properties, and composition
* Ability to distinguish various types of matter and their units of measure
* Understanding of atoms as related to elements and compounds
* Ability to correctly write formulas and name compounds
* Identify elements and compounds from their chemical symbols and write chemical formula for simple inorganic compounds
* Ability to perform stoichiometric calculations
* Perform chemical calculations to convert between grams, moles, and particles
* Determine empirical and molecular formula
* Calculate the theoretical yields of reactions using stoichiometry for pure substances and solutions
* Ability to predict reaction products for common reactions
* Understanding of atomic and molecular structure
* Describe the structure of the atom
* Use the periodic table to classify elements
* Complete and balance chemical reactions
* Write the electronic configurations for the first 50 elements
* Predict bonding and ion formation based on the electronic configurations
* Predict molecular structures and write correct Lewis electron dot structures for simple ions and molecules
* Predict molecular geometries of molecules
* Ability to predict physical properties based on periodic law and atomic structure
* Ability to predict molecular shape and polarity of molecules
* Understanding and application of bonding theories to simple molecules
* Ability to calculate solution concentrations
* Understanding and application of basic gas laws
* Calculate volume, pressure, and temperature of gases based on the ideal gas law
* Understanding of the principles of thermochemical equations and thermodynamics
* Explain behaviors of matter using kinetic molecular theory
* Determine oxidizing and reducing agents in redox reactions

**Course Presentation:** Lecture material will be taken from the textbook.

**Evaluation of Course Competencies:**

Homework: 30% of the course grade

Exams: 50% of the course grade

Comprehensive Final Exam: 20% of the course grade

Homework: 6 homework assignments @ 30 points each = 180 points

Exams: 3 exams @ 100 points each = 300 points

Final Exam: 1 exam @ 120 points = 120 points

Bonus: 40 points

TOTAL: 600 points

***Exams:*** Exams will reflect chapter competencies. There will be no make-up exams. If you miss an exam with prior approval of the instructor and/or a valid written excuse (approved through the university’s One Stop Shop, Kean Hall room 103), your score on the final exam will be used in place of the exam you missed. This can be done for only one missed exam.

***Homework Assignments***: Homework will be assigned on a periodic basis. Homework will be assigned, tracked, and graded using the OWL (Online Web Learning) system. Instructions on using OWL are provided on myTSU on the course homepage. Use the course key

[E-X7FGPMH3QQEEK](https://login.cengagebrain.com/course/E-X7FGPMH3QQEEK) to enroll in OWL. There is a strong, positive correlation between actively practicing the concepts and problem solving techniques discussed in lecture by completing the homework assignments and doing well in this course.

***Comprehensive Final Exam:*** A two-hour departmental comprehensive final exam will be administered. Questions will be taken from all chapters covering major course competencies. Date, time and location of the final exam will be posted at least two weeks prior to the exam. The final exam is mandatory. **No late final exam or makeup for the final exam will be allowed.**

***Participation:*** It is assumed that you want to do the best you can in this class. This means that you want to actively participate in the course. By active participation we mean the following:

* Assignments are completed and, if requested, submitted on time
* You are willing to answer questions put forth by the instructor
* You are willing to ask questions in and out of class
* You arrive to class on time
* Your attention is focused on the material being presented by the instructor

The following behaviors are demonstrative of a lack of class participation:

* Arriving late for or not attending class; not handing in assignments on time
* Talking while the instructor or another classmate is speaking
* Being generally disruptive

**Grading Scale:** 90-100 A

80-89 B

70-79 C

60-69 D

below 60 F

**Grading Policy:** Homework assignments will be given online, and will be graded automatically by OWL over a total of 30 points for each assignment. In-class exams will be on paper, and will be graded manually by the instructor or the Teaching Assistant. The final exam will also be on paper, and will be graded by a scantron over a total of 120 points. Bonus points will be given in class to students answering conceptual/mathematical questions correctly, as asked by the instructor. Each correct answer will receive 5 bonus points, while answers that are partially correct will receive 3 bonus points. The maximum amount of bonus points a student can earn is 40.

**Homework/Exams Return Policy:** Homework grades will be available for viewing on OWL as soon as the students submit their assignments online.In-class exams will be returned to the students within one week of the exam. The final exams will be kept with the instructor for departmental records, and will not be returned to the students.

**Schedule of Exams:**

Exam 1 on Wednesday, February 8

Exam 2 on Wednesday, March 8 (Mid-term exam)

Exam 3 on Wednesday, April 12

Final Exam to be announced

**A Note about the “I” Grade:** Students should not ask for an incomplete (“I” grade) at the end of the semester.

**Attendance and Expectations:** Students are expected to attend every lecture in its entirety. Students are expected to read and study the material to be discussed **prior** to the lecture. This includes working on problems and exercises given in the text. Students should review the material discussed until comprehension is acquired and seek assistance when necessary. **The Chemistry Department Tutorial Center is available to students needing help with chemistry. The Tutorial Center is located in Rm. 106 (Chem. Bldg.).**

**Policy on Cell Phones in Class:** **Use of cell phones or ipods as calculators (in class) is strictly forbidden**. Ringers on phones need to be turned off prior to lecture. Regular scientific calculators, not cell phones or ipods, have to be used in class. Anyone caught using a cell phone or ipod as a calculator will have 5 participation points deducted per usage, and a person caught looking at/using cell phone or ipod during an exam will automatically receive a zero in the exam. A student who has not earned participation points but has violated the stated course policies will have 5 points deducted per violation from his/her total points in class.

**Policy on Calculators:** Regular scientific calculators have to be used in class and during exams. Students will be required to have their individual calculators. Sharing of calculators during exams will not be allowed.

**Class Participation and Disruptive Behavior:** Students will receive participation points if they answer questions in class or work problems out on the board. 5 points will be awarded per attempt. Participation points are bonus points that will help to raise a grade. Points will not be granted if no attempt at participation is made and points will also be taken off if a student acts in a disruptive manner. Examples of disruptive behavior include – talking/laughing in class during lecture, looking at or trying to use a cell phone or ipod, trying to work on assignments other than general chemistry assignments, and being rude and uncooperative.

**Missed Exam Policy:** If an exam is missed due to unavoidable circumstances (with required documentation), the final exam score will be used in place of the missed exam. This can be done for only one missed Chapter Exam.

**Early In-Class Exams Policy:** Early in-class exams are not permitted, unless the student has to leave town on a university-related assignment (in which case appropriate documentation needs to be submitted to the course professor as soon as possible). Although traffic is heavy coming in to Nashville from surrounding areas, getting stuck in a traffic jam or having car problems are not valid excuses for retaking exams. Students should leave home early enough to avoid traffic problems. Students facing car trouble should make alternative transportation arrangements so as to not miss any exams.

**Policy on Academic Misconduct, Cheating and Plagiarism:** In accordance with the university’s policy on academic and classroom misconduct found in the catalog, cheating will not be tolerated in this course and a zero-tolerance policy regarding cheating will be followed throughout the course. A student who is caught cheating or attempting to cheat will be given a zero (F) for that particular assignment/test/quiz for the first offense. If a student is caught cheating a second time, that student will be given an overall grade of “F” for the course. To this end, the following classroom policies will be in effect and enforced.

* Cell phones and any other electronic devices (including smart watches) that connect to wireless networks will not be permitted during any exam or quiz. These devices may not be on your desk during an exam or quiz and must be stored in your bag or purse and/or turned off. Calculators may be used, only if the questions on the exam or quiz warrant their use.
* Once an exam or quiz period has started, you will not be permitted to leave to go to the restroom during the exam period. Please be sure to use the restroom before coming to class. Exceptions will only be made for those with documented medical needs.
* No outside materials may be used during an exam or quiz. Any necessary materials (*i.e.* periodic table, equations & constants, scratch paper, *etc.*) will be provided for you.
* Sunglasses and hats may not be worn during an exam or quiz period.
* The use of headphones and/or earbuds during an exam or quiz is strictly prohibited.
* Duplication or copying of homework assignments will result in a score of zero (F) for each student submitting a copied homework assignment.

**TSU Disability Accommodation Statement:** TSU is committed to creating inclusive learning environments and providing all students with opportunities to learn and excel in their course of study. Any student with a disability or condition which might interfere with his/her class performance or attendance may arrange for reasonable accommodations by visiting the Office of Disability Services (ODS). ODS is located in Kean Hall, room 131 and can be reached at 615-963-7400 or [www.tnstate.edu/disabilityservices](https://email.tnstate.edu/owa/redir.aspx?C=gk6WOH_1TE-MCLQNo_mn52fQIPFZzNMIw444dBa7_m0A7UvXztod9aW6iBa4gjigMROwMmBdzho.&URL=http%3a%2f%2fwww.tnstate.edu%2fdisabilityservices) .  You will be required to speak with ODS staff and provide documentation of the need for an accommodation.  If you qualify for an accommodation you will be provided with a document stating what type of classroom accommodations are to be made by the instructor.  It is your responsibility to give a copy of this document to the instructor **as soon as you receive it**.  Accommodations will only be provided **AFTER** the instructor receives the accommodation instructions from ODS; accommodations are not retroactive.  You must follow this process for each semester that you require accommodations.

**TSU Sexual Misconduct, Domestic/Dating Violence, Stalking Statement:** TSU recognizes the importance of providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking.  If you (or someone you know) has experienced or is experiencing any of these incidents, there are resources to assist you in the areas of accessing health and counseling services, providing academic and housing accommodations, and making referrals for assistance with legal protective orders and more. Please be aware that most TSU employees, including faculty and instructors, are “responsible employees”, meaning that they are required to report incidents of sexual violence, domestic/dating violence or stalking.   **This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must report the information to the Title IX Coordinator.**  Although I have to report thesituation, you will still have options about how your situation will be handled, includingwhether or not you wish to pursue a formal complaint.  Our goal is to make sure you areaware of the range of options available to you and have access to the resources youneed.    
You are encouraged to contact TSU’s Title IX Coordinator to report any incidents of sexual harassment, sexual violence, domestic/dating violence or stalking.  The Title IX coordinator is located in the Office of Equity and Inclusion, McWherter Administration Building, Ste. 260 and can be reached at 615-963-7494 or 615-963-7438.  For more information about Title IX and TSU’s SART or policies and procedures regarding sexual, domestic/dating violence and stalking please visit:  [www.tnstate.edu/equity](https://email.tnstate.edu/owa/redir.aspx?C=gk6WOH_1TE-MCLQNo_mn52fQIPFZzNMIw444dBa7_m0A7UvXztod9aW6iBa4gjigMROwMmBdzho.&URL=http%3a%2f%2fwww.tnstate.edu%2fequity). If you wish to speak to someone confidentially, who is not required to report, you can contact the TSU Counseling Center, located in the basement of Wilson Hall, at 615-963-5611 or TSU Student Health Services, located in the Floyd Payne Campus Center room 304, at 615-963-5084.  You may also contact the following off campus resources:  Sexual Assault Center of Nashville at 1-800-879-1999 or [www.sacenter.org](https://email.tnstate.edu/owa/redir.aspx?C=gk6WOH_1TE-MCLQNo_mn52fQIPFZzNMIw444dBa7_m0A7UvXztod9aW6iBa4gjigMROwMmBdzho.&URL=http%3a%2f%2fwww.sacenter.org) or the Tennessee Coalition to End Domestic & Sexual Violence at 615-386-9406 or [www.tncoalition.org](https://email.tnstate.edu/owa/redir.aspx?C=gk6WOH_1TE-MCLQNo_mn52fQIPFZzNMIw444dBa7_m0A7UvXztod9aW6iBa4gjigMROwMmBdzho.&URL=http%3a%2f%2fwww.tncoalition.org).

**TSU Harassment and Discrimination Statement:** Tennessee State University is firmly committed to compliance with all federal, state and local laws that prohibit harassment and discrimination based on race, color, national origin, gender, age, disability, religion, retaliation, veteran status and other protected categories.  TSU will not subject any student to discrimination or harassment and no student shall be excluded from participation in nor denied the benefits of any educational program based on their protected class.  If a student believes they have been discriminated against or harassed because of a protected class, they are encouraged to contact the Office of Equity and Inclusion at McWherter Administration Building, Ste. 260, 615-963-7494 or 615-963-7438, [www.tnstate.edu/equity](https://email.tnstate.edu/owa/redir.aspx?C=gk6WOH_1TE-MCLQNo_mn52fQIPFZzNMIw444dBa7_m0A7UvXztod9aW6iBa4gjigMROwMmBdzho.&URL=http%3a%2f%2fwww.tnstate.edu%2fequity).

**University Calendar:**

|  |  |
| --- | --- |
| Jan 16  Jan 17 | Holiday – MLK Day  Classes begin |
| Jan 17-20 | Late registration/schedule adjustments |
| Mar 6-11  Mar 12-18 | Midterm Examination Week  Holiday – Spring Break |
| Mar 31 | Last day to withdraw from courses |
| Nov 4  Apr 24-26  Apr 28 | Last day to withdraw from University  Early examinations for Spring 2017 graduation candidates ONLY  Last day of classes |
| Apr 29-May 5 | Final Examinations |
| May 6 | Undergraduate Commencement |

**CHAPTER OUTLINE**

|  |  |  |
| --- | --- | --- |
| Chapter | Description | Pages |
| 1 | **Chemical Foundations**   * Chemistry: An Overview * The Scientific Method * Units of Measurement * Uncertainty in Measurement * Significant Figures and Calculations * Dimensional Analysis * Temperature * Density * Classification of Matter | 1-41 |
| 2 | **Atoms, Molecules and Ions**   * The Early History of Chemistry * Fundamental Chemical Laws * Dalton’s Atomic Theory * Early Experiments to Characterize the Atom * The Modern View of Atomic Structure: An Introduction * Molecules and Ions * An Introduction to the Periodic Table * Naming Simple Compounds | 42-80 |
| 3 | **Stoichiometry**   * Counting by Weighing * Atomic Masses * The Mole * Molar Mass * Percent Composition of Compounds * Determining the Formula of a Compound * Chemical Equations * Balancing Chemical Equations * Stoichiometric Calculations: Amounts of Reactants and Products * Calculations Involving a Limiting Reagent | 81-137 |
| 4 | **Types of Chemical Reactions and Solution Stoichiometry**   * Water, the Common Solvent * The Nature of Aqueous Solutions: Strong and Weak Electrolytes * The Composition of Solutions * Types of Chemical Reactions * Precipitation Reactions * Describing Reactions in Solution * Stoichiometry of Precipitation reactions * Acid-Base Reactions * Oxidation-Reduction Reactions * Balancing Oxidation-Reduction Reactions | 138-188 |
| 6 | **Thermochemistry**   * The Nature of Energy * Enthalpy and Calorimetry * Hess’s Law * Standard Enthalpies of Formation * Present Sources of Energy * New Energy Sources | 245-294 |
|  |  |  |
| 7 | **Atomic Structure and Periodicity**   * Electromagnetic Radiation * The Nature of Matter * The Atomic Spectrum of Hydrogen * The Bohr Model * The Quantum Mechanical Model of the Atom * Quantum Numbers * Orbital Shapes and Energies * Electron Spin and Pauli Principle * Polyelectronic Atoms * The History of the Periodic Table * The Aufbau Principle and the Periodic Table * Periodic Trends in Atomic Properties * The Properties of a Group: The Alkali Metals | 295-350 |
| 8 | **Bonding: General Concepts**   * Types of Chemical Bonds * Electronegativity * Bond Polarity and Dipole Moments * Ions: Electron Configurations and Sizes * Energy Effects in Binary Ionic Compounds * Partial Ionic Character of Covalent Bonds * The Covalent Chemical Bonds: A Model * Covalent Bond Energies and Chemical Reactions * The Localized Electron Bonding Model * Lewis Structures * Exceptions to the Octet Rule * Resonance * Molecular Structure: The VSEPR Model | 351-414 |
| 9 | **Covalent Bonding: Orbitals**   * Hybridization and the Localized Electron Model * The Molecular Orbital Model * Bonding in Homonuclear Diatomic Molecules * Bonding in Heteronuclear Diatomic Molecules * Combining the Localized Electron and Molecular Orbital Models | 415-452 |
| 5 | **Gases**   * Pressure * The Gas Laws of Boyle, Charles and Avogadro * The Ideal Gas Law * Gas Stoichiometry * Dalton’s Law of Partial Pressures * The Kinetic Molecular Theory of Gases * Effusion and Diffusion * Real Gases * Characteristics of Several Ideal Gases * Chemistry in the Atmosphere | 189-244 |