Course Number: CHM 1045  
Prerequisite(s): CHM 1020 with passing grade; or passing grade on departmental qualifying exam; or >490 on SAT Math; or > 20 on ACT Math.

Course Title: General Chemistry I

Course Credit: 3  
Course Hours: 3 per week

College: Arts and Sciences  

Department: Chemistry  
Supplies: Non-programmable scientific calculator

Faculty Name: Dr. E. Onyeozili  
Term and Year: Fall 2009

Office Location: FHS (Science Research Building)  
Place and Time: 101 BL Perry (General Classroom)  
MWF 8:00 - 8:55 pm

Rm. 119  
Telephone: (850)–412–5328

e-mail: edith.onyeozili@yahoo.com

Office Hours  
Monday 9:30-11:30  Tuesday 11:00-12:00  Wednesday 9:30-11:30  Thursday 11:00-12:00  Friday 2:00-4:00  Saturday

Other Requirements:  
1. Internet access.  
2. Email account.

Course website  
http://famu.blackboard.com  
http://wileyplus.com

http://edugen.wiley.com/edugen/class/cls129811/

Course Description  
Fundamental principles and concepts of chemistry are introduced. Topics include properties of matter, nomenclature, reactions, stoichiometry, thermochemistry, periodic properties, introduction to chemical bonding, molecular geometry and gaseous state.

Course Purpose  
Required course for science, engineering, pharmacy and pre-health professions majors.
REFERENCES
2. Essential Algebra for Chemistry Students by David W. Ball, Paul M. Treichel, Gabriela C. Publisher: Brooks Cole
3. General Chemistry by Linus Pauling

Conceptual Framework

The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term “exemplary” refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework:

![Diagram of Exemplary Professional Conceptual Framework]

DIVERSITY
- CF 1
  - Through this focal area, the FAMU professional education candidate will:

| CF: 1.5 (K, S) | Establish a comfortable environment in which all students can learn. | F: 2, 7, 11 | I: 5 |

TECHNOLOGY
• CF 2
• Through this focal area, the FAMU professional education candidate will:

| CF: 2.1 (S) | Use of available technology and software to support student learning. | F: 4,12 | I: 6 |
| CF: 2.2 (S) | Use technology to manage, evaluate and improve instruction. | F: 4, 12 | I: 6,7 |
| CF: 2.5 (S) | Use fundamental concepts in technology. | F: 12 | I: 6 |
| CF: 2.7 (S) | Facilitate the use of technology by students. | F: 4,12 | I: 6 |

CRITICAL THINKING

• CF 4
• Through this focal area, the FAMU professional education candidate will:

| CF: 4.3 (D) | Value critical thinking and self-directed learning as habits of mind. | F: 4 | I: 1,4 |
| CF: 4.5 (S) | Demonstrate the use of higher order thinking skills. | F: 8 | I: 4 |

PROFESSIONALISM

- CF 5
- Through this focal area, the FAMU professional education candidate will:

| CF: 5.1 (K) | Know the content | F: 8 | I: 1 |

National and State Standards Addressed in the Course

Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

**Standard 1: Subject Matter:** The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

*1.10 Knowledge*
1.12 The teacher understands how students’ conceptual frameworks and their misconceptions for an area of knowledge can influence their learning.

1.13 The teacher can relate his/her disciplinary knowledge to other subject areas.

*1.20 Dispositions*
1.24 The teacher is committed to continuous learning and engages in professional discourse about subject matter knowledge and children's learning of the discipline.

*1.30 Performances*
1.35 The teacher develops and uses curricula that encourage students to see, question, and interpret ideas from diverse perspectives.

**Standard 4: Instructional Strategies**: The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.

4.10 Knowledge

4.11 The teacher understands the cognitive processes associated with various kinds of learning (e.g. critical and creative thinking, problem structuring and problem solving, invention, memorization and recall) and how these processes can be stimulated.

4.12 The teacher understands the principles and techniques, along with advantages and limitations, associated with various instructional strategies (e.g. cooperative learning, direct instruction, discovery learning, whole group discussion, independent study, interdisciplinary instruction).

4.13 The teacher knows how to enhance learning through the use of a wide variety of materials as well as human and technological resources (e.g. computers, audio-visual technologies, videotapes and discs, local experts, primary documents and artifacts, texts, reference books, literature, and other print resources).

4.20 Dispositions

4.21 The teacher values the development of students' critical thinking, independent problem solving, and performance capabilities.

4.23 The teacher values the use of educational technology in the teaching and learning process.

4.30 Performances

4.31 The teacher carefully evaluates how to achieve learning goals, choosing alternative teaching strategies and materials to achieve different instructional purposes and to meet student needs (e.g. developmental stages, prior knowledge, learning styles, and interests).

4.33 The teacher constantly monitors and adjusts strategies in response to learner feedback.

4.34 The teacher varies his or her role in the instructional process (e.g. instructor, facilitator, coach, audience) in relation to the content and purposes of instruction and the needs of students.

4.36 The teacher uses educational technology to broaden student knowledge about technology, to deliver instruction to students at different levels and paces, and for advanced levels of learning.

**Standard 5, Learning Environment**

The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.

5.10 Knowledge

5.11 The teacher can use knowledge about human motivation and behavior drawn from the foundational sciences of psychology, anthropology, and sociology to develop strategies for organizing and supporting individual and group work.

5.12 The teacher understands how social groups function and influence people, and how people influence groups.
The teacher knows how to help people work productively and cooperatively with each other in complex social settings.

The teacher understands the principles of effective classroom management and can use a range of strategies to promote positive relationships, cooperation, and purposeful learning in the classroom.

The teacher recognizes factors and situations that are likely to promote or diminish intrinsic motivation, and knows how to help students become self-motivated.

**5.20 Dispositions**

5.21 The teacher takes responsibility for establishing a positive climate in the classroom and participates in maintaining such a climate in the school as a whole.

5.22 The teacher understands how participation supports commitment, and is committed to the expression and use of democratic values in the classroom.

5.23 The teacher values the role of students in promoting each other's learning and recognizes the importance of peer relationships in establishing a climate of learning.

5.24 The teacher recognizes the values of intrinsic motivation to students' life-long growth and learning.

5.25 The teacher is committed to the continuous development of individual students' abilities and considers how different motivational strategies are likely to encourage this development for each student.

**5.30 Performances**

5.31 The teacher creates a smoothly functioning learning community in which students assume responsibility for themselves and one another, participate in decision making, work collaboratively and independently, and engage in purposeful learning activities.

5.32 The teacher engages students in individual and group learning activities that help them develop the motivation to achieve, by, for example, relating lessons to students' personal interests, allowing students to have choices in their learning, and leading students to ask questions and pursue problems that are meaningful to them.

5.33 The teacher organizes, allocates, and manages the resources of time, space, activities, and attention to provide active and equitable engagement of students in productive tasks.

5.34 The teacher maximizes the amount of class time spent in learning by creating expectations and processes for communication and behavior along with a physical setting conducive to classroom goals.

5.35 The teacher helps the group to develop shared values and expectations for student interactions, academic discussions, and individual and group responsibility that create a positive classroom climate of openness, mutual respect, support, and inquiry.

5.36 The teacher analyzes the classroom environment and makes decisions and adjustments to enhance social relationships, student motivation and engagement, and productive work.

5.37 The teacher organizes, prepares students for, and monitors independent and group work that allows for full and varied participation of all individuals.
**Standard 6, Communication**

The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.

**6.10 Knowledge**

6.11 The teacher understands communication theory, language development, and the role of language in learning.

6.12 The teacher understands how cultural and gender differences can affect communication in the classroom.

6.13 The teacher recognizes the importance of nonverbal as well as verbal communication.

6.14 The teacher knows about and can use effective verbal, nonverbal, and media communication techniques.

**6.20 Dispositions**

6.21 The teacher recognizes the power of language for fostering self-expression, identity development, and learning.

6.22 The teacher values many ways in which people seek to communicate and encourages many modes of communication in the classroom.

6.23 The teacher is a thoughtful and responsive listener.

6.24 The teacher appreciates the cultural dimensions of communication, responds appropriately, and seeks to foster culturally sensitive communication by and among all students in the class.

**6.30 Performance**

6.31 The teacher models effective communications strategies in conveying ideas and information and in asking questions (e.g. monitoring the effects of messages, restating ideas and drawing connections, using visual, aural, and kinesthetic cues, being sensitive to nonverbal cues given and received).

6.32 The teacher supports and expands learner expression in speaking, writing, and other media.

6.33 The teacher knows how to ask questions and stimulate discussion in different ways for particular purposes, for example, probing for learner understanding, helping students articulate their ideas and thinking processes, promoting risk-taking and problem-solving, facilitating factual recall, encouraging convergent and divergent thinking, stimulating curiosity, helping stimulate students to question.

6.34 The teacher communicates in ways that demonstrate a sensitivity to cultural and gender differences (e.g. appropriate use of eye contact, interpretation of body language and verbal statements, acknowledgment of and responsiveness to different modes of communication and participation).

6.35 The teacher knows how to use a variety of media communication tools, including audio-visual aids and computers, including educational technology, to enrich learning opportunities.

**Standard 7, Planning Instruction**

The teacher plans and manages instruction based upon knowledge of subject matter, students, the community, and curriculum goals.
7.10 Knowledge
7.11 The teacher understands learning theory, subject matter, curriculum development, and student development and knows how to use this knowledge in planning instruction to meet curriculum goals.

7.12 The teacher knows how to take contextual considerations (instructional materials, individual student interests, needs, and aptitudes, and community resources) into account in planning instruction that creates an effective bridge between curriculum goals and students' experiences.

7.13 The teacher knows when and how to adjust plans based on student responses and other contingencies.

7.20 Dispositions
7.21 The teacher values both long term and short term planning.

7.22 The teacher believes that plans must always be open to adjustment and revision based on student needs and changing circumstances.

7.23 The teacher values planning as a collegial activity.

7.30 Performance
7.31 As an individual and a member of a team, the teacher selects and creates learning experiences that are appropriate for curriculum goals, relevant to learners, and based upon principles of effective instruction (e.g. that activate students' prior knowledge, anticipate preconceptions, encourage exploration and problem-solving, and build new skills on those previously acquired).

7.32 The teacher plans for learning opportunities that recognize and address variation in learning styles and performance modes.

7.33 The teacher creates lessons and activities that operate at multiple levels to meet the developmental and individual needs of diverse learners and help each progress.

7.34 The teacher creates short-range and long-term plans that are linked to student needs and performance, and adapts the plans to ensure and capitalize on student progress and motivation.

7.35 The teacher responds to unanticipated sources of input, evaluates plans in relation to short- and long-range goals, and systematically adjusts plans to meet student needs and enhance learning.

Florida Educator Accomplished Practices (FEAP)

Accomplished Practice #2: COMMUNICATION
2.1 The preprofessional teacher recognizes the need for effective communication in the classroom and is in the process of acquiring techniques which she/he will use in the classroom.
2.2 STANDARD: Communication -- Uses effective communication techniques with students and all other stakeholders.
2.a Establishes positive interactions in the learning environment that uses incentives and consequences for students.
2.b Establishes positive interactions between the teacher and student that are focused upon learning.
2.c Varies communication (both verbal and nonverbal) according to the nature and needs of individuals.
2.d Encourages students in a positive and supportive manner.
2.e Communicates to all students high expectations for learning.
2.h Practices strategies that support individual and group inquiry.
2.j Identifies communication techniques for use with colleagues, school/community specialists, administrators, and families, including families whose home language is not English.

Accomplished Practice #4: Critical-thinking
4.1 The pre-professional teacher is acquiring performance assessment techniques and strategies that measure higher order thinking skills in students and is building a repertoire of realistic projects and problem-solving activities designed to assist all students in demonstrating their ability to think creatively. (A) Uses appropriate techniques and strategies which promote and enhance critical, creative, and evaluative thinking capabilities of students.
1. Uses assessment strategies (traditional and alternate) to assist the continuous development of the learner. ASSESSMENT
4.2. Uses appropriate techniques and strategies which promote and enhance critical, creative, and evaluative thinking capabilities of students.
4.a Provides opportunities for students to learn higher-order thinking skills.
4.b Identifies strategies, materials, and technologies that she/he will use to expand students’ thinking abilities.
4.g Demonstrates and models the use of higher-order thinking abilities.

Accomplished Practice #7: HUMAN DEVELOPMENT AND LEARNING
7.1 Drawing upon well established human development/learning theories and concepts and a variety of information about students, the preprofessional teacher plans instructional activities.
7.a Recognizes developmental levels of students and identifies differences within a group of students.
7.d Communicates with students effectively by taking into account their developmental levels, linguistic development, cultural heritage, experiential background, and interests.
7.e Varies activities to accommodate different student learning needs, developmental levels, experiential backgrounds, linguistic development, and cultural heritage.
7.h Develops short-term personal and professional goals relating to human development and learning.

Accomplished Practice #8: KNOWLEDGE OF SUBJECT MATTER
8.2 Demonstrates knowledge and understanding of the subject matter.
8.b Increases subject matter knowledge in order to integrate the learning activities.
8.f Develops short- and long-term personal and professional goals relating to knowledge of subject matter.

Accomplished Practice #11: ROLE OF THE TEACHER
11.1 The preprofessional teacher communicates and works cooperatively with families and colleagues to improve the educational experiences at the school.
11.2 STANDARD: Role of the Teacher -- Works with various education professionals, parents, and other stakeholders in the continuous improvement of the educational experiences of students.
11.b Provides meaningful feedback on student progress to students and families and seeks assistance for self and families.

Accomplished Practice #12: TECHNOLOGY
12.b Uses technology tools on a personal basis.
12.c Demonstrates awareness of and models acceptable use policies and copyright issues.
12.d Identifies and uses standard references in electronic media.
12.i Selects and utilizes educational software tools for instructional purposes based upon reviews and recommendations of other professionals.
12.j Uses digital information obtained through intranets and/or the Internet (e.g., e-mail and research).
12.k Uses technology to collaborate with others.
12.1 Develops professional goals relating to technology integration.

**National Science Teachers Association Standards (NSTA)**

**Standard 1: Content**

Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations. To show that they are prepared in content, teachers of science must demonstrate that they:

a. Understand and can successfully convey to students the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association.

b. Understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards.

c. Understand and can successfully convey to students important personal and technological applications of science in their fields of licensure.

d. Understand research and can successfully design, conduct, report and evaluate investigations in science.

e. Understand and can successfully use mathematics to process and report data, and solve problems, in their field(s) of licensure.

B.2. In relation to the physical sciences, science specialists at this level should have all of the competencies described for the elementary generalist, but also should be prepared in chemistry and physics to lead students to understand:

11. Potential and kinetic energies and concepts of work.

13. States of matter and bonding in relation to molecular behavior and energy.


15. Classifications of elements and compounds.

16. Solvents (especially water) and solutions.

B.4. To create interdisciplinary perspectives and to help students understand why science is important to them, elementary/middle level science specialists should have all of the competencies described for the elementary generalist, but also should be prepared to lead students to understand:

33. Use of technological tools in science, including calculators and computers.

C.3.a. **Core Competencies.** All teachers of chemistry should be prepared lead students to understand the unifying concepts required of all teachers of science, and should in addition be prepared to lead students to understand:

1. Fundamental structures of atoms and molecules.

2. Basic principles of ionic, covalent, and metallic bonding.

3. Physical and chemical properties and classification of elements including periodicity.


**Standard 10: Professional Growth**

Teachers of science strive continuously to grow and change, personally and professionally, to meet the
diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment. To show their disposition for growth, teachers of science must demonstrate that they:

a. Engage actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements.
b. Reflect constantly upon their teaching and identify ways and means through which they may grow professionally.
c. Use information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth.

**Professional Organization/Learned Society Standards**

National Society of Science Teachers Association  
Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills

**Professional Society / National and State Standards Addressed in the Course**

**American Chemical Society (ACS) Expected Outcomes:**

This course should ensure that students know basic chemical concepts such as stoichiometry, states of matter, atomic structure, molecular structure and bonding, thermodynamics, equilibria, and kinetics. Students need to be competent in basic laboratory skills such as safe practices, keeping a notebook, use of electronic balances and volumetric glassware, preparation of solutions, chemical measurements using pH electrodes and spectrophotometers, data analysis, and report writing.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral Objectives</th>
<th>INTASC Standards</th>
<th>FTCE SAE</th>
<th>FEAPS</th>
<th>NSTA</th>
<th>PEU Conceptual Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework: Selected biochemistry problems from the textbook and additional instructor addendums Each homework assignment will address course content and is aimed at development of problem solving skills.</td>
<td>Students will 1. Demonstrate knowledge of the lecture material, and 2. Develop and enhance the skill of analytical analysis and problem solving</td>
<td>1, 4, 5, 6, 7, 9</td>
<td>3.2, 3.4, 3.12, 3.13, 5.1, 5.2, 5.3, 6.7, 1.3, 4.1, 4.2, 4.3, 4.5, 4.6, 2.1, 2.6, 2.7, 2.10, 3.1, 6.6</td>
<td>2, 4, 7, 8, 11, 12</td>
<td>1, 1. B.2.11, 1.B.2.13, 1. B.2.14, 1. B.2.15, 1.B.2.16; 1.B.4.33; 1.C.3.a.1, 1.C.3.a.2, 1.C.3.a.3, 1.C.3.a.6, 1.C.3.a.8; 10.a., 10.b, 10.c.</td>
<td>1.5, 2.1, 2.2, 2.5, 2.7, 3.4, 4.3, 4.5, 5.1</td>
</tr>
<tr>
<td>Quizzes Selected biochemistry problems from the textbook and additional instructor addendums Each homework</td>
<td>Develop critical thinking and written communication skills</td>
<td>1, 4, 5, 6, 7, 9</td>
<td>3.2, 3.4, 3.12, 3.13, 5.1, 5.2, 5.3, 6.7, 1.3, 4.1, 4.2, 4.3, 4.5, 4.6, 2.1, 2.6, 2.7,</td>
<td>2, 4, 7, 8, 11, 12</td>
<td>1; 1. B.2.11, 1.B.2.13, 1. B.2.14, 1. B.2.15, 1.B.2.16; 1.B.4.33; 1.C.3.a.1, 1.C.3.a.2, 1.C.3.a.3, 1.C.3.a.6, 1.C.3.a.8; 10.a., 10.b, 10.c.</td>
<td>1.5, 2.1, 2.2, 2.5, 2.7, 3.4, 4.3, 4.5, 5.1</td>
</tr>
</tbody>
</table>
assignment will address course content and is aimed at development of problem solving skills.

<table>
<thead>
<tr>
<th>Exams: Four one-hour tests, each test covering specific chapters. Final exam is comprehensive and will cover the material of Chapters 1-21.</th>
<th>Develop critical thinking and written communication skills</th>
<th>1, 4, 5, 6, 7, 9</th>
<th>2, 4, 7, 8, 11, 12</th>
<th>1.C.3.a.1, 1.C.3.a.2, 1.C.3.a.3, 1.C.3.a.6, 1.C.3.a.8; 10.a., 10.b, 10.c.</th>
<th>1.5, 2.1, 2.2, 2.5, 2.7, 3.4, 4.3, 4.5, 5.1</th>
</tr>
</thead>
</table>

**Overall Goals of the Course**

In this course some of the fundamental concepts on the study of matter will be developed and some new concepts will be introduced. The student should be developing a disciplined attitude toward learning and analytical reasoning skills, i.e., the ability to read, understand, and devise solutions to problems. The course objectives have been chosen in order to help students acquire a basic knowledge of chemistry and establish a basic foundation in this natural science.

We will cover chapters 1-10 in their entirety. This is the first part of a two-semester general chemistry course intended to introduce you to basic chemical concepts and principles. The diverse nature of the science of chemistry requires that a broad range of topics be covered in this course. These include atomic and molecular structure, chemical equilibrium, electrochemistry, molecular bonding theories, and molecular gas laws, to name a few. This course should instill in you a strong appreciation of the importance of chemistry to other disciplines, such as biology, pharmacy, medicine and engineering. This course will also teach you to solve problems using analytical thinking skills as opposed to memorization techniques.

**Online Materials**

Constant use of the course websites will have a major impact on your success in this course. Most of the relevant course material (i.e., syllabus course outline, problem sets, quizzes, test/quiz grades, assignments, etc.) will be presented to you online via the websites (MOSTLY WILEYPLUS), and not in class. If you do not have access to a computer in your dormitory room, you may use the computers located in the various facilities on campus such as Coleman Library.

**Wiley Plus**

Students are strongly urged to enroll in WileyPlus. All course material will be posted on WileyPlus and nowhere else a week after the class begins.

**Specific Behavioral Objectives**
Chapter 1 Classification of Matter and Measurement (Standards Addressed in this chapter: FTCE 1.1, 1.6, 1.7, 6.1, 6.2, 6.3, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7; ACS)

1. Distinguish between physical and chemical properties and changes.
2. Describe the features of the three states of matter.
3. Learn the basic metric measurement units (Table 1.4) and the metric prefixes and factor multipliers. (Table 1.5)
4. Use the conversion factor approach to convert units within the metric system (for example, convert nm to cm or km).
5. Use the conversion factor approach to relate density to mass and volume.
6. Transform between the Celsius and Kelvin temperature scales.
7. Properly use scientific notation and the significant figure (SF) convention to report the degree of uncertainty in a measurement or calculation.

Chapter 2 Atoms, Molecules and Ions (Standards Addressed in this chapter: FTCE 3.2, 3.4, 3.12, 3.13, 5.1, 5.2, 5.3, 6.7; ACS)

1. Understand the laws of mass conservation, definite composition and multiple proportions.
2. Understand Dalton's atomic theory and how it explains the mass laws as well as its limitations.
3. Describe the results of the key experiments by Thomson, Millikan, and Rutherford concerning atomic structure.
4. Explain the structure of the atom, the main features of the subatomic particles, and the significance of isotopes; use atomic notation to express the subatomic makeup of an isotope (number of p, n & e⁻); calculate the atomic mass of an element from its isotopic composition
5. Describe the format of the periodic table and the general location and characteristics of metals, metalloids, and nonmetals. Learn the names of groups 1, 2, 17 and 18.
6. Explain the essential features of ionic and covalent bonding and distinguish between them; predict the monatomic ion from a main group element.
7. Know the common forms of the most common nonmetals: H₂, F₂, Cl₂, Br₂, I₂, N₂, O₂, P₄, S₈.
8. Memorize the common polyatomic ions in Table 2.5. Write names, formulas and formula masses of single-atom ions, polyatomic ions, oxoanions, and ionic compounds (including hydrated). Know when to include a Roman numeral in the ion or ionic compound name.
9. Write names, formulas, and molecule masses of binary molecular compounds, and acids (including oxoacids).

Chapter 3 Stoichiometry: calculations with Chemical Formulas and Equations (Standards Addressed in this chapter: FTCE 1.3, 4.1, 4.2, 4.3, 4.5, 4.6; ACS)

1. Be conversant with all Key Terms. Note that the term stoichiometry encompasses all concepts and calculations that involve quantities of atoms, ions or molecules.
2. Realize the usefulness of the mole concept, and use the relation between molecular (or formula) mass and molar mass to calculate the molar mass of any substance
3. Use Avogadro's number to calculate the mass of one atom or molecule
4. Use molar mass to relate moles to mass and to relate molecular formula to the simplest formula (empirical formula).
5. Use mass percent and molar mass to determine empirical and molecular formulas and weights.
6. Balance chemical equations given formulas or names, and use mole ratios to calculate amounts of reactants and products used in reactions.
7. Be familiar with combustion, combinations, and recombination reactions
8. Understand why one reactant limits the yield of product, and solve limiting reactant problems.
9. Explain reasons for lower than expected yields and the distinction between theoretical yield, actual yield and percentage yield.
10. Understand the meaning of concentration and the effect of dilution. Perform stoichiometric calculations involving molarity.

Chapter 4 Aqueous Reactions and Solution Stoichiometry (Standards Addressed in this chapter: FTCE 1.4, 1.5, 4.1, 4.9, 4.15, 4.16; ACS)

1. Understand how water dissolves an ionic compound compared to a covalent compound. Use a compound's formula to determine moles of ions in aqueous solutions.
2. Understand the difference between molecular and net ionic equations. Be able to write either for a chemical process.
3. Understand the key events in precipitation and acid-base reactions and use ionic equations to describe them.
4. Learn the solubility rules as given in Table 4.1, and be able to apply them.
5. Distinguish between strong and weak acids and bases, and memorize names and formulas of the six most common strong acids (HCl, HBr, HI, HClO₄, HNO₃ and H₂SO₄) and the most common strong bases, group 1 and 2 hydroxides (NaOH, Ca(OH)₂, for example).
6. Be able to perform acid-base titration calculations.

Chapter 5. Oxidation and Reduction (Standards Addressed in this chapter: FTCE 4.1, 4.16, 4.17, 4.18; ACS)

1. Understand the ideas of oxidation and reduction.
2. Know how to assign oxidation numbers to each atom in a formula.
3. Know how to balance equations in acidic or basic solution using the ion-electron method.
4. Use oxidation numbers to monitor the movement of electron charge and to balance simple oxidation-reduction reactions.
5. Be able to tell which acids are non-oxidizing and which are oxidizing in metal-acid reactions.
6. Identify three important types of redox reactions that include elements: combination, decomposition, displacement.
7. Know what single and double displacement reactions are.
8. Be able to perform stoichiometric calculations for redox reactions.

Chapter 6 Thermochemistry: Energy Flow and Chemical Change (Standards Addressed in this chapter: FTCE 2.1, 2.6, 2.7, 2.10, 3.1, 6.6; ACS)

10. Understand the use of the △ notation, and the sign convention associated with the flow of heat.
11. Understand exothermic and endothermic energy changes, and be able to draw or interpret energy-level diagrams for chemical reactions.
12. Understand the difference between a temperature change, ΔT, and heat energy transferred, q.
13. Work calorimetry problems involving heat transfer between the reaction (system) and the surroundings.
14. Understand the difference between heat transferred, q, and the heat of reaction, ΔH, and be able to relate the two quantities using quantity of substance.
15. Use, interpret and manipulate thermochemical equations.
16. Estimate standard reaction enthalpies from a table of ΔHᵣ values or using Hess' Law.
Chapter 7 Electronic Structure of Atoms. (Standards Addressed in this chapter: FTCE 1.5, 2.8, 2.9, 4.1, 4.9, 4.15, 4.16, 5.4, 5.5, 5.6, 6.5, 6.6; ACS)

1. Qualitatively identify the different regions of the electromagnetic spectrum (X-ray, UV, visible, IR, microwave, radio).
2. Describe the wave nature of light and interconvert wavelength and frequency.
3. Describe the particle (photon) nature of light and determine the energy of a photon from its frequency or wavelength.
4. Determine when and how the Bohr theory of the atom is useful, and as well as its limitations, and why it is not really correct.
5. Relate the frequency of an absorbed or emitted photon to a change in electron energy level.
6. Know the significance of the $n$, $l$, and $m_l$ quantum numbers (QN), and valid values for each. Be able to use them to code for a level (shell), a sublevel (subshell), or an a specific orbital in an atom.
7. Relate the frequency of an absorbed or emitted photon to a change in electron energy level.
8. Use the spin quantum number with the other three quantum numbers to code for a particular electron in an atom.
9. Apply the Pauli Exclusion Principle and Hund's Rule to determine the placement of electrons in orbitals. Describe the effect of electrostatic interactions (nuclear charge, effective nuclear charge, and penetration) on orbital energies.
10. Write the electron configuration or orbital diagram (boxes) for any atom.
11. Describe how atoms are arranged in the periodic table.
12. Discuss the relationship between similar valence electron configuration and similar chemical behavior. Also note the unusual configurations for transition and inner transition elements.
13. Know periodic trends and reason for the trend for predicting atomic size, ionization energy (IE) and electron affinity (EA). Write a balanced equation to define IE or EA.
14. Relate variation in successive ionization energies (IE$_1$, IE$_2$, IE$_3$, ... ) to electron configuration.
15. Describe trends in metallic behavior and acid-base behavior of the element oxides.
16. Write the electron configuration or orbital diagram (boxes) for any main-group or transition metal ion using only a periodic table. Note the difference between main-group and transition metal ion formation.
17. Predict the magnetic behavior of an atom or ion.
18. Compare the sizes of several ions or several atoms and ions.

Chapter 8 Basic Concepts of Chemical Bonding (Standards Addressed in this chapter: FTCE 3.3, 3.9, 3.10, 3.11, 3.14; ACS)

1. Recognize the three types of chemical bonding: ionic, covalent and metallic.
2. Describe ionic bonding and properties of ionic compounds using electron configurations or orbital diagrams and trends in lattice energy.
3. Describe covalent bonding and properties of covalent compounds using electron-dot symbols, bond order, bond length, and bond energies.
4. Use bond energies to calculate $\Delta H_{\text{rxn}}$.
5. Predict electronegativity (EN) trends and use them to determine oxidation number (ON) and $\Delta H_{\text{rxn}}$ to determine bond polarity.

Chapter 9 Molecular Geometry and Bonding (Standards Addressed in this chapter: FTCE 3.6, 3.7, 3.8, 3.9 3.11; ACS)
1. Apply the Octet Rule to construct Lewis structures for multi-atom molecules. Recognize violations of the octet rule.
2. Use resonance and formal charge to describe the most "correct" Lewis structure.
3. Use VSEPR Theory and Lewis structures to describe approximate molecular geometries, including shape and bond angle.
5. Describe the mixing of pure atomic orbitals to form hybrid atomic orbitals, and how this rationalizes observed molecular shapes, and be able to determine the hybrid orbitals of a central atom.
6. Describe the orbital overlap that forms sigma and pi bonding, and how these form single and multiple bonds in molecules.

Chapter 10  Gases (Standards Addressed in this chapter: FTCE 1.3, 4.3, 4.4, 4.7; ACS)

1. Understand the definition of pressure. Use the definition to predict and measure pressures experimentally.
2. Describe experiments that show relationships between pressure, temperature, volume, and moles for a gas sample.
3. Use empirical gas laws to predict how a change in one of the properties of a gas will affect the remaining properties.
4. Use empirical gas laws to estimate gas densities and molecular weights.
5. Use volume-to-mole relationships obtained using the empirical gas laws to solve stoichiometry problems involving gases.
6. Understand the ideal gas law \(pV=nRT\), and be able to use this expression to perform \(p,V,T\), dependent calculations (Boyle's Law, Charles' Law... molar mass.).
7. Understand the derivation of Dalton's Law and its application.
8. Understand the concept of partial pressure in mixtures of gases.
9. Use the ideal kinetic-molecular model to explain the empirical gas laws.
10. List deficiencies in the ideal gas model that will cause real gases to deviate from behaviors predicted by the empirical gas laws. Explain how the model can be modified to account for these deficiencies.

National and State Standards Addressed in the Course

American Chemical Society (ACS) Expected Outcomes:
This course should ensure that students know basic chemical concepts such as stoichiometry, states of matter, atomic structure, molecular structure and bonding, thermodynamics, equilibria, and kinetics. Students need to be competent in basic laboratory skills such as safe practices, keeping a notebook, use of electronic balances and volumetric glassware, preparation of solutions, chemical measurements using pH electrodes and spectrophotometers, data analysis, and report writing.

Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE)
Competencies and Skills:

1 Knowledge of the nature of matter
   1. Differentiate between pure substances, homogeneous mixtures, and heterogeneous mixtures.
   2. Determine the effects of changes in temperature, volume, pressure, or quantity on an ideal gas.
3. Apply units of mass, volume, and moles to determine concentrations and dilutions of solutions.
4. Analyze the effects of physical conditions on solubility and the dissolving process.
5. Evaluate problems relating colligative properties, molar mass, and solution concentrations.
6. Analyze the effects of forces between chemical species on properties (e.g., melting point, boiling point, vapor pressure, solubility, conductivity) of matter.
7. Solve problems involving an intensive property (e.g., density, specific heat) of matter.
8. Differentiate physical methods (e.g., chromatography, filtration, extraction) for separating the components of mixtures.

2 Knowledge of energy and its interaction with matter
1. Distinguish between different forms of energy (e.g., thermal, electrical, nuclear).
2. Relate temperature and heat to kinetic molecular theory.
3. Interpret a phase diagram of a pure substance.
4. Interpret a heating/cooling curve of a substance.
5. Calculate thermal changes in chemical reactions, such as heats of reaction, heats of formation, and/or heats of combustion, from data.
6. Analyze entropy changes during solution formation, phase changes, and chemical reactions.
7. Predict spontaneity of a chemical process given initial and final values of free energy, temperature, enthalpy, and/or entropy.
8. Relate regions of the electromagnetic spectrum to the energy, wavelength, and frequency of photons.
9. Relate regions of the electromagnetic spectrum to their effect on chemical or physical properties of matter.
10. Analyze energy transformations in physical and biological systems (e.g., energy from the Sun to electricity, from food consumption to physical activity).

3 Knowledge of bonding and molecular structure
1. Identify the basic theory and applications of spectroscopy (e.g., MRI, x-ray, mass spectrometry, UV, microwave, NMR, IR).
2. Identify types and examples of metallic, ionic, and covalent (polar and nonpolar) bonds.
3. Apply electronegativity to bond type.
4. Identify characteristics of simple organic compounds.
5. Given the structural formula for a simple organic compound, identify the hybridization of the atoms.
6. Identify sigma and pi bonds in a compound.
7. Interpret the information derived from the following models: Lewis electron dot structures, valence shell electron pair repulsion (VSEPR) theory, and molecular orbital (M/O) theory.
8. Select the most probable Lewis electron dot structure for an ionic or covalent formula (e.g., CO₂, Na₂CO₃) that follows the octet rule.
9. Predict geometry of simple molecules (e.g., symmetry elements).
10. Predict polarity of simple compounds.
11. Predict physical or chemical properties based upon the type of bonding involved.
12. Identify an inorganic chemical formula (ionic or molecular), given the name.
13. Select the name of an inorganic chemical compound (ionic or molecular), given its formula.
14. Identify properly named formulas for simple organic compounds.
15. Identify common organic functional groups.
16. Differentiate between the structures of common biochemical compounds, such as lipids, amino acids, carbohydrates, and nucleic acids.

4 Knowledge of chemical reactions and stoichiometry
   1. Balance chemical equations.
   2. Given common chemical species and reaction conditions, predict probable reaction products.
   3. Solve mass-mass stoichiometry problems.
   5. Solve solution stoichiometry problems.
   7. Determine empirical formulas from experimental data.
   8. Analyze the effects of concentration, temperature, pressure, surface area, and the presence or absence of catalysts on the rates of reaction.
   9. Assess the effects of changes in concentration, temperature, or pressure on a state of a system initially at equilibrium (Le Chatelier's principle).
  10. Determine rate laws from concentration and rate data.
  11. Calculate either the equilibrium constant or concentration of a reaction species at equilibrium (e.g., $K_a$, $K_b$, $K_c$, $K_d$, $K_{eq}$).
  12. Identify the characteristics of a chemical system in dynamic equilibrium.
  13. Identify major characteristics of strong and weak acids or bases.
  14. Evaluate the properties of buffer systems.
  15. Interpret graphical and numerical titration data.
  17. Balance incomplete redox equations in acidic and basic solutions.
  18. Determine the spontaneity of a chemical reaction using standard reduction potentials.
  19. Identify the characteristics of biochemical and fossil fuel combustion reactions.
  20. Solve problems related to pH of strong acids or bases.
  21. Analyze electrolytic and/or voltaic cells.

5 Knowledge of atomic theory and structure
   1. Using the periodic table, determine the number of protons, neutrons, and electrons in a specific isotope of an atom or ion.
   2. Using the periodic table, relate the physical properties of atoms and ions to the elements' positions on the table.
   3. Using the periodic table, relate the chemical reactivity of elements to their positions on the table.
   4. Using the periodic table, determine electron configurations for main group and transition elements.
   5. Relate chemical activity to electron configuration.
   6. Identify characteristics of the wave and particle nature of matter.
   7. Identify characteristics of unstable nuclei and the particles and energies emitted.
   8. Given measurable quantities, calculate parameters of radioactive decay.
  10. Analyze the processes of nuclear fission and fusion, including interconversion of mass and energy.
  11. Identify electron density distribution diagrams and characteristics for s, p, and d orbitals (e.g., nodes).
6 Knowledge of the nature of science
   1. Identify the characteristics and components of scientific inquiry.
   2. Identify how the characteristics of scientific research differ from those of other areas of learning.
   3. Identify variables in a given experimental design.
   4. Identify bias in an experimental design.
   5. Evaluate, interpret, and predict from empirical data.
   6. Interpret graphical data.
   7. Analyze the relationship between experimental observations and underlying assumptions, hypotheses, conclusions, laws, or theories.
   8. Relate experimental evidence to models.
   9. Differentiate between the uses of qualitative and quantitative data.
  10. Analyze the relationship between basic scientific research and applied research, technology, the economy, or the public good.
  11. Identify how science and society influence each other.
  12. Identify evidence of the progressive development of science.

7 Knowledge of measurement
   1. Convert between dimensional units for 1, 2, and 3 dimensional measurements.
   2. Analyze the dimensional units of a mathematical formula.
   3. Identify prefixes (e.g., kilo-, milli-, nano-) used in scientific measurements.
   4. Distinguish between accuracy and precision and between systematic and random error.
   5. Apply the correct number of significant figures in measurements or calculations.
   6. Relate the Celsius, Fahrenheit, and Kelvin temperature scales as they pertain to the physical properties of water.
   7. Convert between different units of energy.

8 Knowledge of appropriate laboratory use and procedures
   1. Identify appropriate chemistry laboratory procedures for the safe storage, use, and disposal of materials and equipment.
   2. Choose the correct laboratory equipment for a particular procedure.
   3. Identify emergency procedures and safety equipment needed in the science laboratory and classroom.
   4. Identify the areas of teacher liability and responsibility in science-related activities.
   5. Demonstrate knowledge of pertinent legislation and national guidelines regarding laboratory safety, hazardous materials, experimentation, and accommodations for special needs students (e.g., American Chemical Society, National Science Teachers Association).

Academic Learning Compact (ALC)/Expected Outcome

The ALC is located at the home page of the University (http://www.famu.edu) under ‘Academics’ Graduates will demonstrate the following:

1. Communication:
   Effectively communicate concepts and principles of organic chemistry both orally and in writing.

2. Content:
   Knowledge of chemical principles and other chemical information gained through the
afore mentioned ‘Learning objectives’.

3. **Quantitative Reasoning**
   Analyze and solve chemical problems using basic chemical principles.

4. **Critical Thinking:**
   Ability to analyze and solve chemical problems, read, evaluate and interpret numerical and general chemical information.

5. **Information Resources:**
   Ability to make effective use of information resources and technology in chemical applications.

**Topical Outline**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter</th>
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</thead>
<tbody>
<tr>
<td>Introduction, Classification of Matter, Measurement</td>
<td>1</td>
</tr>
<tr>
<td>Atoms, Atomic Theory, Discovery of Atomic Structure</td>
<td>2</td>
</tr>
<tr>
<td>Isotopes, Atomic Number and Mass Number, Molecules, Naming</td>
<td>2</td>
</tr>
<tr>
<td>Stoichiometry, The Mole</td>
<td>3</td>
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<tr>
<td>Empirical Formula, Quantitative Information from Balanced Equation.</td>
<td>3</td>
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<tr>
<td>Aqueous Reactions and Solution Stoichiometry</td>
<td>4</td>
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<tr>
<td>Concentration of Solutions</td>
<td>4</td>
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<tr>
<td>Thermochemistry</td>
<td>5</td>
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<tr>
<td>Hess's Law</td>
<td>5</td>
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<tr>
<td>Electronic Structure of Atoms</td>
<td>6</td>
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<tr>
<td>Periodic Properties of the Elements</td>
<td>7</td>
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<tr>
<td>Basic Concepts of Chemical Bonding</td>
<td>8</td>
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<tr>
<td>Molecular Geometry and Bonding Theory</td>
<td>9</td>
</tr>
<tr>
<td>Gas Laws</td>
<td>10</td>
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<tr>
<td>Gases (Ideal and Real Gases)</td>
<td>10</td>
</tr>
</tbody>
</table>

**Teaching Methodology**

Lecture Style, Use of Overheads, and Powerpoint, Web-Based Instruction (Course Compass, Blackboard, etc.)

**Course Evaluation**

Written quizzes and Exams, Homework, Multiple Choice Exam.

Multiple quizzes and homework assignments (in class and online) will be given throughout the semester to evaluate your performance. Fourteen or fifteen take-home quizzes will be given. The quizzes will be
posted on WileyPlus. Each student will come to class with the answers to all the quiz questions posted but will answer only one of the three or four questions on line. Two or three of the lowest quiz scores will be dropped when the overall quiz score is calculated.

**Grading**

The final grade for this class will be based on the following:

<table>
<thead>
<tr>
<th>Event</th>
<th>Points</th>
<th>% Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four Hour Exams, 100 points each (Best of 3)</td>
<td>300 points</td>
<td>60</td>
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<tr>
<td>Final Exam</td>
<td>100 points</td>
<td>20</td>
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<tr>
<td>Quizzes (Unannounced)</td>
<td>75 points</td>
<td>15</td>
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<tr>
<td>Homework</td>
<td>25 points</td>
<td>5</td>
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<tr>
<td><strong>Total:</strong></td>
<td><strong>500 points</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Final Grades (%)**

A: 90-100  B: 80-89  C: 70-79  D: 60-69  F: below 60

The above scale should serve as a guide to how your grade will be arrived at. The instructor reserves the right to adjust the grading scale so as to conform to the performance of the class. Please note that this does not in any way imply "CURVING." Students will be informed when and if any adjustments are made to the grading scale.

**Tentative Examination Schedule:**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Material</th>
<th>Week of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>Chapters 1,2, 3</td>
<td>Sep. 22nd</td>
</tr>
<tr>
<td>Exam 2</td>
<td>Chapters 4,5</td>
<td>Oct. 13th</td>
</tr>
<tr>
<td>Exam 3</td>
<td>Chapters 6,7,8</td>
<td>Nov. 17th</td>
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<tr>
<td>Exam 4</td>
<td>Chapters 9,10</td>
<td>Dec. 1st</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Comprehensive (1–10)</td>
<td>Dec. TBA</td>
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</tbody>
</table>

- I strongly encourage you to be prepared for each exam at least two days prior to the scheduled date so that you have time to resolve any questions that you may have.
  
  **Do not wait until the last minute to study!!!!**

- No MAKE-UP Exams or Quizzes will be given in this course. However, one of exams 1–4 will be dropped. This will take care of one missed exam. Please note that the final exam **CANNOT** be dropped. Two or three of the lowest quiz scores **MAY** be dropped.
<table>
<thead>
<tr>
<th>The Week of</th>
<th>Lecture</th>
<th>Topic</th>
<th>Chapter/Section</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 24th</td>
<td>1-3</td>
<td><strong>Fundamental Concepts and Units of Measurement:</strong></td>
<td>1.1–1.3</td>
<td>WileyPlus.com</td>
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<tr>
<td></td>
<td>Aug. 24</td>
<td>INTRODUCTION to Course, Syllabus Reading</td>
<td>1.4</td>
<td>Homework Chapter 1/</td>
</tr>
<tr>
<td></td>
<td>Aug. 26</td>
<td>Introduction, The Scientific Method, Composition of Matter,</td>
<td>1.5–1.8</td>
<td>Quick Quiz 1</td>
</tr>
<tr>
<td></td>
<td>Aug. 28</td>
<td>Classification and Properties of Matter</td>
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<td>Take-Home Quiz 1</td>
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<td><strong>Measurements and Units,</strong> <strong>Conversion of Units (Dimensional</strong></td>
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<td><strong>Analysis), Intensive (Density) and Extensive Properties.</strong></td>
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<tr>
<td>Aug. 31st</td>
<td>4-6</td>
<td><strong>Elements, Compounds, And Chemical Reactions:</strong></td>
<td>2.1-2.9</td>
<td>WileyPlus.com</td>
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<tr>
<td></td>
<td>Aug. 31</td>
<td><strong>Atomic theories, Subatomic Particles,</strong></td>
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<td>Homework Chapter 2/</td>
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<tr>
<td></td>
<td>Sep. 2</td>
<td><strong>Introduction to the Periodic Table, Elements, Writing chemical</strong></td>
<td></td>
<td>Quick Quiz 2</td>
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<td></td>
<td>Sep. 4</td>
<td><strong>formulas and equations,</strong> <strong>Composition of and bonding in</strong></td>
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<td>Take-Home Quiz 2</td>
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<td><strong>molecular and ionic compounds,</strong> <strong>predicting formulas of</strong></td>
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<td><strong>ionic compounds.</strong></td>
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<td><strong>Nomenclature (naming) of molecular and ionic compounds</strong></td>
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<tr>
<td>Sep. 7th</td>
<td>7-8</td>
<td><strong>Sep. 7th: LABOR DAY</strong></td>
<td>3.1-3.6</td>
<td>WileyPlus.com</td>
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<td></td>
<td>Sep. 7</td>
<td><strong>The Mole: Relating The Microscopic World of Atoms To Laboratory</strong></td>
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<td>Homework Chapter 3/</td>
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<td></td>
<td>Sep. 9</td>
<td><strong>Measurements:</strong></td>
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<td>Quick Quiz 3</td>
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<td></td>
<td>Sep. 11</td>
<td>The mole concept, the mole as a link between mass and number of</td>
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<td>Take-Home Quiz 3</td>
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<tr>
<td>Date</td>
<td>Days</td>
<td>Topics</td>
<td>Weeks</td>
<td>Notes</td>
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<tr>
<td>Sep. 14th</td>
<td>9-11</td>
<td>Determination of chemical formulas (empirical and molecular) from experimental mass measurements, <strong>The Mole:</strong> continued</td>
<td>3.1-3.6</td>
<td>WileyPlus.com Homework Chapter 4/ Quick Quiz 4 Take-Home Quiz 4</td>
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<td>Sep. 14</td>
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<td>Exam 1 (1.1–3.6) (September 22nd)</td>
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<td>Sep. 16</td>
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<td>Sep. 18</td>
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<td>Sep. 21st</td>
<td>12-14</td>
<td><strong>Reactions of Ions And Molecules in Aqueous Solutions:</strong> Terminology employed in solutions stoichiometry, reactions in aqueous solutions (electrolytes, Acids, and bases); nomenclature of acids and bases. Ionic reactions and their prediction, describing the composition of a solution by its concentration, molarity, applications of solution stoichiometry (chemical analysis and titration).</td>
<td>4.1–4.8</td>
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<td>Sep. 21</td>
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<td>Sep. 25</td>
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<td>Sep. 28th</td>
<td>15-17</td>
<td><strong>Reactions of Ions And Molecules in Aqueous Solutions:</strong> continued Ionic reactions and their prediction, describing the composition of a solution by its concentration, molarity, applications of solution stoichiometry (chemical analysis and titration).</td>
<td>4.5-4.8</td>
<td>WileyPlus.com Homework Chapter 4 Quiz 4</td>
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<td>Sep. 28</td>
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<td>Oct. 5</td>
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<td>Quick Quiz 5</td>
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<td>Oct. 7</td>
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<td>Take-Home Quiz 5</td>
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<td>Oct. 9</td>
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<tr>
<td>Oct. 12th</td>
<td>21-23</td>
<td>Energy And Chemical Change: <strong>Heat, work, internal energy, enthalpy, absorption and release of energy during chemical reactions.</strong> Heat of reaction and its measurement (Hess’s Law), thermochemical equations, state functions. Prediction (calculation) of the heat of reaction using Hess’s Law.</td>
<td>6.1–6.8</td>
<td>WileyPlus.com Homework Chapter 6 Quick Quiz 6 Take-Home Quiz 6 EXAM 2 (4.1-5.6) (October, 13th)</td>
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<td>Oct. 16</td>
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<td>Oct. 19th</td>
<td>24-26</td>
<td>Energy And Chemical Change: <strong>continued</strong> Heat of reaction and its measurement (Hess’s Law), thermochemical equations, state functions, prediction (calculation) of the heat of reaction using Hess’s Law.</td>
<td>6.1–6.8</td>
<td>WileyPlus.com Homework Chapter 7 Quick Quiz 7 Take-Home Quiz 7 7.1–7.5</td>
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<td>Oct. 23</td>
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<td>Oct. 26th</td>
<td>27-29</td>
<td><strong>The Quantum Mechanical Atom:</strong> Electronic structures of atoms, quantization of energies, particle and wave properties of electrons (photoelectric effect, Bohr’s Model of the H atom).</td>
<td>7.6–7.8</td>
<td>WileyPlus.com Homework Chapter 8 Chemical Bonding: General 8.1–8.7</td>
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<tr>
<td>Oct. 26</td>
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<td>Oct. 30</td>
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<td>Nov. 30-32</td>
<td>Chemical Bonding: General</td>
<td>8.1–8.7</td>
<td>WileyPlus.com</td>
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<td>Nov. 2</td>
<td>Nov. 4</td>
<td>Nov. 6</td>
<td>2nd Nov. 2</td>
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<tr>
<td>Nov. 9th</td>
<td>33-34</td>
<td>Nov. 9</td>
<td>Nov. 11</td>
<td>Nov. 13</td>
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<tr>
<td>Date</td>
<td>Event</td>
<td>Description</td>
<td>Grade</td>
<td>Additional Information</td>
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<tr>
<td>Nov. 30th</td>
<td><strong>Nov. 26–27: Thanksgiving</strong></td>
<td>Gases: continued</td>
<td>10.6-10.9</td>
<td>WileyPlus.com Homework Chapter 10</td>
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<tr>
<td>Nov. 30</td>
<td></td>
<td>Kinetic molecular theory, non-ideal behavior of gases (real gases).</td>
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<td>Quiz 10</td>
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<tr>
<td>Dec. 2</td>
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<td>Partial pressure, Graham’s Law (effusion and diffusion), kinetic molecular theory, non-ideal behavior of gases (real gases).</td>
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<td>EXAM 4 (9.1-10.9) (December 1st)</td>
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<td>Dec. 4</td>
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<td>Gases: continued</td>
<td>10.6-10.9</td>
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<td>Dec. 4th</td>
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<td>Kinetic molecular theory, non-ideal behavior of gases (real gases).</td>
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<tr>
<td>Dec. 7th</td>
<td><strong>Dec. 7–11: Final Exams.</strong></td>
<td>Final Exam</td>
<td>1.1-10.9</td>
<td>Chapt. 1.1 – 10.9</td>
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<tr>
<td>TBA</td>
<td><strong>FINAL EXAM</strong></td>
<td>COMPREHENSIVE</td>
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**Course Policies**

1. **Attendance Policy**

*ATTENDANCE IS TAKEN DURING EACH CLASS MEETING. IT IS YOUR RESPONSIBILITY TO WRITE YOUR SIGNATURE NEXT TO YOUR NAME ON THE DAILY ROLL SHEET. IF YOU FAIL TO DO THIS, YOU ARE ABSENT—No exceptions. TWO (2) UNEXCUSED ABSENCES FOR THE CLASS RESULT IN A LOWERING OF YOUR GRADE. “A STUDENT EXCEEDING THE NUMBER OF UNEXCUSED ABSENCES MAY BE DROPPED FROM THE COURSE AND ASSIGNED THE GRADE OF “F.” STUDENTS MAY BE READMITTED TO THE CLASS WITH THE DEAN’S AND THE INSTRUCTOR’S PERMISSION.” These regulations are fully given on page 31 of the 2006-2008 General Catalog.*

*PLEASE NOTE THAT (1) Students ARE ALLOWED one unexcused absence per credit hour of the course. A student exceeding the number of unexcused absences (3 for a three-credit hour course) will be dropped from the course and assigned a grade of “F”.*

2. **Student Conduct**

A. **Cell Phones:** Once a class period has begun, cell phones are not to be seen or heard in the classroom. Complete all calls before entering the classroom, and once in the classroom, turn off all cell phones, pagers, etc. VIBRATE IS NOT OFF. Students will be warned about violation of this request. A persistent disregard for this request will result in a student being asked to leave the classroom and not returning until they have conferred with the Chair of the Chemistry Department. ANY TEXT MESSAGING WILL RESULT IN AUTOMATIC AND PERMANENT DISMISSAL FROM THE COURSE.
B) Etiquette, Behavior, and Attitude

- Students are expected to enter the classroom, seat at their assigned seats, have notebooks or paper, and pencil or pen available, and ready to write when the instructor begins his/her lecture.
- Students should only be talking when they raise their hands to ask questions.
- Students may only leave the classroom after receiving permission from the instructor. During the class period, students should only ask for permission to leave to go to the lavatory or for medical reasons. If a student knows they need to leave early the student must ask for permission to leave before class begins.
- Cell phones should neither be seen nor heard during the class period. A student who violates this request more than once will be asked to leave the room and will be considered absent.
- A student should not come to class to read newspapers, read fiction books, study for other classes, finish assignments for other classes, listen to MP3 players, etc.
- Students who violate this request more than once will be asked to leave the room and will be considered absent.
- Please, use the restroom, etc before class begins.
- Lateness to class is discouraged. If you are entering the classroom late, PLEASE, DO NOT WALK IN FRONT OF THE PODIUM. PLEASE USE THE SIDE ISLES IF LATE TO CLASS.
- Please do not talk when the instructor is teaching. This is very distracting to the instructor and to the rest of the class. If you have something to say or question(s) to ask, please simply raise your hand, and you will be recognized. Please do not disrupt the class. If you choose to disrupt the class, you will be warned and if the problem continues, asked to leave the classroom.
- PLEASE, DO NOT BRING ANY FOOD OR DRINK INTO THE CLASSROOM.
- If you disrupt the class in any way or show disrespect to the professor and/or fellow student, you will receive an F in the course.

3. Exams

On exam day students should enter the classroom, seat at their assigned seats, take out a pen and/or pencil(s), and a non-programmable calculator. (The calculator function of cell phones may not be used).

Once an exam has begun, if the ring or any cell phone sound is heard, the instructor reserves the right to add an additional question to that exam. Each infraction of this rule may result in an additional question being added to the exam. Beyond the initial number of questions on an exam, no adjustment for the length of the exam will be made for additional questions added due to infractions.

Exams/Quizzes: Please indicate your name and student ID on all exams and Quizzes, otherwise you will receive “ZERO”. Keys to exams and quizzes may be posted on blackboard, please check them for corrections or comments, and report any concerns to me not later than five days after result is posted. NO MAKE-UP EXAMS OR QUIZZES WILL BE GIVEN. Quizzes will be unannounced and given during lecture time throughout the semester.

Final Exam: A comprehensive final examination covering all topics in CHM 1045. The format of the final exam is multiple-choice questions.
4. **Regrade policy**
If you feel that your test has been graded improperly, you may request in writing that it be regraded. After a test is returned, you have exactly one week to hand in your test paper and written request for regrading. The written request must be a single paragraph stating what you feel has been graded improperly and why you are turning it in for regrading. Staple the request to a copy of the test. Under no circumstances is a test accepted for regrading after one week or without the written request. Under no circumstances will disputed test items be discussed until this procedure is followed exactly. If a different score results from the regrading process, this score (higher or lower) shall replace the old exam score.

5. **Academic Honor Policy**
It is the aim of the faculty of Florida A and M University to foster a spirit of complete honesty and high standard of integrity. Any one caught cheating in any manner is awarded the grade of “F” (**No warnings will be given**). It is your responsibility to do your own work. The use of textbooks, notes, pagers, cell phones, and programmable calculators are not allowed in any quiz or exam. **Both persons collaborating by cheating will receive the Final grade of “F” with offenders also liable to serious consequences, possibly academic suspension.**
The University’s Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct- Regulation 2.012 section, beginning on page 55-56.

6. **Students with disabilities**
All students with disabilities should notify me immediately at the latest before the beginning of the third week of classes. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.
**Official Statement:** Any student whose disability falls within the American Disabilities Act (ADA) and requires accommodations should contact the Office of Services for Students with Disabilities. The office is located in the Student Service Building Room 204. You may also reach the office by phone at 259-6035.

7. **Policy Statement on Non-Discrimination**
It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

8. **Procedure for Resolving Faculty-Student Conflicts**
- Student first attempts to resolve issue with instructor
- Student submits written statement of problem to Departmental chair
- Chair forwards student statement to instructor
- Instructor responds in writing to chair
- Chair meets with instructor and/or student if necessary
- Chair forwards response/recommendation to Dean’s office
Suggestions and Help for Doing well in CHM 1045

Chemistry is often a challenging subject for most students. It has been my experience that the main source of this difficulty is that most students do not put enough time and effort into the course. As such, I am giving you the following suggestions for how to do well in this course.

- Read the material in **detail** before coming to class. This will make it easier for you to understand the lecture and ask relevant questions.
- Come to class with **specific** questions about material that you don't understand.
- Stay on schedule with the lecture pace. You cannot afford to get behind in this class; we constantly build upon the information previously learned!!!!
- Read each chapter at least **three** times prior to the exam.
- Form study groups with your classmates.
- Do the assigned homework problems well in advance of the exam. This will give you a chance to determine what concepts you need help on
- **Spend at least** 1 hour every day studying chemistry!!!!!
- Work out the problems in the book, work out the problems in the book, work out the problems in the book!!!!!!!!!!!
- **Find a chemistry tutor** if you are having problems, do not wait until it is too late to seek help.
- **Be prepared for each exam at least 2 days in advance. This will allow time for me to give you a one-on-one quiz to determine how well you really understand the material.**
- I strongly encourage you to be prepared for each exam at least two days prior to the scheduled date so that you have time to resolve any questions that you may have.
- **Do not wait until the last minute to study!!!!**
- Last, but not least, work very hard in this course. This is a serious course that requires a lot of your attention. Do not think that you can cram or take shortcuts. IT WILL NOT WORK, TRUST ME.

If you follow these suggestions you should do well in the course. Conversely, if you find that at the end of the semester that you did not do as well as expected, ask yourself if you followed these suggestions.

**Office hours:** During office hours I am available to help you in any way I can. To be most effective, you should bring all work regarding the topic of interest. Please bring failed attempts at problems. I will be figure out your problems and help you. It is of little value to you if you come in and ask me to solve a problem that you have not considered.

**Problem-Solving Sessions:**
Problem-solving sessions will be held outside of class on a routine basis. While attendance at these sessions is optional, I strongly encourage you to take advantage of the opportunity to receive additional help. **Do not wait until you are struggling to request help!!!**

**Tutorial Laboratory**
The Chemistry Department provides tutors in Rm. 223, Jones Hall for any student who is taking CHM 1031, CHM 1045, or CHM 1046 and needs help. The schedule for tutoring sessions is posted at Rm. 223, JH or can be obtained from the Chemistry Department office in Rm 219, JH.